



PAAVAI ENGINEERING COLLEGE

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**Proceedings of 7th International e-Conference on
Adaptive Technologies for Sustainable Growth
(ICATS 2021)**

Proceedings of 7th International e-Conference on Adaptive Technologies for Sustainable Growth (ICATS 2021)

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INDEX

SL.NO	TITLE OF THE ARTICLE	PAGE.NO
1.	ANALYSIS OF AERODYNAMIC PERFORMANCE QUADROTOR UAV	1
2.	CFD ANALYSIS PROPELLER BLADES USED FOR UNMANNED AERIAL VEHICLE AT HIGH ALTITUDES	5
3.	DESIGN AND ANALYSIS OF WING WITH WINGLET AT LOW REYNOLDS NUMBER	9
4.	EXPERIMENTAL INVESTIGATION OF SHOCKWAVE AND BOUNDARY LAYER INTERACTION ON THE EXTERNAL TRANSONIC FLOW OVER AN AIRFOIL	14
5.	POWER, LIFT AND DRAG COEFFICIENTS ANALOGY OF WIND TURBINE BLADE FROM AERODYNAMICS CHARACTERISTICS OF NACA2412 & NACA0012	22
6.	DESIGN AND FABRICATION OF TETHERED DRONE FOR VERSATILE APPLICATIONS	26
7.	ARTIFICIAL INTELLEGEENCE IN AGRICULTURE	36
8.	ARTIFICIAL INTELLIGENCE IN AGRICULTURE-II	41
9.	DATA ANALYSIS IN AGRICULTURE	48
10.	DRONE AGRICULTURE DRONES FOR SMART AGRICULTURE	53
11.	FABRICATION OF ECO-FRIENDLY SEEDLINGS POT TRANSPLANTER	58
12.	IMPLEMENTS OF SOLAR POWER IN AGRICULTURE	65
13.	LITTLE MILLET-BASED INTERCROPPING FOR NUTRIENT SECURITY AMIDST PANDEMICS	69
14.	ORGANIC CULTIVATION OF CHILLI	74
15.	PROTECTED CULTIVATION OF ONION	80
16.	RESEARCH ON SURFACE DEFECT DETECTION ON CARROT	85
17.	TRANSPORT TECHNOLOGY IN AGRICULTURE	91
18.	ECG SIGNAL PROCESSING USING 1D CONVOLUTIONAL NEURAL NETWORKS AND APPLICATIONS: REVIEW	98
19.	MEDICAL INDUSTRY TRENDS THAT PROMOTE THE USE OF OPTICAL MEDICINE FIBER	102
20.	ARTIFICIAL ORGAN AND 3D PRINTING PACEMAKER	106
21.	ARTIFICIAL ORGANS AND 3D PRINTINGS	114
22.	INTERNET OF THINGS IN HEALTHCARE AND MEDICAL SECTOR: APPLICATIONS OF BLOCKCHAINS, CHALLENGES AND FUTURE PERPECTIVES	118
23.	MAXIMO CAMPO VISUAL INSIGHT	122

24.	A REVIEW OPTICS COHERENCE TOMOGRAPHY BASED MEDICAL INSTRUMENT	128
25.	FETAL ODDITY USING ULTRASOUND IMAGE ACQUISITION	133
26.	ELECTRIC THERAPY FOR LESION PALLIAT	141
27.	DIABETES PREDICTION USING MACHINE LEARNING	151
28.	EFFECTS OF ARTIFICIAL INTELLIGENCE IN ILENT COMMUNICATION	156
29.	SYNTHESIS AND CHARACTERIZATION OF SILICA NANOPARTICLES WITH CATHARANTHUSROSEUS EXTRACT ON CORE FOR ANTI-CANCER APPLICATIONS	161
30.	TECHI-HAND	166
31.	SPLICE CONNECTION USING RAILWAY STEEL TRUSS BRIDGES	170
32.	A NOVEL APPROACH FOR FEATURE SELECTION IN BIG DATAUSING MVDE	173
33.	A SMART HEALTHCARE SYSTEM FOR THE IDENTIFICATIONAND MONITORING OF COVID19 UTILIZING THE INTERNETOF THINGS AND CLOUD COMPUTING	176
34.	COMPUTER AIDED DETECTION AND SEGMENTATION OF LUNG TUMOR USING SOFTCOMPUTING TECHNIQUES	183
35.	DATA MINING'S ROLE IN MINING MEDICAL DATASETS FOR DISEASE ASSESSMENTS – A CASE STUDY	190
36.	LARGE-SCALE DATA STORAGE AND PROCESSING SYSTEMS USING FAULTTOLERANT	202
37.	SMART MIRROR BASED ON RASPBERRY PI	219
38.	TOPOLOGY & FLOW CONTROL TECHNIQUES INMULTI-RADIO MULTI- CHANNEL WIRELESS MESH NETWORKS: A SURVEY	224
39.	DEVELOPMENT OF LOW COST AGRICULTURAL TYING HANDLER MACHINE (ATHM)	230
40.	DIABETES PREDICTION USING MACHINE LEARNING	234
41.	LOGO DETECTION USING DEEP LEARNING AND PYTHON	239
42.	MONITORING AND CONTROLLING SOWING SYSTEMS USING INTERNET OF THINGS	242
43.	MUSIC ANNOTATION BASED ON FACIAL EXPRESSION USING HAARCASCADE ALGORITHM	244
44.	VOICE BASED PRESCRIPTION GENERATION USING PYTHON	248
45.	CO-EXTRACTION OF PECTIN AND POLYPHENOL FROM MORUS NIGRA POMACE USING AN ECO-FRIENDLY TECHNIQUE	253

46.	DESIGN OF COMPOSTER AND ANALYSIS OF COMPOST MATERIALS	261
47.	DYE-SENSITIZED BLACKBERRY SOLAR CELL (DSSC)	267
48.	ELECTRO CHEMICAL TREATMENT FOR TEXTILE DYE EFFLUENT	271
49.	INVESTIGATION AND ANALYSIS OF MOSQUITO REPELLENT EXTRACTION FROM NATURAL WASTES	274
50.	PREPARATION OF GINGER OIL FOR OSTEOARTHRITIS PAIN RELIEF	278
51.	SYNTHESIS OF ACETYLATED STARCH NANOPARTICLES FOR FOOD PACKAGING APPLICATION	282
52.	AI-BASED HALTING OF BABY ABDUCTION AND CHILD MINDER BY INTELLIGENT RETRIEVAL	287
53.	AN EFFICIENT LOW POWER ARITHMETIC CIRCUIT USING GDI BASED REVERSIBLE LOGIC	290
54.	AN EMBEDDED BASED SMART SERICULTURE SYSTEM FOR EFFECTIVE GROWTH OF SILKWORMS	296
55.	CHRONICLE ANALYSIS OF VARIOUS UPGRADATIONS CARRIED OUT IN UPCOMING 5G WIRELESS TECHNOLOGY	300
56.	DATA PACKET SIZE OPTIMIZATION IN WIRELESS SENSOR NETWORKS	308
57.	DEEP LEARNING FRAMEWORKS FOR PATIENT HEALTH MONITORING SYSTEM	313
58.	INTELLIGENT ROBOT SYSTEM FOR DISASTER MANAGEMENT	318
59.	AUTOMATIC UPDATION OF ELECTROMAGNETIC BILL AND UNIT CONSUMPTION USING SMART GADGETS	321
60.	MIND WAVE OF COMMAND THE DEVICE USING EEG BASED BLINK TALK METHOD	326
61.	PERFORMANCE ENHANCEMENT IN HYBRID ENERGY STORAGE MICROGRID SYSTEM USING ANIS CONTROLLER	329
62.	3D BRAIN TUMOR CLASSIFICATION USING STACK ENSEMBLE WITH DEEP LEARNING APPROACHES	334
63.	3D FINGER VEIN AND IRIS PATTERN BASED VERIFICATION SYSTEM	341
64.	A NOVEL APPROACH FOR MITIGATING SMALL-PERIOD POWER FLUCTUATIONS IN WIND POWER SYSTEMS USING DIRECT INTEGRATION METHOD	347
65.	A SMART HOME WITH RENEWABLE ENERGY SOURCE AND VEHICLE-TO-GRID FOR GRID	353
66.	ACCIDENT ALERT SYSTEM WITH IOT AND MOBILE APPLICATION	359

67.	ANALYSIS OF POWERSYSTEM STABILITY IN A STANDARD IEEE BUS SYSTEM WITH RENEWABLE ENERGY INTEGRATION	363
68.	AUTOMATIC RAILWAY GATE OPERATING SYSTEM	371
69.	AUTOMATIC RAIN SENSING CAR WIPER	377
70.	COATING DIFFERENT MATERIALS IN DIFFERENT LAYERS WITH THE NATURAL DYE	381
71.	CONVERSION OF CONVENTIONAL BIKE INTO ELECTRICAL BIKE	388
72.	GENERATION OF ELECTRICITY USING HUMAN WALKING PRESSURE IN FLOOR TILES	391
73.	HOMOLOGY MODELING AND STRUCTURAL REFINEMENT OF BANANA BUNCHY TOP VIRUS	394
74.	HYBRID ELECTRIC CYCLE	397
75.	IMPACT OF NANOTECHNOLOGY IN PHARMACEUTICALS	400
76.	LIGHT FIDELITY (LI-FI)	409
77.	LIVER LESSION DETECTION AND CLASSIFICATION IN 3D CT IMAGE USING DNN BASED ON WATERSHED AND GAUSSIAN MIXTURE MODEL	415
78.	SUPERVISORY CONTROL AND MONITORING OF IOT ENABLED OPTIMIZED MPPT IN MASS SOLAR POWER PLANT	419
79.	BIOPLASTIC FROM MUSA ACUMINATE	423
80.	DEVELOPMENT OF EDIBLE COATING FROM SARGASSAM TENERRIMUM AND SARGASSUM CRISTAEOFOLIUM AND ANALYSING THE SHELF LIFE OF FRUITS AND VEGETABLES	428
81.	INVESTIGATION OF SEAWEED-MIXED FRUIT JUICE BY USING EXTRACTION METHOD	433
82.	MULTIFUNCTIONAL EDIBLE STRAW	437
83.	PREPARATION OF HERBAL ICE CREAM USING ALOE BARBADENSIS MILLER AND MINT FLAVOURING	442
84.	PROJECTION OF PEELS(ALLIUM CEPA AND ALLIUM SATIVUM) TO PRESERVATIVES FOR PERISHABLE FRUITS & VEGETABLES	446
85.	THE ELABORATE STUDY ON CYAMOPSIS TETRAGONOLOBA AND THEIR SEVERAL PROPERTIES	451
86.	A DESIGN AND IMPLEMENTATION OF FIRM LEAVE SCHEDULING AND MANAGING APPLICATION BASED ON PHP & MYSQL	457
87.	BLOCKCHAIN'S APPLICABILITY IN IOT FOR MITIGATING DISTRIBUTED DENIAL OF SERVICE ATTACKS	464

88.	CLASSIFICATION OF ADVANCED PERSISTENT THREATS AND ATTACKS DETECTION METHOD IN CLOUD COMPUTING BASED ON AUTOENCODER	475
89.	CLASSIFICATION OF BROAD LEAF WEEDS IN THE PADDY FIELD BASED ON THE DENSITYUSING COMPUTER VISION	481
90.	IMPACT OF MACHINE AND DEEP LEARNING IN DRUG REPURPOSING	486
91.	POWER CONTROL TECHNIQUES IN MULTI-RADIO MULTICHANNEL WIRELESS MESH NETWORKS: A SURVEY	493
92.	PRIVATE CLOUD HOSTING FOR GCEB	499
93.	REAL-TIME FACIAL EXPRESSION AND EMOTION RECOGNITION USING CUSTOMIZED CNN MODEL	505
94.	SECURITY CONCERNS REGARDING MOBILE CLOUD COMPUTING	512
95.	AUTOMATED EXTERNAL NIPAH VIRUS DEFECT DETECTION SYSTEM IN FRUITS USING IMAGE SEGMENTATION	520
96.	FOOD WASTE MANAGEMENT AND DONATION SYSTEM USING WEB APPLICATION	524
97.	IOT BASED SOCIAL DISTANCING AND MONITORING FOR QUEUE	529
98.	SMART MIRROR TV	533
99.	ANALYTICAL CHARACTERIZATION OF SUSTAINABLE BIO- FUEL OBTAINED FROM PYROLYSIS OF WOOD BARKS OF BAEI	536
100.	DESIGN AND ANALYSIS OF AQUA SILENCER	544
101.	DESIGN AND ANALYSIS OF HIGHWAY WIND POWER GENERATION USING WIND TURBINE	548
102.	DESIGN AND SIMULATION OF ELECTROMECHANICAL BRAKE SYSTEM	552
103.	DEVELOPMENT OF SOLAR E-BIKE	560
104.	ELECTRICITY GENERATION BY HOT GASES	564
105.	EMISSION CONTROL ANALYSIS USING BLENDED FUELS	573
106.	EXPERIMENTAL ANALYSIS OF SPUR GEAR NATURAL FIBERS REINFORCED WITH POLYESTER RESIN	587
107.	FABRICATION OF COMPOSITE CONTAINING ALUMINIUM 7075 WITH FLYASH AND E- GLASS FIBER	592
108.	INVESTIGATION OF ALUMINIUM 6061 METAL MATRIX COMPOSITE	597
109.	INVESTIGATION OF ALUMINIUM METAL MATRIX COMPOSITE PREPARED BY SQUEEZE CASTING METHOD	604

110.	INVESTIGATION ON THE PROPERTIES OF NATURAL AND GLASS FIBRE REINFORCED ALUMINIUM LAMINATE COMPOSITES	611
111.	INVESTIGATION ON WEAR RESISTANCE COMPARISON OF COATED AND UNCOATED I.C ENGINE COMPONENT	618
112.	PARAMETRIC REVIEW ON DI CI ENGINE CHARACTERISTICS FUELED WITH TYRE OIL BLENDS	623
113.	PRODUCTIVITY IMPROVEMENT BY OPTIMIZING TOW TRUCK MATERIAL MOVEMENT IN MANUFACTURING PLANT	628
114.	REVIEW OF PARAMETERS INVOLVED IN THE ELECTROCHEMICAL MICROMACHINING PROCESS	631
115.	STUDY THE EFFECT OF PORT FUEL INJECTION OF BIOFUEL IN A DI DIESEL ENGINE	635
116.	AQUATIC DETECTION AND RESEARCH TECHNOLOGY	645
117.	AUTOMATIC PURCHASING TROLLEY SYSTEM	647
118.	COAL MINE SAFETY MONITORING AND ALERTING SYSTEM USING IOT BASED	650
119.	CREATURE'S REVERT SYSTEM FOR RANCH	653
120.	DROWSINESS DETECTION IN AUTOMOTIVE VEHICLES	657
121.	ELECTRICAL ENERGY STORAGE USING LIGHT SOURCE	660
122.	INTELLIGENT WATER LEAKAGE CONTROLLER USING RASPBERRY PI	663
123.	IOT BASED AGRICULTURE MONITORING AND SMART IRRIGATION SYSTEM USING CLOUD SERVER	666
124.	SPIDER BOT USING RADAR MECHANISM	669
125.	WOMEN SAFETY DRONE	672
126.	DEVELOPMENT AND VALIDATION OF MULTICOMPONENT TRANSDERMAL PATCHES	676
127.	EXTRACTION AND CHARACTERIZATION OF BIOACTIVE COMPOUNDS FROM THE DALBERGIA LATIFOLIA LEAF EXTRACT	682
128.	FORMULATION AND IN-VITRO EVALUATION OF POLYMERIC NANOPARTICLES OF ANTI-EMETIC DRUG PROCHLORPERAZINE	687
129.	FORMULATION AND IN-VITRO EVALUATION OF OSMATIC DRUG DELIVERY SYSTEM OF ACEBUTOLOL	692
130.	FORMULATION OF MEDICATED CHEWING GUM WITH SIMVASTATIN FOR HYPERLIPIDAEMIA	696
131.	INSILICO INVESTIGATION OF ANTI-BIOFILM ACTIVITY OF CYMBOPOGAN CITRATUS EXTRACT AGAINST METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS	701

132.	IN-VITRO STUDY OF RHIZOME ALPINIA CALCARATA IN LUNG CANCER CELL LINES	707
133.	PREPARATION OF DETOXIFYING AND SKIN WHITENING FACE CREAM	710
134.	STUDY OF PROPHYLACTIC POTENTIALS OF PROBIOTIC BACTERIA IN FISH MODEL	715
135.	A STUDY ON AGE ASSORTMENT AMONG FACULTIES TOWARDS EMPLOYEE PERFORMANCE IN ENGINEERING COLLEGE, NAMAKKAL DISTRICT, TAMILNADU.	719
136.	A STUDY ON JOB STRESS OF RAILWAY EMPLOYEES WITH SPECIAL REFERENCE TO ERODE DISTRICT	728
137.	AN EXPERIMENTAL STUDY ON FLEXURAL BEHAVIOUR OF FIBER REINFORCED GEOPOLYMER CONCRETE SLABS	733
138.	DEVELOPMENT OF LIGHT WEIGHT AND LIGHT TRANSMITTING CONCRETE USING WASTE SCRAP MATERIALS	737
139.	AN EXPERIMENTAL INVESTIGATION ON SELF HEALING OF HIGH PERFORMANCE CONCRETE	741
140.	PERFORMANCE ANALYSIS OF THE FIBROUS PERVIOUS CONCRETE BY THE PARTIAL REPLACEMENT OF CEMENT WITH SILICA FUME	745
141.	EXPERIMENTAL STUDY ON CONCRETE WITH ADDITION OF POLYPROPYLENE FIBER	748
142.	EXPERIMENTAL INVESTIGATION ON SIGNIFICANCE OF ENERGY EFFICIENT MATERIALS IN ENHANCING COMPRESSIVE STRENGTH PROPERTY OF CONCRETE	754
143.	EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF MS SAND BY CERAMIC WASTE & COARSE AGGREGATE BY E-WASTE IN CONCRETE	763
144.	EXPERIMENTAL STUDY ON HYBRID FIBER CONCRETE	765
145.	STUDY OF GROUNDWATER QUALITY IN INDUSTRIAL AREA USING GIS	771
146.	SPLICE CONNECTION USING RAILWAY STEEL TRUSS BRIDGES	776
147.	EXPERIMENTAL STUDY OF CONCRETE MADE WITH GRANITE AND IRON POWDERS AS PARTIAL REPLACEMENT OF SAND	779
148.	SUSTAINABLE ORGANIC BIOMASS BY USING DYEING BIOLOGICAL SLUDGE AND COIR PITH	784
149.	EXPERIMENTAL STUDY ON BEHAVIOUR OF STEEL FIBER REINFORCED CONCRETE	789
150.	EXPERIMENTAL INVESTIGATION ON BEHAVIOUR OF FOAMED CONCRETE	795

151.	EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE	798
152.	EXPERIMENTAL STUDY ON STRENGTH PROPERTIES OF PERVIOUS RIGID PAVEMENT	804
153.	EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE	809
154.	DUPLICATE SIGNATURE VERIFICATION USING DEEP LEARNING ALGORITHM	814
155.	FORMULATION AND DEVELOPMENT OF INSTANT MIX PRODUCT BY USING TURKEY BERRY POWDER	824

Analysis of Aerodynamic Performance Quadrotor UAV

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Abstract: The mobility of the UAV quad rotor is significantly affected by its aerodynamics, especially when the narrow rotors are separated in a multi-rotor system. This article deals with the aerodynamic modeling of a non-flat quadrilateral UAV with different rotor distances (1 d - 2 d) and disc planes (0-50 °). This article also recommends interference between rotors and power models. CFD analyzes were performed to validate the non-plan model. The results obtained show that the flow area of a non-flat quadrant is very complex in terms of uncertain flow. Partial angle of attack and pulsation of pressure distribution occur as the blade passes through the vortex. The thrust increases significantly with the angle of inclination due to the higher power of the non-flat rotors, which also results in more power. However, the increase in thrust is less pronounced if the distance is greater than 1.4d.

Keywords: quadrotors; aerodynamic configuration; numerical simulation; hover; aerodynamic interference; non-planar model.

I. INTRODUCTION

The quadrotor has a wide range of applications in both military and civilian applications due to its ability to adapt to all types of flight conditions. For a traditional planar quadrotor UAV, rotors are rotating in the same plane with four degrees of freedom. When rotors are tilting an angle around the axis of the rotor arm, this kind of non-planar quadrotor UAV obtains the six degrees of freedom. For example, the horizontal movement needs the change in the attitude. In addition, the rotational speeds of the four rotors are the only four independent control inputs, which do not allow independent control of position.

[1–8]. Therefore, inspired by the tilt angle of the rotor, a non-planar quadrotor structure with a more controlled advantage has been developed in last 5 years [2]. The non-planar quadrotor has additional actuation freedom which allows complete control of the position and orientation of the quadrotor, making it virtually a fully actuated aircraft. Considering that the non-planar design provides a total of 6 degrees of freedom of maneuverability, the maneuverability will be an important feature of many future applications of UAVs, especially those involving interaction/manipulation in a complex environment.

However, most of the research conducted for quadrotor has focused on attitude control and trajectory tracking. Salih and Li, et al., used a PID controller-stabilized quadrotor in simulation and actual flight experiments [9–11]. Also, in [12,13], the reverse thrust and sliding mode methods have been utilized to control the quadrotor tracking trajectory. Markus and Efraim, et al., modeled the dynamic additional aerodynamic effects for non-planar quadcopter airplanes and proposed a nonlinear path-following controller based on dynamic feedback linearization technology [2,6]. The literature shows that the aerodynamic model of quadrotor has been oversimplified in most studies. Therefore, the accuracy of the aerodynamic model needs to be improvised [14]. Turpin, et al., observed that the error of the quadrotor model increased the error of the desired trajectory [15]. The Stanford University STARMAC project team applied the blade flap and thrust changes to the model in high-speed forward flight [16]. The control effect has been significantly improved but the aerodynamic

model is still simplified.

These preliminary results are advantageous to understand the flow field of the quadrotor. However, there is no research focusing on the flow field around the non-planar quadrotor and its aerodynamic characteristics. Besides, an oversimplified model is not suitable for describing the unique aerodynamic characteristics. Above all, it is necessary to study the aerodynamic characteristics of the non-planar rotors with different spacing and tilt angle.

II. AERODYNAMICS OF THE QUADROTOR

Considering there is a tilt angle of each rotor, the inflow and the downwash of the non-planar quadrotor are totally different from the traditional planar quadrotor. The flow field is more concentrated with stronger interference. Therefore, the aerodynamic characteristics of an isolated rotor under generalized motion are analyzed by momentum theory and blade element theory. Figure 1 shows the structure of non-planar quadrotor.

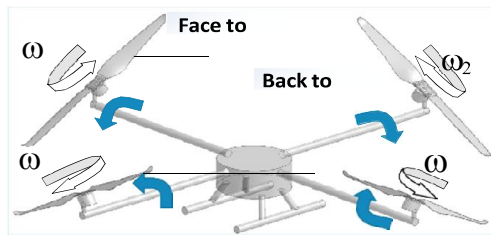


Figure 1. Schematic diagram of the non-planar quadrotor structure.

In the Figure 1, the tilt angle is the rotation angle around the support arm, and the spacing l is the distance between centers of adjacent rotor. For the non-planar rotors with different configuration, take 30-1.5 for example, it indicates that the rotor is rotated 30 deg around the support arm and the adjacent rotor center distance is 1.5 d (d is the rotor diameter).

III. COMPUTATIONAL-FLUID-DYNAMICS ANALYSIS

Motions of the quadrotor depend on the variable speed of each rotor, which makes the aerodynamic performance design more challenging. It is also necessary to consider other factors such as the balance of the moment, and the stability of the crosswind. Moreover, the aerodynamic interference between the rotors is complex, and it is difficult to analyze the aerodynamic performance through flight test or wind tunnel test only. Therefore, the CFD simulation is our best choice to optimize the performance with a large number of combinations.

In order to study the mutual interaction between the rotors, various combinations with different spacing ($1d-2d$) and tilt angle ($0-50$ deg) are numerically simulated with ANSYS. The N-S equation model is applied to analyze the characteristics of the external flow field. Also, mesh refinement is performed on four rotor regions with a large gradient of physical field flow. According to the airfoil geometry, the Reynolds number is approximately 1.1×10^5 , so the fluid is treated as incompressible. Additionally, the finite volume method is used to discrete the differential equations. Considering the low Reynolds number environment, the Spalart-Allmaras model is selected to obtain the flow field of the non-planar rotor pairs. The pressure correction is performed using the Semi-Implicit Method for Pressure Linked Equations (SIMPLE) algorithm, and the pressure interpolation is selected in the standard format. Momentum, energy equation, and turbulent viscosity are all in the first-order upwind discrete format for the initial simulation, then the second-order upwind is applied in the final simulations. The rotor speed is set at 2200 rpm. At last, the sliding grid is used to deal with the interaction between the rotating and the stationary regions, and then the steady state calculation result of the Multiple Reference Frame (MRF) method is applied as the initial condition for the slip mesh transient calculation. The mesh distribution is showed in Figure 2.

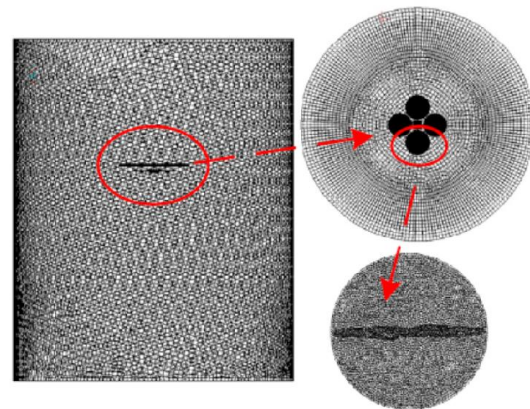


Figure 2. Mesh distribution.

3.1 CFD Simulations for the Isolated Single Rotor

The steady state calculation obtained by the MRF method is used as the initial value and the thrust value shows a stable periodicity after 1.5 turns of the isolated rotor. Therefore, the average thrust during the stabilization period is taken as the exact value of the rotor. Figure 3 shows the thrust variation of the isolated rotor with azimuth angle at 2200 rpm.

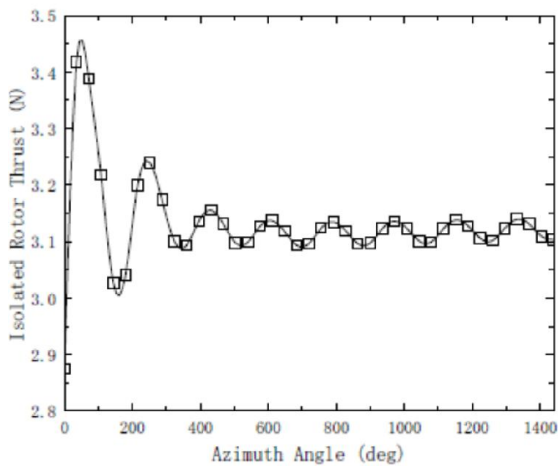


Figure 3. Thrust variation of the isolated rotor.

3.2 Simulation Results of Non-Planar Quadrotor

Figure 4 shows the pressure and the velocity contours of the planar quadrotor on the vertical plane with rotor spacing of 1.05 d.

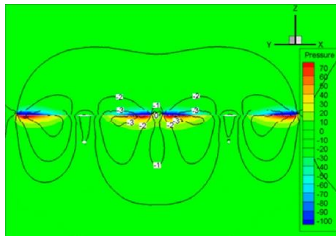


Figure 4. The pressure and velocity contours of the planar quadrotor with rotor spacing of 1.05 d.

It can be seen that with small spacing, the inter-rotor interference is obvious, and the high-pressure areas are overlapped and reduced. Obviously, the wakes between the rotors are attracted to each other, which reduce the flow velocity and cause the pressure difference between the upper and lower surfaces on the adjacent rotors. These results are consistent with the analysis of the twin-rotor interference wake [10].

Figure 4 shows the velocity distribution on the vertical plane of non-planar quadrotors.

It can be seen that the rotor is affected by the left-facing rotor, and the tilt angle causes a large change in the flow field below the rotor. The flow field distributions of 10 and 50 deg at $l/d = 1.1$ are different from each other. Obviously, the inflow is stronger at 50 deg which is mainly affected by the left-facing rotor. Therefore, the high-speed airflow distribution area above the adjacent blades tip is relatively large, which not only reduces the pressure in the negative pressure region but also increases the inflow, thereby increasing the thrust. According to the momentum blade element theory under the generalized motion of the rotor, the wake moves in the opposite direction with respect to the airflow,

this may lead the incensement of thrust. The thrust is increased again because χ_{mn} is less than 0, and finally the actual induced speed is increased. Moreover, the flow field distributions of 10 and 50 deg with $l = 2d$ show the same trend, but the interference is much weaker than that with $l = 1.1d$. However, a large spacing may still increase the rotor thrust. Figure 5 shows the different velocity vector distribution of the traditional planar rotors and non-planar rotors.

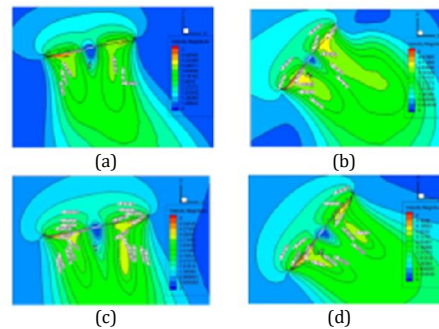


Figure 5. The velocity distribution contours of typical non-planar configuration: (a) 10-1.1; (b) 50-1.1; (c) 10-2; (d) 50-2.

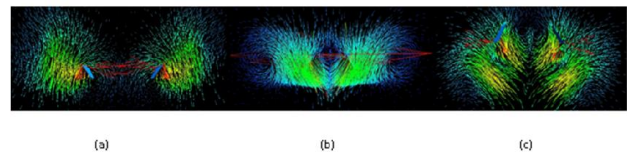


Figure 6. Velocity vector distribution of planar rotors and non-planar rotors: (a) traditional planar rotors; (b) back-to-back non-planar rotors; (c) face-to-face non-planar rotors.

As showed in the figure, the downwash of the back-to-back rotors are flushed together and the inflow is limited, while the outflow of both rotor pairs is increased. Since the two vortices are diffused and reformed under the blade, the interaction of the lower blade surface is much more intense with the airflow.

CONCLUSIONS

In this paper, an aerodynamic model of non-planar quadrotor considering the mutual interference is established. The simulation of an isolated single rotor and non-planar quadrotor along with the experiments demonstrate that the proposed model is able to better explain the unique aerodynamic interference of non-planar quadrotor. The conclusions of this paper are as follows:

- (1) The non-planar quadrotor rotor thrust will

increase by 5–6% compared to the isolated rotor without interference. The tilt angle increased the actual induced velocity and outflow to increase the thrust of rotor;

- (2) The thrust becomes stable when the spacing is larger 1.4 d and the power is also significantly affected by the high-intensity vortex attached to the surface of the rotor and the tip vortex;
- (3) The flow field of the non-planar quadrotor is extremely complex, mainly based on unsteady flow caused by the intense outflow. There is a large pressure gradient in the vortex due to the periodic unsteady airflow pulsation generated by the rotor itself and the wake diffusion. Each vortex is a distorted sub-zone that causes the pressure distribution pulsations;
- (4) Power consumption of the non-planar quadrotor increases with the thrust which will cause a substantially balanced power loading. Moreover, the power loading of the non-planar quadrotor is less than the isolated rotors showed a better performance compared with the traditional planar rotors;
- (5) The unique aerodynamic performance of the non-planar quadrotor is significantly improved at a larger tilt angle with smaller spacing where the tip vortex is relatively strong, which is beneficial to optimize the multi-rotor system for the further studies.

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CFD Analysis Propeller Blades Used For Unmanned Aerial Vehicle At High Altitudes

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Abstract: *The unmanned aerial vehicles available are not good enough for search and rescue flights at high altitudes. This is because the higher the altitude, the lower the air density which affects the formation of the UAV. The aim of this work is to design a shock-absorbing vane for an altitude range of 3,000–5,000 m with an air density of 0.7364 kg/m³ in the same order and to perform a stress analysis. The lightweight properties of 1,060 aluminum were selected for designing and testing blades. The mathematician, designed for an altitude of 3000-5,000 m, faces a total load of 6.0 MPa, which is at 70% of the blade tension. This load is within the aluminum strength limit, 28 MPa. CFD analysis was carried out at ANSYS CFX which gave a rated load of 2.27 N for the same conditions.*

Keywords: *UAV, Propeller blades, CFD Analysis, High Altitude vehicles, ANSYS.*

I. INTRODUCTION

Unmanned Aerial Vehicles (UAVs) have seen rapid development in recent years. Impressive successes have been achieved through the use of UAVs in the civil and military sectors, for example in aerial photography, surveillance, remote sensing,

Agricultural surveillance and fire control. Numerous institutes have been actively involved in the search for possible applications for drones. These drones range from large [1, 2] to mini (start,) [3, 4] to micro-UAV (takeoff weight 5 kg, height 250 m) [5]. The High Altitude High Endurance (HALE) drone (17-25 km) [6] has attracted increasing interest in recent years. The height and mass of the payload have a great influence on the size and design of drones [7]. Helios (73 m wingspan), developed by NASA and UAS, rose to more than 29 km altitude [6]. Unfortunately, Helios was destroyed during the flight test on June 26, 2003 due to turbulence and structural failures [8]. Also, the Zephyr (wingspan 25 m, weight 75 kg) designed and built by the British company QinetiQ holds the official world endurance record of 14 days, 22 minutes, 8 seconds without refueling [9].

Conventional wings such as NACA wings have been designed to operate with high Reynolds numbers [10]. Therefore, to obtain optimal aerodynamic properties, the aerodynamic profile with a low Reynolds number should be used for drones [11]. Some low Reynolds number wings ($Re < 300.00$) are designed for a maximum lift and drag ratio. [12, 13] such as A18, S6062, SD7032 and BW-3 [14]. The S1223 profile is better suited to low speeds and a high lift / drag ratio (, at Re 50,000 and 3.25° AOA) [15, 16].

Therefore, the main objective here is to design and test the fixed pitch propeller of the unmanned search and rescue aircraft to obtain the maximum thrust.

The assumptions are as follows:

- (i) Fixed pitch blade
- (ii) the chord (b) is given by equation(4).
- (iii) The radius of the blades is 0.15m.
- (iv) Two numbers of sheets
- (v) Variations in angle of attack do not affect efficiency.
- (vi) The chosen profile S1223 is an efficient design for higher heights.

II. EXPERIMENTATION

A. Blade Element Theory

The single wing element theory is the most widely used propeller theory. In this theory, the sheet is divided into several parts. The total thrust of the propeller with several blades is given by equation (1). Likewise, the torque is given by equation (2), where are the number of blades, the density of the air, the speed, the chord, the radius of the blade and the lift coefficient. The efficiency results from equation (3). Figure 1 shows the velocity

vectordiagram with blade reactions.

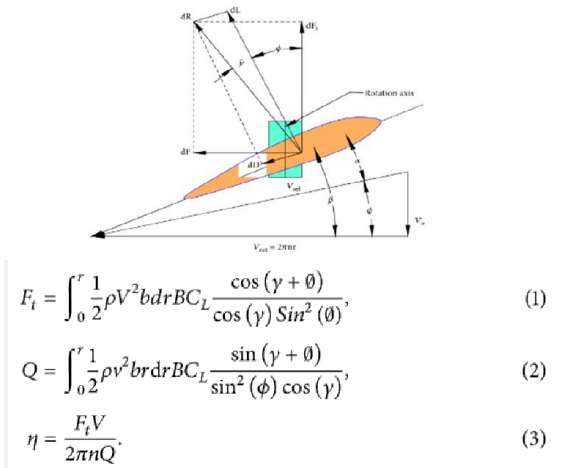


Figure 1: Velocity vector diagram with reaction in the blade

The end of the propeller with the highest relative velocity is assumed not to exceed the speed of sound; Thus, the whole place does not exceed the speed of sound. From equation (3) it can be clearly seen that an increase in free flow velocity contributes to higher efficiency.

B. Modelling

The design model is a linear, self-explanatory type, in which the inputs for calculating thrust and other forces are solved by known input parameters, such as density and height of the ground. It is time dependent and the approach is deterministic. The thrust calculation was based on equation (1); the other parameters assumed are the density of the air at 4000 m is 0.8194 kg / m³, the number of wings is 2, and for AOA it is 1.35 and 0.05, 33000, the radius of the wing is 0.15 m and the chord is given by the equation (4) . The propeller is used with a limit of 0-4000 rpm, while some analysis has been done for the factor of safety up to 5000 rpm.

The three different blades designed for the same thrust (3.35 N) are shown in Figure 2. If the blade is used with the same thrust generation of 3.35 N at sea level, the required radius is reduced to 134 mm. Also, the blade is used at a height of 8000m for the same thrust performance as the required radius is increased to 167mm. Next, the spot used for an altitude of 4000 m was analyzed at different free flow velocities; H. 10 m / s, 50 m / s, 100 m / s (shown in figure 5). With higher air velocity, a higher vortex angle was needed. The blade designed for an altitude of 4000 m and a speed of 10 m / s is selected for analysis. Engineered blade has 7.1mm thick root and 1.5mm fine point..

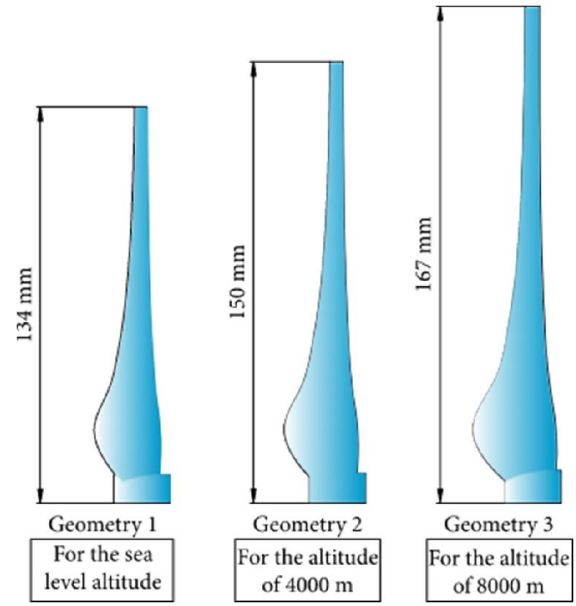


Figure 2: The geometry of blade for 3 different altitudes for the same thrust generation 3.35 N.

III. CFD Analysis

A. Computational Model

The calculation area is divided into two parts (Figure 3). The stationary zone occupies 10 times the diameter of the propeller upstream and downstream. The diameter in the span direction is 10 times larger. The inlet, outlet, and exterior of the propeller are fixed. The cylindrical rotating domain has a diameter of 400 mm and a height of 400 mm. Figure 13 shows individual meshes for stationary and rotating areas with the propeller blade. Figure 14 shows the mesh independence test. Three different lattice structures were used to ensure the independence of the results at a propeller speed of 2,679 rpm. The number of coarse meshes is 0.39 million; the network used (fine network) consists of 0.42 million cells. The maximum difference between fine and coarse tissue is only 0.26% for the thrust generated. This means that the results are not influenced by the network used. Therefore, the fine mesh is used in the CFD simulation of the designed propeller.

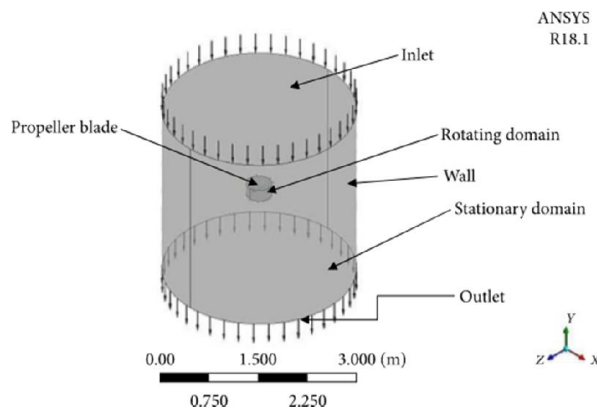


Figure 3: Computational domain and boundary conditions.

B. Computational Method

The propeller flow field is stationary under the rotational coordinate system. ANSYS CFX Turbo mode is used to solve the problem. The Reynolds-averaged Navier-Stokes equations are considered the determining equations. The finite volume method with the pressure-based solver is used to discretize the governing equations. The second order (high resolution) upstream is used for the advection scheme. Pérez et al. performed quadrotor propeller CFD and found that the kw and Spalart Allmaras turbulence models overestimated both thrust and torque compared to experimental flight test results. To simulate turbulence, the standard k-e model is used, which requires the flow to be completely turbulent. Convergence is also ensured by controlling residual value below it. The propeller flow which requires the flow to be completely turbulent. Convergence is also ensured by controlling residual value below it.

C. Boundary Conditions

All boundary conditions apply based on experience at 1400 m. The flowing liquid is considered air at 20 °C and the flow rate is constant. The boundary conditions are presented in Table 2, which are the assumptions based on the work of previous authors [15].

Inlet boundary conditions

Inlet type	Velocity inlet
Velocity	1 m/s

Wall boundary conditions

Wall motion	Stationary wall
Shear condition	No slip
Outlet boundary conditions	
Outlet type	Pressure outlet
Gauge pressure	0 Pa
Solution method	
Scheme	Second-order upwind
Properties of flowing fluid	
Fluid	Air at 20 °C
Density	1.07 kg/m ³

Table 1 Boundary conditions

RESULTS AND DISCUSSIONS

The results obtained from the analytical values and the experimental and numerical values were compared. The experimental value gave a thrust of 0.92 N at 2679 rpm. The corresponding value from the analytical calculations was 1.7 N. CFD analysis gave the corresponding value of 2.27 N at 2,679 rpm. The shovel has been developed for an altitude range of 3000 to 5000 m, which is suitable for search and rescue operations at high altitudes. The blade could not be tested at high altitudes, but test results with CFD analysis show that it can be used for rescue operations at high altitude.

V.conclusion

Here are the conclusions that can be drawn from this research.

(i) CFD thrust analysis showed a thrust generation of 2.27 N for an altitude of 1400 m with a rotational speed of 2679 rpm. The experimental thrust of 0.92N was predicted less accurately by CFD. Previous literature has shown that the error between CFDs and experience ranged from 14 to 24%. Therefore, further research is suggested to reduce the differences in results. (ii) The total stress to which the blade is subjected is 6 MPa, which represents approximately 70% of the span without danger to the blade compared to an aluminum yield strength of 28 MPa (iii) The test of Thrust performance showed thrust generation of 0.92 N at 2679 rpm. The analytical value based on the test conditions for 2679 rpm would be 1.7 N. This represents 45% of the test result.

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Design and Analysis of Wing With Winglet At Low Reynolds Number

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Abstract: *In the world so many aircrafts are flying in the sky which was designed by the good design engineer who's know the fundamentals of the aircraft. On the concede of newton third law "For every action there is an equal and opposite reaction" from this, for every force are act as a twin. From above the statement wherever the forward(thrust) force occurs there is equal or lessbackward(drag)force are formed. When designing an airplane, one of the major challenges is drag. When designing an airplane, one of the major challenges is drag. We choose to reduce one of the main drag is the life induced drag for our project, which is set up by the pressure difference that occurs on either side of the wing tip of the aircraft. The bottom surface of the wing has a high-pressure region and the top surface of the wing have a low-pressure region, so due to this pressure difference, in the bottom of high pressure is taxing to move to the low-pressure region to stabilize the imbalance of the pressure. During the pass on the high-pressureregion to low-pressure region is in the shape like circle, so the continuation of this process it creates a vortex. Because of this vortex the downwash will formed and interact with the neighbour relativestream line flow of air so relative stream will be deflected. Due to this vortex and downwash the performance of the aircraft will is reduce and the fuel consumption is increase to create a thrust for moving the aircraft forward. But we can't avoid the this drags fully so we can reduce the impactof this drag in the way of transpose the cant angle of the winglet to get a better performance for the aircraft.*

Keywords—*Aerodynamic performance, Cant Angle, Lift Induced drag, Low ReynoldsNumber, winglet*

I. INTRODUCTION

Regulatory civil aviation agencies are pushing aircraft manufacturers and operators to improve aircraft efficiency by reducing fuel consumption, cutting carbon dioxide CO₂ and nitrogenoxide NO_x emissions, and lowering the perceived external noise. One way to help achieve this goal is by using improved and innovative technologies targeting drag reduction, specifically, lift induced drag reduction. The drag breakdown of a typical transport aircraft shows that emissions and an 8% reduction in NO_x emissions. They also increase the aftermarket value of the aircraft and add more aesthetics to the aircraft design. Winglets are among the most widely used fuel saving and performance enhancing technologies in aviation today. Wing tip vortex flow causes a drag force called induced drag force. Induced drag is typically defined as part of the pressure drag caused by lift effects.. Induced drag is created due to lift force on a finite wing. For a wing to produce the lift force, the pressure of the lower surface must be greater than the upper one so that a circulation of air from the surface of high pressure of the top is created. In other words, comparing with the infinite wingin this case there is a flow in the direction of wing span. . Due to the collision of these two opposing flows, a swirling flow is created and is clearly centred on two wingtip vortices. Some energy is used to create these vortices; This loss of energy from the wing to the air is called induced drag.

II. METHODOLOGY

This chapter will discuss about the flow of this Final Year Project from the beginning until finish this project. The flow chart is very important to illustrate the sequence of operations to finish the job. The flow chart is usually drawn in the early stages. It will guide to finish the works. Meanwhile, the Gantt chart shows how the project is planned and it is instantly seen if the project is behind or ahead of schedule. The function of the Gantt chart is to guide you in the direction of the project plan. So these two charts are very important to guide us to finish the projects. Moreover, in this chapter also will discuss about the concept generation. There were four design of product. Then list the advantages and disadvantages of each of the product designs. After that, proceed to finalize concept. This final concept is choosing the good of the four designs. The best product will go on to another step, which is the manufacturing process. Before that, the material selection is needed to do. This is to select the proper material to use. The selection of the material is also followed by the function of the product.

III. FLOWCHART

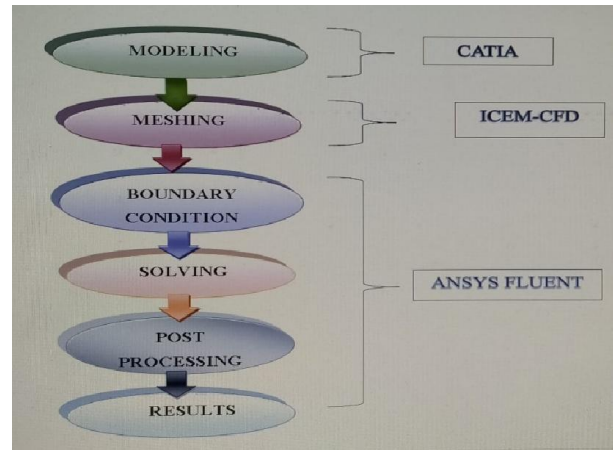
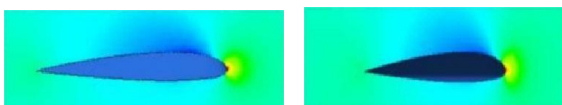
The flow chart is very important to illustrate the sequence of operations to finish the job. It uses symbol to represent of a process. Each of the process steps is represented by a different symbol and contains a brief description of the process step. The top of the flowchart will begin with start. Then it followed by literature review. In this step the current method will be discussed and then the literature will be reviewed. In this step the current use of the method will be discussed. That is collecting using the hand, with shovel and basket and rake. Apart from that, there is list of advantage and disadvantage of each method. In doing so, know which one is efficient and which one takes a short time to collect.

IV. MODEL

CATIA (computer-aided three-dimensional interactive application) is a multi-platform software suite for computer-aided design (CAD), computer-aided manufacturing (CAM), computer-aided engineering (CAE), PLM and 3D, developed by the French company Dassault Systems.

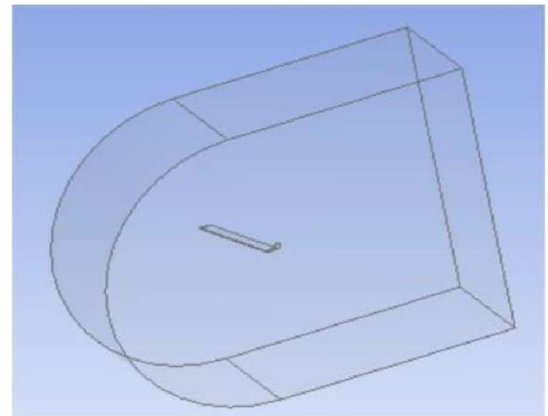
MESHING AND PRE-PROCESSING

Meshing is a part of the engineering simulation form where complex geometries and models are divided into simple elements that can be used as discrete local approximations of the larger domain



COMPUTATION FLUID DYNAMICS

Computational fluid dynamics (CFD) is an engineering tool used to simulate the action of thermofluids in a system.



BOUNDARY CONDITIONS

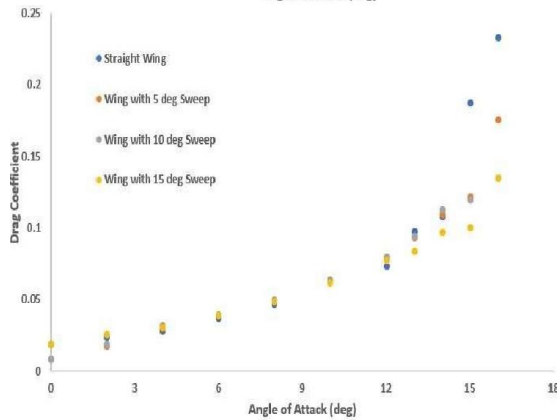
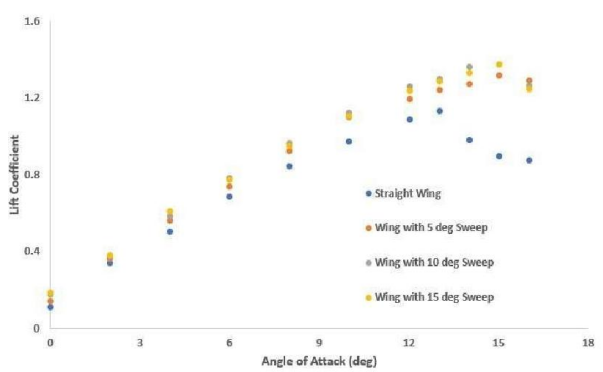
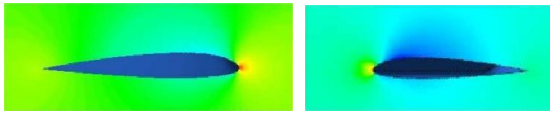
In ANSYS FLUENT, the wing with winglet model has been extended with a y^+ -insensitive wall treatment (Enhanced Wall Treatment), which allows the application of the model independent of the near wall y^+ resolution.

RESULT AND DISSCUSSION

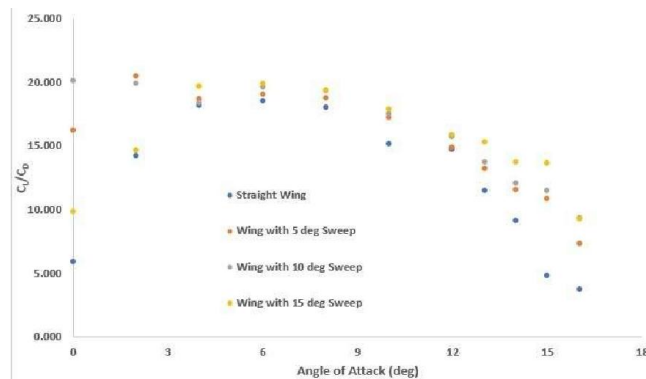
The purpose of the whole study is to examine the aerodynamic efficiency of the wing winglet for the different sweepback angle of the winglet. This is envisaged by studying the variation of lift coefficient and drag coefficient for different angle attack of the wing.

Illustration of Pressure contour over a plane of wing

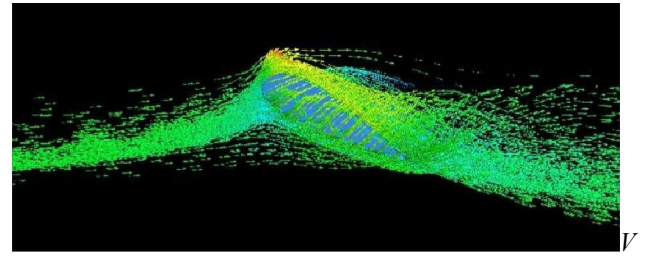
Lift co-efficient VS Angle of attack



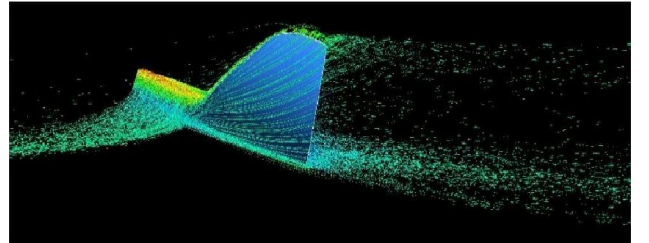
Drag co-efficient VS Angle of attack



CL/CD VS Angle of Attack



vortex on Straight wing



Vortex on sweep 5°

GOVERNING EQUATIONS

The Navier-Stokes equation for the compressible, viscous flow is numerically solved for the analysis of hypersonic flow in the three ramp inlets. The differential form of the Navier-stokes equation is given below as continuity, momentum, and energy equation

Continuity equation

$$\frac{\partial \rho}{\partial t} + \frac{\partial (\rho u_k)}{\partial x_k} = 0 \quad k=1,2,3$$

Momentum equation

$$\frac{\partial (\rho u_i)}{\partial t} + \frac{\partial (\rho u_i u_k)}{\partial x_k} + \frac{\partial p}{\partial x_i} = \frac{\partial (\tau_{ik})}{\partial x_i}, k = 1, 2, 3$$

where ρ - Density

U_i - Velocity components,

p - Pressure

Turbulent shear stress is defined as

$$\tau_{ik} = \mu \left(\frac{\partial u_i}{\partial x_k} + \frac{\partial u_k}{\partial x_i} \right)$$

$\mu = \mu_l + \mu_t$ is the total viscosity;

μ_l - Laminar viscosity

μ_t - Turbulent viscosity

Laminar viscosity (μ_l) is calculated from Sutherland law as

$$\mu_l = \mu_{ref} \left(\frac{T}{T_{ref}} \right)^{\frac{3}{2}} \left(\frac{T_{ref} + S}{T + S} \right)$$

Where T is the temperature and μ_{ref} , T_{ref} and S have known coefficients.

In eddy viscosity models, the stress tensor is expressed as a function of turbulent viscosity (μ_t). Based on dimensional analysis, few variables (k , ε , ω) is defined as given below,

Turbulent kinetic energy k ,

$$k = \overline{u'u'}/2$$

7 7

Turbulent dissipation rate ε ,

$$\varepsilon = \nu \frac{\partial^2 \overline{u'u'}}{\partial x_j^2} = \nu \left(\frac{\partial^2 \overline{u'u'}}{\partial x_1^2} + \frac{\partial^2 \overline{u'u'}}{\partial x_2^2} + \frac{\partial^2 \overline{u'u'}}{\partial x_3^2} \right)$$

Specific dissipation rate ω ,

$$\omega = \varepsilon/k$$

The turbulent viscosity μ_t is calculated.

The heat flux q_k is calculated.

λ is the thermal conductivity.

Turbulent kinetic energy is (k)

Specific dissipation rate (ω)

k- ω Turbulence Model

The turbulent viscosity is calculated as a function of k and ω

G_k , Y_k , Γ_k and G_ω , Y_ω , Γ_ω are the production, dissipation and diffusion terms of the k and ω equations respectively

DISCUSSION

When comparing the 5° cant sweep, 10° cant sweep, 15° cant sweep. Each of them has a different airflow over the wing with winglet according to their sweep angle of the winglet. 5° cant sweep winglet has a low vortex when compared to 10° cant sweep and 15° cant sweep. The 10° cant sweep winglet has a medium vortex when compared to 15° cant sweep angles. The graph is plotted according to their values. From the graph and after the brief discussion we conclude the 5° of cant sweep angle winglet has a low vortex and less induced drag.

CONCLUSION

The results of this study shows that use winglet can improve the performance of the wing even with the addition of winglets will increase the drag line with increasing angle of attack. But with the addition of winglets, the performance can be improved better than plain wing. Winglet led to the formation of tip vortices can be reduced significantly. After the analyzing of three different angle of wing with winglet we conclude the sweep angle of 5° of winglet have a low drag because CL/CD maximum when compared to others. So, the fuel efficiency, lift induced drag and the vortex are low in the 5°-sweep angle.

The WCSA-45-40 has the highest lift-to-drag ratio, CL/CD by about 10.5 to 13% along the angle of attack more than wing without winglet. This is followed by WCSA-45-20 which is the second highest lift-to-drag ratio, CL/CD by about 8.7 to 11.5% along angle of attack more than the wing without winglet. The WCSA-45-00 gives the third lowest lift-to-drag ratio, CL/CD about 8.5 to 10% with angle of attack more than wing without winglet.

From a numerical study, it was found that the use of winglet can produce some flow characteristics, namely:

- With increasing angle of attack will increase the wingtip vortices and drag coefficient
 - Wing with the addition of winglet produce CL/CD higher than plain wing.
- Winglet used most effectively at a high angle of attack

To produce CL/CD is high then the necessary pressure on the lower surface is much higher than the upper surface. Forward wingtip fence produces CL/CD better than the rearward wingtip fence for forward wingtip fence enlarge the effective area of the formation so that the lift can be improved

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Experimental Investigation Of Shockwave And Boundary Layer Interaction On The External Transonic Flow Over An Airfoil

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Abstract. Shockwave and boundary layer interaction has significant influence on both the internal and external flow over the solid surfaces. Out of all other fluid flow situations, one such flow situation, i.e., the flow over the wing in transonic flow regime has determinantal effect on the drag produced by that body. A numerical simulation has been carried out by solving RANS equation with turbulence model using commercial CFD package. Analysis of fluid flow behavior has been performed for two freestream Mach No. 0.5 and 0.7 by extracting spatial variation of fluid flow parameters for the entire flow field over the airfoil and also extracting the fluid flow parameters on the surface of the of the airfoil. In the transonic regime, the critical Mach number have been achieved by the normal NACA 2412 airfoil while flow velocity over the body increases. After critical Mach No, while increasing the flow velocity further, there is a shock wave formation on the airfoil due to the supersonic conditions achieved on the surfaces. This shock waves impinges on the boundary layer present over an airfoil and this interaction results in a complex fluid flow. Because of this interaction, the turbulent intensity and skin friction coefficient increase on the surface of the airfoil due to the turbulent fluid flow structure after the interaction point.

Keywords :CFD, Transonic flow, Airfoil, Shockwave and Boundary layer Interactions, Critical Mach Number, Mesh analysis.

I. INTRODUCTION

Now a days, The performance of the aircraft is improved in lot of areas in the aircraft components like wing, engine, etc. but the aircraft manufacturers have some trouble in the area of Shockwave and Boundary layer interaction (SBLI) in the supersonic aircrafts. Because, the performance of the aircraft is reduced due to this interaction. The property of

the shockwave is to increase the static pressure of the flow. These interaction of shockwave and Boundary layer produces the changes in shockwave and also produces the pressure gradient in upstream. This is lead to splitting the shockwave. The shockwave and boundary layer interactions results the large amount of wave drag.This SBLI control techniques are classified into two types. There are Shock controls and Boundary controls. Compared with other SBLI control, the wall ventilation through the shallow cavity is the best one. It reduces the losses by decreasing the thickness of the airfoil. The flow reaches near to an isentropic compression, when the pressure drop across the shock becomes uniform. It leads to great pressure recovery. Many researchers have investigated about the bleed form to suppress the separation bubble and minimizes the pressure loss. It produces low effective mass flow rate. In this phenomenon, to transform the single strong shock into several weak shocks and it extends the interaction zone. This Shockwave and Boundary layer interaction explains that the Reynolds number effect is non existent is fully turbulent and it has a strong effect on laminar flow, which has viscous dominated.

1. TRANSONIC FLOW

The flow, which flows at or near the speed of sound. The Transonic aircrafts are flies at the Speed range of Mach number 0.72 to 1.2 . Now, lot of modern jet powered aircrafts are operated at Transonic speed. The Supersonic expansion fan forms intensive low pressure and low temperature at various points around the aircraft. When the temperature drops below the dew point, one type of visible cloud will form. It will remain with the aircraft because of the aircraft flies. It is a result of Transonic flow.

1.1 TRANSONIC FLOW CALCULATION

The NACA 6 series airfoil is developed and to perform the Odorsen method for conformal mapping, the hand computation is used. Wind tunnel is the main tool for developing the aerodynamic configurations. Shapes of the airfoil were tested and modifications were selected by using the flow visualization techniques. When the Mach number is increased, there is a raise in the drag. The pressure rise through the shock wave becomes too large then the separation of boundary layer is occurred. The most efficient cruising speed is Transonic flow regime.

2. NUMERICAL PROCEDURE

The Numerical solution of RANS equations with a turbulence inside the nozzle injection with the help of commercial CFD package, is called as the FLUENT. It is the main method for the Numerical solutions. In the fluid motion, the governing equations are the partial differential equations. These equations are non linear in nature because these terms are in the form of convection. Numerical tools are developed for the simulation purposes with appropriate boundary conditions. The interested flow field is discretized by a set of cells called as Mesh. To convert the governing equations into the algebraic equations, a FLUENT uses control volume based techniques.

2.1 PHYSICAL DOMAIN AND MESH GENERATION

The interaction of Shockwave and boundary layer is studied by inducing the compressible flow over an airfoil. We have chosen the NACA 2412 airfoil to analyse the mesh quality. The C-Domain is drawn over the airfoil in required boundary values and it is analysed using ANSYS FLUENT software. Here, the airfoil is a physical domain for the current Numerical solution. The ICEM CFD software is used to create the geometry as a C – Domain. Then the mesh quality is analysed by using unstructured mesh.

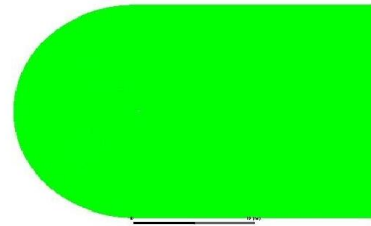


FIGURE 1. C - Domain over an airfoil

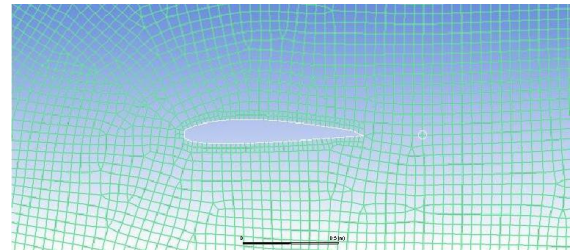


FIGURE 2. Mesh quality of an instructed mesh

The unstructured mesh is selected for giving accurate solution of the mesh. This unstructured mesh contains the Tetra shapes in 3Dimensions and triangle shapes in 2Dimensions. It does not follow a uniform pattern. An unstructured mesh had been created into the Domain with Pressure far field as velocity inlet and pressure outlet as out condition.

2.2 GOVERNING EQUATIONS

The Navier-Stokes equation for compressible viscous flow is solved numerically for the analysis of hypersonic flow on the three inlet ramps. By using the differential form of the continuity, momentum, and energy equation,

Turbulent shear stress is defined as

$$\tau_{ik} = \mu (\partial \partial x_{uki} + \partial \partial u_{xki})$$

$\mu = \mu_l + \mu_t$ is the total viscosity;

Laminar viscosity (μ_l) is calculated from Sutherland law as

$$\mu_l = \mu_{ref} \left(\frac{T}{T_{ref}} \right)^{\frac{3}{2}} \left(\frac{T_{ref} + S}{T + S} \right)$$

Where T is the temperature and μ_r , T_{ref} and S have known coefficients.

Based on dimensional analysis, few variables (k , ϵ , ω) is defined as given below,

Turbulent kinetic energy k ,

$$k = \overline{u_i' u_i'} / 2$$

Turbulent dissipation rate ϵ ,

$$\epsilon = \nu \frac{\partial \overline{u_i' u_i'}}{\partial x_j} \frac{\partial \overline{u_j' u_j'}}{\partial x_i}$$

Turbulent kinetic energy (k) equation:

$$\frac{\partial}{\partial t} (\rho k) + \frac{\partial}{\partial x_i} (\rho k u_i) = \frac{\partial}{\partial x_j} (\Gamma_k \frac{\partial k}{\partial x_j}) + G_k - Y_k$$

Specific dissipation rate(ω) equation:

$$\frac{\partial}{\partial t} (\rho \omega) + \frac{\partial}{\partial x_i} (\rho \omega u_i) = \frac{\partial}{\partial x_j} (\Gamma_\omega \frac{\partial \omega}{\partial x_j}) + G_\omega - Y_\omega$$

Where G , Y , Γ are the production, dissipation and diffusion terms respectively.

2.3 TRANSITION MODEL

The transition SST model couples the k - ϵ SST transport equations with two other transport equations, one for the intermittency and one in terms of momentum-thickness and Reynolds number. Using the k - ϵ SST model in the initial stage of analysis and later switched to the transition SST model gives better results in capturing the boundary layer properties. Due to the additional equations imposed, the transition SST model permits to define the turbulence accurately compared to other turbulence models.

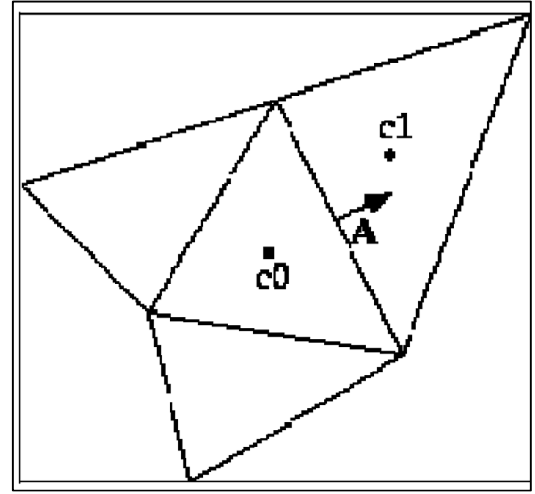


FIGURE 3. Computational Stencil

The face value ϕ_f is computed using the following expression:.

$$\phi_f = \phi + \nabla \phi \cdot \Delta \vec{s}$$

However, for the explicit solution technique, this term is expressed at previous time step and CFL number should be less than or equal to 1 for matching of physical domain with computational domain

$$\phi_i^{n+1} = \phi_i^n - \frac{\Delta t}{V_i} R_i^n$$

Where,

$$\frac{V_i}{\Delta t} \cdot \Delta \phi_i^n + \frac{\partial R_i^n}{\partial \phi} \cdot \Delta \phi_i^n = -R_i^n$$

FLUENT® uses both explicit and implicit methods with multidirectional upwinding schemes, but for the sake of accuracy implicit methods are preferable in compressible flows. As a general remark, explicit methods are less accurate take longer times to converge, have stability limitations (CFL condition) but are easier to construct and require less computer resources whereas implicit methods are accurate, don't have stability problems but are difficult to construct due to computation of this Flux Jacobians and require more resources.

3.RESULT AND DISCUSSIONS

By solving the RNAS equation with turbulence model, The numerical solution is carried out for resolving the fluid flow over the flow field for two different Mach numbers 0.5 and 0.7. Here, the formation of Shockwave over the surface of the airfoil due to Critical Mach number is the main section of this project. To understand the effect of this phenomenon, the contour plots have been captured.

4.1. VARIATIONS IN CONTOUR PLOTS

The following given contour plots represents the spartial variation in Velocity, Mach number, Static pressure, turbulent intensity and density around the airfoil. For a freestream Mach number 0.5 and 0.7. In terms of flow acceleration, A clear visualization has been seen in the upper surface due to the curvature effect and the maximum velocity is reached on the top surface of the airfoil. At the freestream Mach number 0.5, the accelerating flow doesn't reach the sonic condition but in the case of Mach number 0.7, the flow reaches the sonic condition.

CONTOURS FOR VELOCITY MAGNITUDE

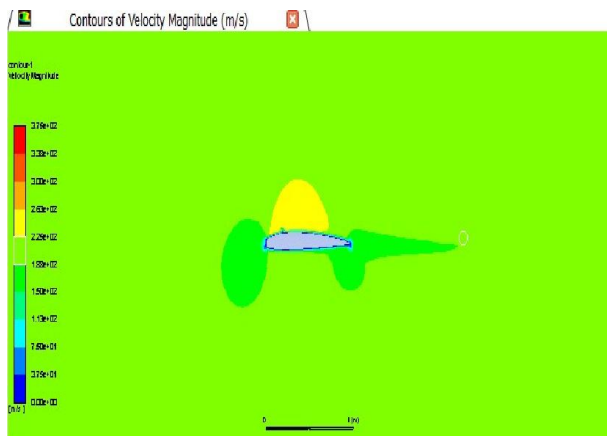


FIGURE 4. Spatial Variation in Velocity Magnitude Contour for a Mach No. of 0.5

The above Contour figure explains the Variations in Velocity for Mach number 0.5 over an airfoil, when the Shockwave interacts with the Boundary layer at the sonic condition. The Maximum Velocity zone has been achieved on the top surface of the airfoil. The accelerating flow doesn't reach the sonic condition at this Freestream Mach number 0.5 and it doesn't achieve the desired Velocity acceleration

At Mach number: 0.7

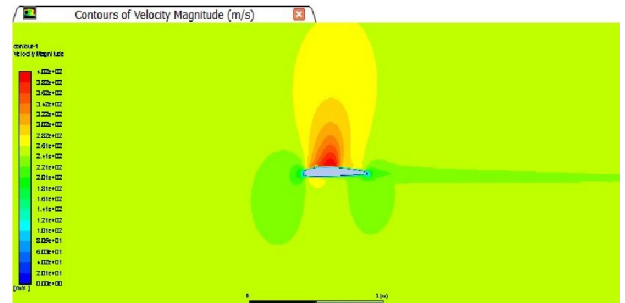


FIGURE 5. Spatial Variation in Velocity Magnitude Contour for a Mach No. of 0.7

The above given figure explains about the change in Velocity at the Mach number 0.7, When the Shockwave and Boundary layer interacts with each other at Supersonic condition. The Maximum Velocity zone has been achieved on the top surface of the airfoil. The accelerating reached the sonic condition at this Freestream Mach number 0.7. Compared with the Mach number of 0.5, The sonic condition and the Velocity acceleration is achieved in the Mach number of 0.7.

CONTOURS FOR MACH NUMBER

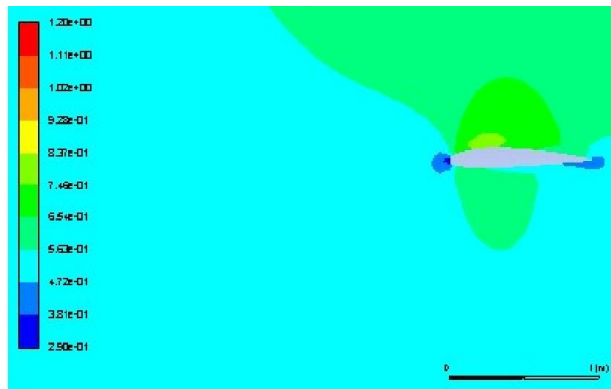


FIGURE 6. Spatial Variation in Mach No. Contour for a Mach No. of 0.5

The above contour shows the variations in Mach Number over an airfoil at the Mach number 0.5, when the shockwave and boundary layer interacts with each other. The maximum Mach Number also has been achieved on the top surface of the airfoil. Compared with the Mach number of 0.7, The total effect on the airfoil is very high in the Mach number of 0.5. It doesn't achieve the Sonic condition.

At Mach number: 0.7

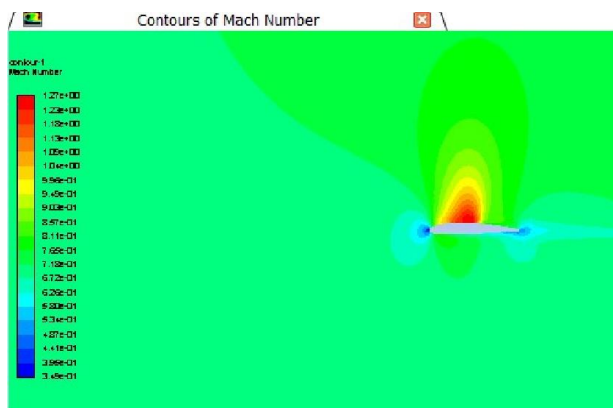


FIGURE 7. Spatial Variation in Mach No. Contour for a Mach No. of 0.7

The above contour shows the variations in Mach Number over an airfoil at the Mach number 0.7, when

the shockwave and boundary layer interacts with each other. The maximum Mach Number also has been achieved on the top surface of the airfoil. Compared with the Mach number of 0.5, The total effect on the airfoil is very high in the Mach number of 0.5 is low and It reaches the Sonic condition and flow acceleration.

CONTOURS FOR TURBULENT INTENSITY

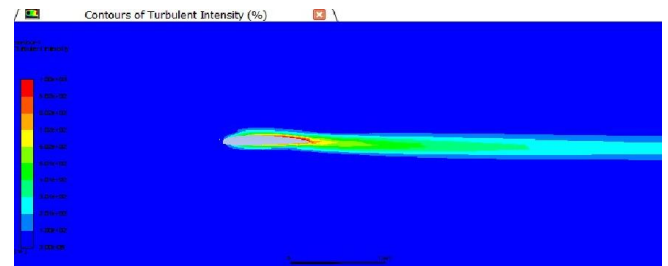


FIGURE 8. Spatial Variation in Turbulent Intensity Contour for a Mach No. of 0.5

The above contour figure shows the Variations in Turbulent intensity over an airfoil, when the Shockwave interacts with the Boundary layer at sonic condition. The Maximum Turbulent intensity is achieved at the back surface of the airfoil. Compared with the Mach number of 0.7, The turbulent effect on the airfoil is very high in the Mach number of 0.5 and also It doesn't achieve the Sonic condition and the flow acceleration.

At Mach number : 0.7

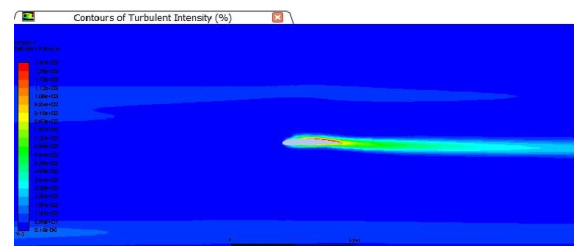


FIGURE 9. Spatial Variation in Turbulent Intensity Contour for a Mach No. of 0.7

The above contour figure shows the Variations in Turbulent intensity over an airfoil, when the Shockwave interacts with the Boundary layer at sonic condition. The Maximum Turbulent intensity is

achieved at the back surface of the airfoil. Compared with the Mach number of 0.5, The turbulent effect on the airfoil is very high in the Mach number of 0.7. In this Mach number the Sonic condition and the flow acceleration is achieved.

4.2. Variations in Graphics

Variations in the Pressure coefficient, Wall shear stress, Skin friction coefficient and Turbulent intensity over the surface of the airfoil is shown in the following graphics. According to these graphics, For the freestream Mach number 0.5, the flow over an airfoil doesn't attend the Critical Mach number. At the same time, the Critical condition hieved for freestream Mach number 0.7. Because, there is a difference in the interaction between the Supersonic flow field over an airfoil and the Boundary layer over anairfoil. Due to this variation, there is an increase in the Pressure coefficient, Wall shear stress, Skin friction coefficient and Turbulent intensity on the surface. Finally, there is a clear raise in the upper surface of the airfoil, mainly in the area in and around the point, at which the Sonic condition is achieved.

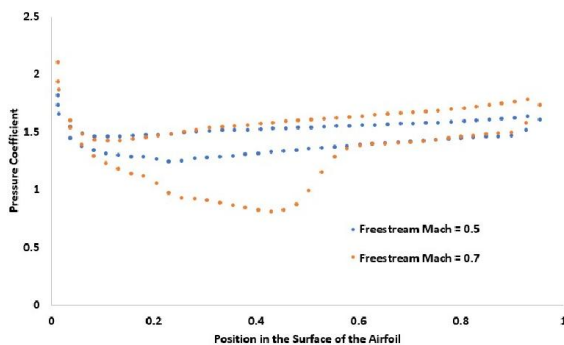


FIGURE 10. Variation of Pressure Coefficient on the Surface of the Airfoil

The above figure shows the graph between Pressure Coefficient and the Position in the surface of the airfoil. It explains the variations in Pressure Coefficient over the surface of the airfoil, when the shockwave and boundary layer interacts with each other. At the different freestream Mach number 0.5 and 0.7, the maximum value of pressure coefficient is

achieved at the initial positions over an airfoil and the minimum value of pressure coefficient is achieved at the top surface of the airfoil. Compared to the freestream Mach number 0.5 and 0.7 . The Sonic condition is achieved at the Mach number 0.7.

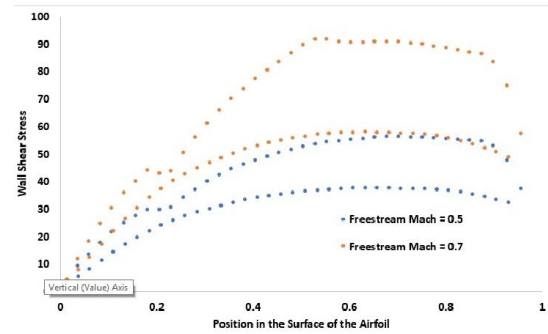


FIGURE 11. Variation of Wall Shear Stress on the Surface of the Airfoil

The above figure shows the graph between Wall Shear Stress and the Position in the surface of the airfoil. It explains the variations in Wall Shear Stress over the surface of the airfoil, when the shockwave and boundary layer with interacts each other. At the different freestream Mach number 0.5 and 0.7, the maximum value of wall shear stress is achieved at the top surface of the airfoil and the minimum value of wall shear stress is achieved at the initial positions over the surface of the airfoil. Compared to the freestream Mach number 0.5 and 0.7 . The Sonic condition is achieved at the Mach number is 0.7

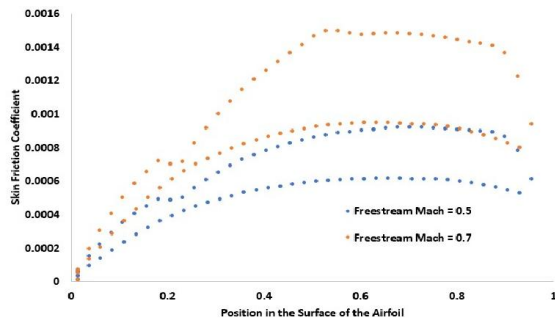


FIGURE 12. Variation of Skin Friction Coefficient on the Surface of the Airfoil

The above figure shows the graph between Skin Friction Coefficient and the Position in the surface of the airfoil in different Mach No. It explains the variations in Skin Friction Coefficient over the surface of the airfoil, when the shockwave and boundary layer interacted. At the different freestream Mach number 0.5 and 0.7, the maximum value of wall shear stress is achieved at the top surface of the airfoil and the minimum value of wall shear stress is achieved at the initial positions over the surface of the airfoil. Compared to the freestream Mach number 0.5 and 0.7. The Sonic condition is achieved at the Mach number is 0.7.

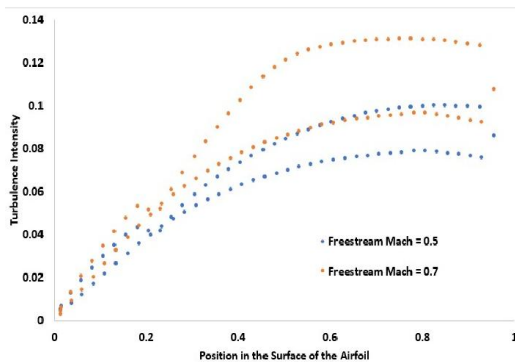


FIGURE 13. Variation of Turbulent Intensity on the Surface of the Airfoil

The above figure shows the graph between Pressure Coefficient and the Position in the surface of the airfoil. It explains the variations in Pressure Coefficient over the surface of the airfoil, when the shockwave and boundary layer interacts with each

other. At the different freestream Mach number is 0.5 and 0.7, the maximum value of wall shear stress is achieved at the top surface of the airfoil and the minimum value of wall shear stress is achieved at the initial positions over the surface of the airfoil. Compared to the freestream Mach number 0.5 and 0.7. The Sonic condition is achieved at the Mach number is 0.7.

CONCLUSION

The Shockwave and Boundary layer interaction has lot of effects in Aerospace Engineering applications. Mainly, the external over an airfoil in the Transonic regime has specific contribution in increasing the Wave drag of the vehicle. A numerical solution is carried out by solving the RNAS Equations using the ICEM CFD software. By extracting the spatial variation of fluid flow parameters for the entire flow field over an airfoil for two different freestream Mach numbers 0.5 and 0.7, the fluid flow behavior has been analyzed. The variations on the fluid flow over the surface of airfoil also extracted. The Critical Mach number has been achieved by the normal NACA 2412 airfoil, while flow Velocity over the body increases in the Transonic regime. After reaching the Critical Mach number, the flow Velocity is increased furtherly and there is a formation of Shockwave on the surface of airfoil due to the Supersonic condition achieved on the surface of airfoil. Then this Shockwave interacts with the Boundary layer on the surface and it results in a complex fluid flow. Due to the turbulent fluid flow structure after the interaction point, the turbulent intensity and Skin friction coefficient are increased on the surface of airfoil.

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Power, Lift And Drag Coefficients Analogy Of Wind Turbine Blade From Aerodynamics Characteristics Of Naca2412 & Naca0012

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performance(J. Johansen& N. N. Sorensen-2007) can be improved the optimal wind blade geometry.the control

Abstract

In this paper analysis of two dimensional airfoils model of NACA002412 and NACA0012 for the aerodynamic characteristics at various Reynolds number for a range of attack from lift through stall, based on the chord length of the airfoil. Using the Spalart-Allmaras, the k-epsilon (RNG) and the k-omega shear stress transport (SST) models are used to simulate drag, pressure coefficient, local characteristics and the lift. In the wind tunnel of NACA(National Aeronautics Advisory Committee) experimental measurement and comparison prognosis for selected aerodynamic airfoils are presented. The geometric parameters of blade including twist angle distribution and chord are determined based on aerodynamic parameters results at a specific Reynolds number. This study is carried out by providing an optimal blade design strategy for horizontal-axis wind turbines operating at different Reynolds numbers. In this approach can be further developed to create the most efficient of horizontal axis wind turbine blade design. As a conclusion the experimental results were compared with simulation results, good concordance were noted.

keywords- Wind turbine, aerodynamics, turbine blade, lift coefficient, drag coefficient.

1. INTRODUCTION

Nowadays in market the upward three bladed horizontal axis in wind turbine are leading player.the range of the different turbine construction found to be best industrial compromised(P. J. Musgrove-1987). When the development of individual turbine components to conducting the current wind industry innovation.the blade performance of output measure response the blade geometry(M. O. L. Hansen-2000), the chord , twist, airfoil type distribution along the span.therefore the overall turbine

problems, aerodynamical and structural involved the design of optimal blade.iterative and stepped method where the design cycle is approached practically. the blade can be model as serious section along pitch axis by the aerodynamical optimization.the results of collection of pitch angle and local twist one by each section has an airfoil shape,chord length and attach angle the control strategy of whole energy systems depends of this last property of blade while pitch angle.

The purpose of this paper is to asset twist distribution and chord of wind turbine design. The design process includes thedetermination of the blade airfoil, twist angle chord length distribution along the radius and the selection of the wind turbine type.There are enhance based on theory of aerodynamic forces on an airfoil and conversion of angular momentum. BEM (Blade Element Momentum) theory is first derived then used to conduct a parametric study that will determine if the enhance values of blade twist and chord length create the most efficient blade geometry. One of the most efficient wind turbine blade is analyzed finally from the two different airfoils. CFD (Computational Fluid Dynamics) software is used to simulate wind turbine and offer aerodynamic blade analysis. This experiment includes a analysis of the most important parameters of maximum efficiency for wind turbine blade. Lift and drag coefficient,power output around airfoil and lift

to drag ratio were calculated and compared. In this study, numerical simulation of NACA2412 & NACA0012 airfoils was performed to determine optimum angle of attack.

II. MATHEMATIC MODEL

The governing equations are the Navier-Stokes and continuity equations. This has the advantage of making our simulation not require a moving mesh to account for the rotation of the blade. These equations are written in a frame of reference rotating with the blade.

III. MATERIAL AND METHOD :

CFD is the most of the important components of Aerodynamics and fluid mechanics industries. already to exist the most of the all aerodynamics in our world. but connection with an fluid dynamic for the analysis of moving cases. (like flow around object) in CFD toolboxes. There are hypothetical to exist(left) the model for turbulent simulation. The material and method explain about briefly as follow.

A. The Spalart-Allmaras model :

The Spalart-Allmaras model (1992) model is relatively easy of equation model an solve to other transport equation for the K.M eddy (turbulence) viscosity. It is designed by the especially for aerospace and spacecraft are applicable an involving the wall-boundary flows has been given accurate decision for boundary layer subjected to adverse pressure gradient(P.R.Spalart& S. R.Allmaras-1992) . For turbo machinery application is also gain popularity . It is authentic (original) create a low-Reynolds number model is effectively , The viscous affected region of the boundary layer to be properly resolved.

B. The k-omega SST turbulence model :

The k-omega SST turbulence model is a two equation of turbulence viscosity model as very popular(F. R. Menter-1993). The shear stress transport (SST) expression to combine the two world. Here use of k-omega expression is the inside part of the boundary layer to make the model directly . Able to all way is down to the wall passing the viscous sub-layer. The low Reynolds turbulence has been used the K-omegaSST model without any extra damping process. The SST expression also switches to K-omega problem that the model is fielding to the inlet free stream turbulence property. The adverse pressure gradients and separate flow is the author who use the SST K-omega model after advantage for it is normal behaviors.

C. The K-epsilon RNG model :

The K-epsilon is the most one of the general turbulence models(W. P. Jones, B. E. Launder-1972). Even though it is doesn't perform well in case large adverse pressuregradient(B. E. Launder, B. I. Sharma-1974). This is that two equation model that means including both extra

transport equation can be represented the turbulence flow of property. Here involving the two equation is like convection and diffusion of turbulent energy. Denoted by K. The second variable of type turbulent distraction , Denoted by ϵ . To variable that determine the scale of turbulence , the first variable is K, secondary energy has been determine the turbulence. The RNG model was developed using Re- Normalization group (RNG) method by the Navier-Stokes equation , the effect of smaller scale of motion(V. Yakhot, S. A. Orszag et al-1992).

D. Blade Element Momentum (BEM) Theory :

The Blade Element Momentum (BEM) Theory is a collection of two moment theory and blade element theory(J.L.Tangler-2002). Momentum theory , which is useful in conclude ideal efficiency and the flow velocity, It is resolved of force acting on the rotor to reduce the motion of the fluid. the theory resolved to the force on the blade the conduction of finale the motion of the fluid in terms of geometry blade parameter. Density is 1.2043 Kg/m³, wind speed is 14.383, 2.09888, angle of attack is -18:0.25:18, chord length is 1 m, temperature is 273 K and reference pressure is 1 atm above mentioned are the computational conditions.

To study of the incompressible flow. so assume to be turbulence over all entire airfoil. The computational domain is the located at chord length is 100 away from the leading edge, and The chord length 200 located at the trailing edge . Boundary condition and flows as show in Fig(1).

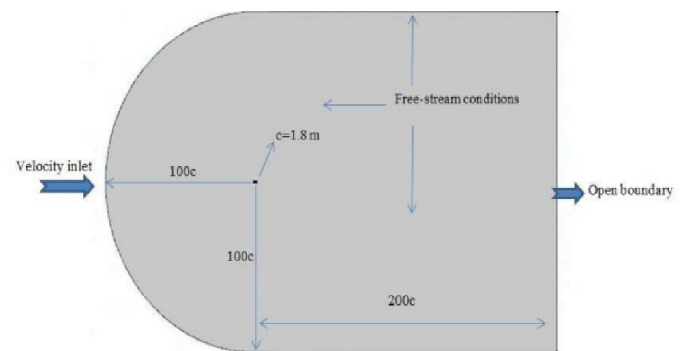


Fig.(1) Boundary condition and flow domain.

IV. RESULTS AND DISCUSSION

The study has been conducted using simulation software NACA2412 & NACA0012 airfoil and pressure coefficient formed around two airfoils has been compared with different angle of attack of airfoil. Numerical calculation were carried out at different angle of attack. The first objective of this calculation is to find optimum angle of attack to obtain maximum lift to drag ratio. Angle of attack for inclined airfoil and lift coefficient for different angle of

attack are calculated and shown in Table 1 and Fig(II) respectively.

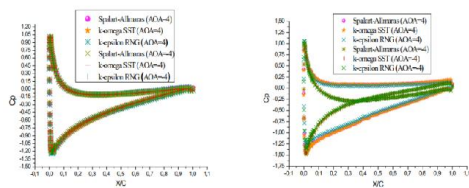


Fig.(2). (a) CL variations vs. angle of attack $Re=1.106$; (b) C_d variations vs angle of attack at $Re=1.106$ from the current numerical work by using three different turbulent models' simulation compared with the numerical data.

Fig(II) shows that the result for the drag coefficient and lift coefficient is obtained by Spalart-Allmaras model, the k-omega SST, the k-epsilon RNG turbulence model.

The k-omega SST, the k-epsilon RNG turbulence model are not able to predict stall condition but the Spalart-Allmaras model predict well, also the experiment can be divided into two system (i) pre-stall and (ii) post-stall. In pre-stall regime different experiment setups give similar lift and drag coefficient for a given angle of attack. This means we can quantitatively compare against the experiment values to validate our simulation methods.

Tab. 1 The result for the lift coefficient and drag coefficient by different method

Fig. (3). (a), (b) Comparison of pressure distribution over the surface of NACA0012 and NACA2412 airfoil between angle of attack of 4 and -4 at $Re=1.106$

As can be seen from the Fig(3), with decreasing angle of attack from 0 to -4 degrees, the pressure distribution between upper and lower surface decrease. The pressure difference between upper and lower surface starts to increase again when the angle of starts to increase after 0 degrees. The pressure difference between upper and lower surface reach maximum when angle of attack around 4 degree.

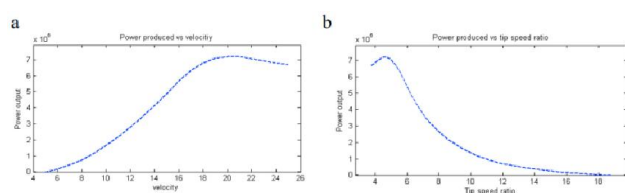


Fig. (4). (a) Power output as function of wind speed of NACA0012, (b) Power output as function of tip speed ratio of NACA0012.

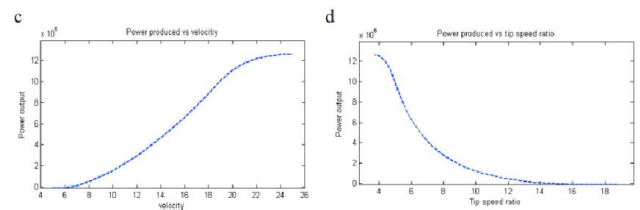


Fig. (5). (c) Power output as function of wind speed of NACA2412, (d) Power output as function of tip speed ratio of NACA2412.

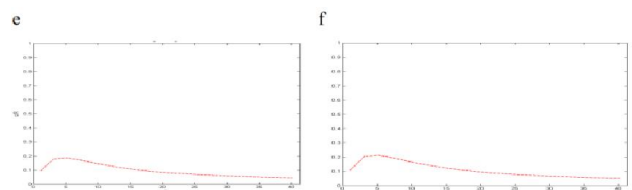


Fig. (6). (e) Chord length as function of radius for NACA0012, (f) Chord length as function of radius for NACA2412.

	NACA0012		NACA 2412	
	CL	CD	CL	CD
Experimental Data	1.0596	0.01293	0.7624	0.0077
Spalart-Allmaras	0.812363	0.02006	0.7290	0.0232
k-omega SST	0.612518	0.05746	0.7984	0.0155
k-epsilon RNG	0.867807	0.05547	0.7302	0.0232

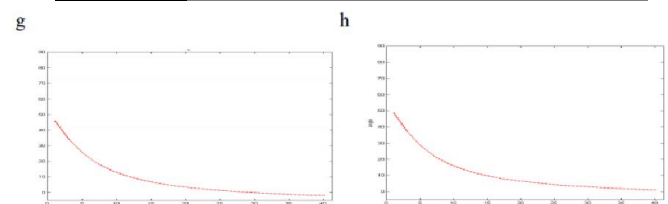


Fig. (7). (g) Twist distribution as function for NACA0012 of radius, (h) Twist distribution as function for NACA2412 of radius.

V. CONCLUSION

This paper consider maximum angle of attack for two airfoils NACA2412 & NACA0012 to find maximum lift and drag ratio for Reynolds number of $Re=1.106$. In this paper the k- ω SST, the k- ϵ RNG, the Spalart-Allmaras using these models we study simulate air flow around airfoils. Lift, drag, pressure coefficient, lift to drag ratio, chord ,twist distribution and power output of the airfoils are calculate, airfoil simulated and results are compared initially. There is a range of angle of attack where the lift coefficient varies linearly at some point, further increase in angle of attack a lift coefficient reaches maximum value. This referred to as stall, there is a region having a lowest value of lift coefficient. Outside of this range it increases again sometimes rapidly for both of airfoils. Good agreement of all the se model with experimental data from angle of attack between -5 to 5. The ultimate parametric study was conducted to determine if the airfoil had an appreciable effect on the efficiency of the turbine. Based BEM theory it was confirmed that changing the airfoil could have an appreciable effect on the turbine efficiency. Through this experiment shows that the NACA2412 airfoil have a higher efficiency at tip speed ratio of 7 and also have higher maximum power output than the NACA0012. In choosing between the two airfoils, it is clear that the NACA 2412 creates a more efficient turbine blade than the NACA 0012. Additionally, continuation of this analysis would include analyzing different airfoils such as the S-Series airfoils created specifically for wind turbine blades.

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DESIGN AND FABRICATION OF TETHERED DRONE FOR VERSATILE APPLICATIONS

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Abstract: *The popularity of the hexacopter is increasing as the sensors and control systems are becoming more advanced and less expensive. There are many commercial hexacopter available on the market today, but they are often hard to configure and comprehend. There is main drawback in all drones is that the time of flight is very less (around 20 min) The proposed system aims to provide continuous power supply to the drone by using power supply from ground and it been used for various application such as flame thrower, water stored tanks for cleaning higher raised building at precise location and reduces operating time. This system used IMU 6DOF (3-axis accelerometer & 3-axis gyroscope) and hexa based model which ensure it smooth movement, graceful motion and trajectory tracing. GPS system and barometric sensor make it more efficient with an FPV setup.*

I. INTRODUCTION

The Unmanned Aerial Vehicles (UAV) are developing a lot in almost every field, This UAV has been used for aerial photography, cinematic shots, medical and rescue, army force, agriculture, surveillance and many more. All the drone which are developed with modern technology and advanced system of control and equipped sensor loaded works great in the action of work. But when times come for endurance many well doing machines fails in that case. The power consumption is high for Vertical Takeoff (VT) drone. The most used energy to sustain in air against the gravity pull. The motor has to exhibit power more than the gravity for sustainable flight in air.

The hexacopter is a popular drone, mainly because of its unique properties. The major advantages of the hexacopter, is its ability to hover, or stand still in the air, and its VTOL capabilities. This allows the hexacopter to be operated in nearly any environment such as indoor playing or tight spaces with limited manoeuvrability.

The conventional helicopter with one main rotor and one tail rotor posses many of the same properties as a hexacopter. However, hexacopter have no moving parts except for the rotating motors and propellers, while the conventional helicopter require a complex hub to make it possible to rotate the motor axis to induce a translating movement. The hexacopter is also prone to vibrations and it is more flexible when it comes to the placement of the centre of gravity. Due to smaller size of the rotors, they can be more easily covered, making it safer to operate.

The typical hexacopter design, as noted above, has no moving parts except the propellers. The motors and their

propellers are mounted are mounded to the frame and the only way to induce a lateral motion is to tilt the entire frame.

Unlike a conventional helicopter, The hexacopter does not have a tail rotor to control the yaw motion. The hexacopter has six motor where three spins clockwise and three spin counter clockwise. If the pair of clockwise motors are spinning at a direction rate than the pair of counter clockwise motors, then it will create a moment about the yaw axis.

II. ASPECTS REQUIRED DURING DESIGN

A. Estimation of roll and pitch

In order to control the hexacopter roll and pitch angles, the angles must be known. None of the sensors measure the angles directly, therefore an estimate has to be obtained from the accelerometer and/or gyroscope sensors. In this section, we propose various estimation schemes for bank and pitch angles, and compare the resulting estimates. An estimation scheme is chosen based on the results.

B. Estimation of position

The height above the ground is the most crucial information needed in order to control the hexacopter. This will allow the hexacopter to be manually controlled, using the desired height and tilt angles as input. If the North and East coordinates are known as well, a complete control scheme can be implemented. An estimation strategy for height is proposed, using gyroscope, and an estimation scheme for position is proposed, using a GPS and an IMU. Solutions are chosen based on the result.

Control of altitude

By controlling the attitude, the hexacopter should not drift. Controlling the height above the ground as well, will enable the hexacopter to hover in the air. An altitude control scheme will be presented and a solution will be chosen based on the result.

Development of a prototype

In this section, we will go through the development of the working prototype, by using available resources .

User control interface

To control the hexacopter, a user control interface needs to be used. Here an application Qcontrol has been used for mapping and telemetry programs, for programming ardo pilot open source software are used as interface.

Error handling: Various unexpected errors can occur at any time during a flight.. A number of possible errors and solutions will be explored.

By considering above all aspects the designing of a hexacopter can be accomplished. All the aspects must be considered as essential one for obtaining a proper working hexacopter.

III. UAV HEXACOPTER

A UAV Hexacopter is an unmanned aerial vehicle with six rotating rotors used for lift and movement. It uses an electronic control system and electronic sensors to help stabilize itself. Hexacopter parts have been decreasing in price over the past couple of years due to technological advances. As a result more hobbyists, universities, and industries are taking advantage of this opportunity to design and develop applications for the Hexacopter

only pitch angle acceleration is changed. Figure 2.3 shows an example of pitch movement of a hexacopter. As the front engine slows down, the forces created by the corresponding rotor are less than the forces created by the rear rotor. These forces are represented by the black arrows. These forces cause the hexacopter to tip forward and this movement is represented by the black curve arrow.

Here the pitch and roll moment are controlled by the directing and the momentary force of the vehicle that makes up the vehicle to change by its own direction and by the command received from the system which is processed under the standard procedure with the internal programs and algorithm calculation, if get standardize the control switch to the action applied on the system

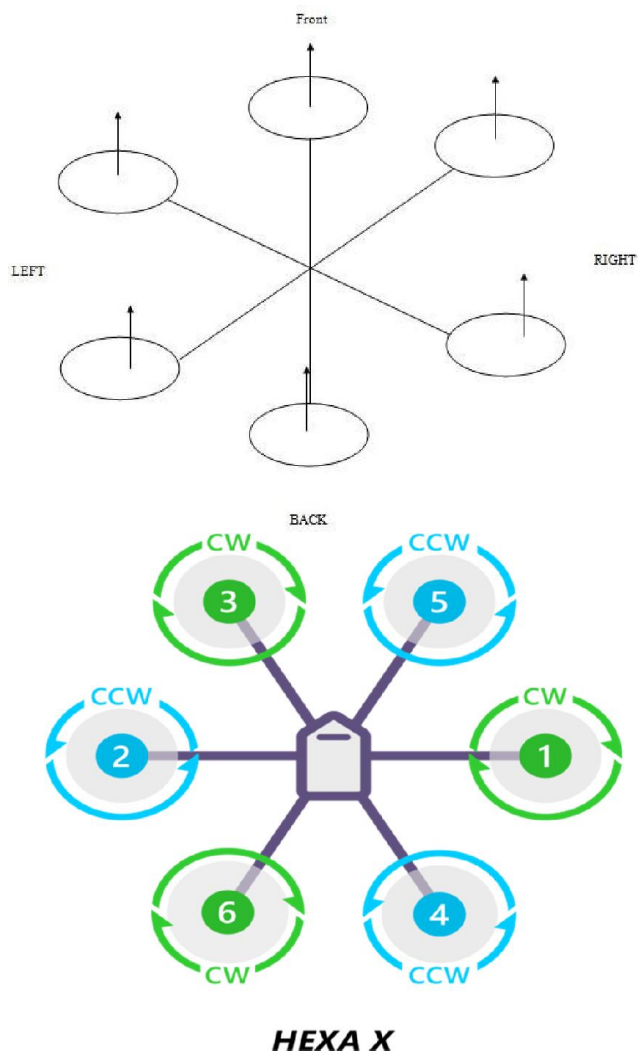


Figure 1.1: Hexacopter: Motor rotation and directions

Figure 1.2: Hexacopter: Vertical thrust movement

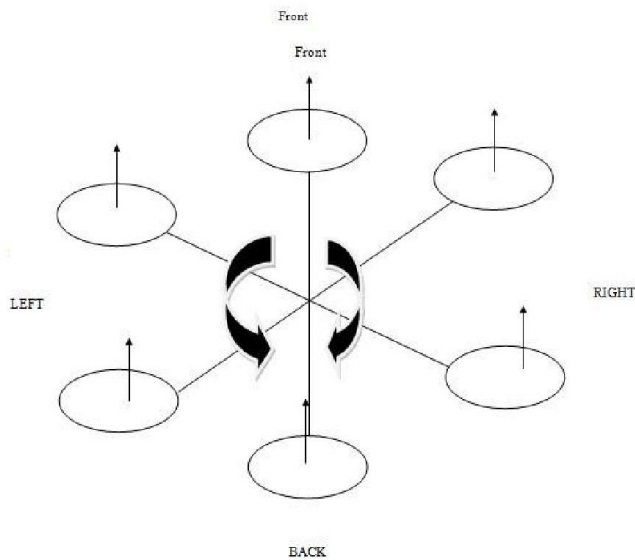
Balancing is obtained by increasing (or decreasing) the speed of the right and left rotor motors. This causes the hexacopter to turn along the y axis. The overall vertical thrust is the same as in hover due to the front and rear engines; therefore, only the roll angle acceleration is changed. Figure

Flight Control

A hexacopter consists of six motors evenly distributed along the hexacopter frame as can be seen in figure 2.1 below. The circles represent the spinning rotors of the hexacopter and the arrows represent the rotation direction. Motors one, three and six rotate in a clockwise direction using pusher rotors. Motor two, four and five rotate in a counter-clockwise direction using puller rotors. Each motor produces a thrust and torque about the center of the hexacopter. Due to the opposite spinning directions of the motors, the net torque about the center of the hexacopter is ideally zero, producing zero angular acceleration. This eliminates the need to stabilize the yaw.

A vertical force is created by increasing the speed of all motors by the same amount of acceleration. As the vertical forces overcome the gravitational forces of the earth, the hexacopter begins to rise in altitude. Figure 2.2 shows the vertical movement of the hexacopter. As above, the circles represent the spinning rotors, the black arrows represent the forces caused by the spinning rotors.

Pitch is provided by increasing (or decreasing) the speed of the front or rear engines. This causes the hexacopter to turn along the x axis. The overall vertical thrust is the same as hovering due to the left and right motors; hence



2.4 shows an example of roll movement of a hexacopter. As the right engine slows down, the forces created by the corresponding rotor are less than the forces created by the left rotor. These forces are represented by the black arrows. This causes the hexacopter to tip to the right and this movement is represented by the black curve arrow.

Yaw is provided by increasing (or decreasing) the speed of the front and rear motors or by increasing (or decreasing) the speed of the left and right motors. This causes the hexacopter to turn along its vertical axis in the direction of the stronger spinning rotors.

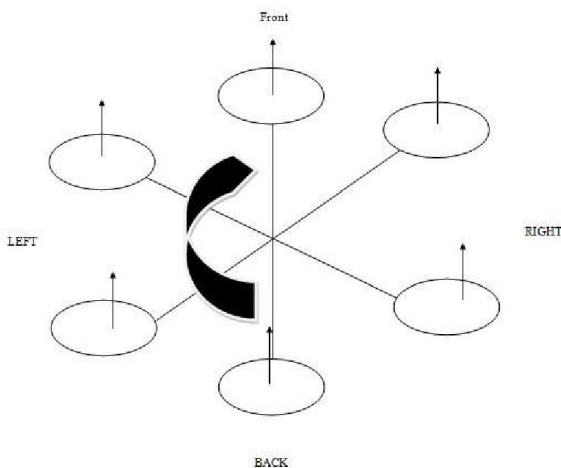


Figure 1.3: Hexacopter: Pitch movement

Figure 1.4: Hexacopter: Roll movement

Figure 1.5:m Hexacopter Yaw movement

IV. ADVANTAGES OF A HEXACOPTER

There are many advantages to hexacopters compared to other aircrafts. A hexacopter does not require a large area to obtain lift, like a fixed wing aircraft does.

The hexacopter creates thrust with six evenly distributed motors along its frame. A helicopter suffers from torque issue due to its main rotor. The design of the hexacopter does not suffer from the same torque issues as the helicopter. The counter balancing forces of the spinning motors cancel out the torque forces caused by each motor causing the hexacopter to balance itself. Because the hexacopter uses four rotors instead of one main rotor, it requires less kinetic energy per rotor.. Due to this and its symmetrical design, a hexacopter maintenance and manufacturing costs are relatively lower than other aircrafts.

V. LITERATURE REVIEW

The detailed literature review is done in this chapter to recognize the researchgap in the field of Data Gathering, Tethered Assembly, Hexacopter design and its system for the clear view of development.

Data Gathering System

Data Gathering Aerial system tethered system which was reported by AdamWoodworth and James Canton in the year of 2013. Where tethering an aerial vehicle to a ground station is a proven method of restricting the flight space of that aerial vehicle. By restricting the flight space, the aerial vehicle can operate autonomously, or under humancontrol, so that a fly-away will not occur. These tethered aerial vehicles may be outfitted witha suite of sensors for surveillance or other data gathering. In addition to restricting the flight space of an aerial vehicle, the tether may be used to deliver power and/or datacommunications to/from the aerial vehicle. Depending increasing the safety of a tethered aerial vehicle. . According to a first aspect of the present invention, an aerial vehicle systemfor gathering data comprises: a ground station; a first aerial vehicle, wherein the first aerial vehicle comprises a sensor payload; a second aerial vehicle; a first mooring portion operatively coupled between the ground station and the second air vehicle; and a second operatively coupled tie-down portion between the second aerial vehicle and the first aerial vehicle; wherein thefirst tether portion is configured to deliver power from the ground station to the second aerialvehicle and the second tether portion is configured to deliver power to the first aerial vehicle. In certain aspects, the ground station, the An aerial vehicle system for gathering data, the aerial vehicle system comprising: a ground station; a first aerial vehicle, the air vehicle comprises a sensor payload; a second air vehicle: a first mooring portion operatively coupled between the ground station and the second air vehicle; and a second tether portion operatively coupled between the second aerial vehicle and the first aerial vehicle: wherein the first tether portion is configured to deliver power from the ground stationto the second aerial vehicle and the second tether portion is configured to deliver power to thefirst aerial vehicle.

The aerial vehicle system of claim 1, wherein the ground station comprises a device foradjusting the tension or length of the first tether portion. The aerial vehicle system of claim 1, wherein the first or second aerial vehicle comprises a device for adjusting the tension or length of the first or second tether portion. By considering this study tethered system can be used for gathering information, power source,

bidirectional communication from ground to drone and vice versa with the path guided system.

Tethered Drone Assembly

A tethered drone assembly is provided Which by Pinakin desai and Stephen Faivre in 2016 by these the tethered drone assembly may be a vehicle-based tethered drone assembly system or may be a free-standing tethered drone assembly system. The tethered drone assembly has a plurality of Related U.S. Application Data drones each tethered by a cord. Thetethered drones may hover in front of behind or on either side of the vehicle so as to better survey the surrounding aca of the vehicle. In Some embodiments, a main product tank is used to Supply liquids, foams, gases, powders, electrical power and/or electrical communication to the drones. A plurality of sensor Publication Classification sensors located on the drones allows the drones to detect objects and environmental conditions in front of behind or on either inside of the moving vehicle in real-time and allow the vehicle to tethering adjust its work accordingly. The drones may be controlled remotely by a user or may be automatically controlled by sensors. Here by the study of this research cuts of the idea of using Multiple drone assembly for supply which can anything like bypassing from one one side to another such as liquids, foams, gases, Plurality sensors to detect object and environmental condition and to adjust by themselves.

System of Tethered Multicopter

The first main contribution is from fagiano to introduce a new class of tethered UAVsin 2017, named here Systems of Tethered Multi copters (STEM), which ideally combine the advantages of untethered and tethered UAVs. These systems are composed of two or more drones, linked by tethers to each other and to an attachment point on the ground (ground station). The use of more than one unit yields a much larger flexibility and operational range with respect to systems with a single tethered UAV, while still retaining all the advantages provided by the tether (runtime, reliability, safety, data transmission etc.). A similar concept has been explored in the literature (Tognon and Franchi (2015)). The novelties introduced in this paper are to consider an arbitrary number of tethered drones, with six degrees of freedom each (i.e. rigid bodies in a three-dimensional space), and with flexible (elastic) tethers, able to transfer only traction forces. Moreover, the tethers can be adjusted in length, thanks to controlled winches installed onboard the drones and on the ground station, hence adding moredegrees of freedom to the whole system. The controlled winches to adjust the length of the wire with the Decoupled control between drones. By the approach of Hierarchical control for superior way of controlling over multiple drones.

Tethered Unmanned Aerial Vehicle

The tethered UAV which is deployable and tangle free moment of the wire and its system was taken from the research of Hank J Hundemer in 2018 with system which includes

- (i) a base including a bottom surface and a first coupling - point ;
- (ii) a vertically - oriented elongate structure

comprising a lower end , an upper end , and an inner channel , wherein the inner channel comprises an upper access - point disposed proximate the upper end , wherein the base is coupled to the elongate structure proximate the lower end ; (iii) a deploy able cushioning - device coupled to the elongate structure ; and (iv) a tether comprising a first portion , a second portion , a third portion , and a fourth portion , wherein the first portion is coupled to the first coupling - point , the second portion is coupled to a second coupling - point of the UAV , the third portion extends through the inner channel , the fourth portion extends from the upper access - point to the second coupling point , and the fourth portion has a length that is less than a distance between the upper access point and the bottom As discussed above, a UAV can fly without an onboard . A connection tether can limitthe distance that the UAV can fly away from mechanism can be a relatively simple mechanism , such as a the top of the elongate structure . Thus, the tether may cable or system bus , or a relatively complex mechanism , constrain the UAV to a volume centered at the top of the such as a packet - based communication network . Here Deployable cushioning device and surface free play is taken for the development of the system.

Summary

Based on the above research is considered as a foundation for our project for tetheredconcept and power module. The project further developed for implementing applications.

VI. RESEARCH METHODOLOGY AND ITS PROCESS

Initially the research work begins from the demand and requirement of the system which we need to develop as the outcome of the work. Where it starts from equalizing the process with the need for accomplishment of the system on its concern.

Requirement and its Design

The major drawback has seen in the drone which is high consumption of the power that lead it to the drain of the battery and its low endurance. In another side of Application oriented, Nowadays the building as developed to the extreme height and the cleaning process are done by man power by risking their life in work. This development could be the safety factor of life and alterative side of work process. For another Application Cleaning od debris in High tension service line, for destruction of deadly species and for making deforestation ina controlled manner. Major requirement is a Drone with capable of have longer endurance and further made according to application oriented.



Figure 3.1: Process of Development

Analysis of Material

Based on the requirement each and every material which is used are analyzed to fulfill the requirement purpose. Where the information taken from research of Boubdallah in 'Full control of a Quadcopter'. Where the process of selection and its criteria is considered for the consideration the material.

Selection of Material

By the outcome of the research references of Alexis and Huerzeler in 'Hybrid modeling and control of a coaxial unmanned rotorcraft' and based on Analysis the suitable material like Flight controller, GPS systems have been used and all the material which is used on the

development of the system is chosen on priority of availability and condition to use it.

Assembly and Programming

The material which is analyzed and selected are used for assembly of the system as per the requirement needed. Initially the Hexacopter is needed to assemble as base for the other fitments on it. Here all the other application-oriented material is need to be assembled separately. Once the hexacopter is assembled it moves to the next step of Programming. In programming hexacopter need to be attached to the source code of program and by further process the source code has to be integrated to the system where it uploads on the hexacopter for its function and its commanding.

Testing and Troubleshooting

The source code which is uploaded on the Hexacopter required to be tested and the working of the system should be checked to avoid failure at the last stage. The troubleshooting of the process if any flaws are founded on the operation of the system. By identifying the issue and by following the process of troubleshooting with help to rectify the issue faced during the testing.

Controls and Process

To design a stable multi copter we need maintain some physics, mathematics and aerodynamic term. Aerodynamic help to define its movement and inertial motion. In the other hand mathematical calculation helps to manipulate required lift force, angular position, graceful motion and trajectory definition. We designed drone's body according with dynamics and also designed artificial algorithm to make it autonomous and wellbehaved. Hardware system consists of different sensors, powerful controller unit and electronic equipment so on. For a desire movement controller takes data from different sensors. 3-axis accelerometer and 3-axis gyroscope provide data of its orientation, acceleration and angular rate. Then these data processed and compare with reference and desire value. This operation performs with the help of PID loop. Several PID loops used in these case like pitch control, roll control, yaw control, hover, altitude holding and orientation control. IMU (inertial measurement unit) provides real altitude, angular movement and orientation. After that required pulse sends to ESC (Electronic Speed Controller) for desire speed of rotation. Magnetometer provides real time direction with the global magnetic field reference. Barometric pressure sensor also provides real time altitude. GPS (global position system) module helps to make system autonomy. It helps find out any coordinate and reach to this coordinate. Telemetry kit helps to observe flight data wirelessly from ground station. It also send mission file and communicate with air part like USB serialmode (TTL mode). In ground part consists of powerful ground station. PC/Laptop used for sending data through telemetry and coding or data logging from air part. Another radio transmitter used to switch different mode and operate in manual mode.

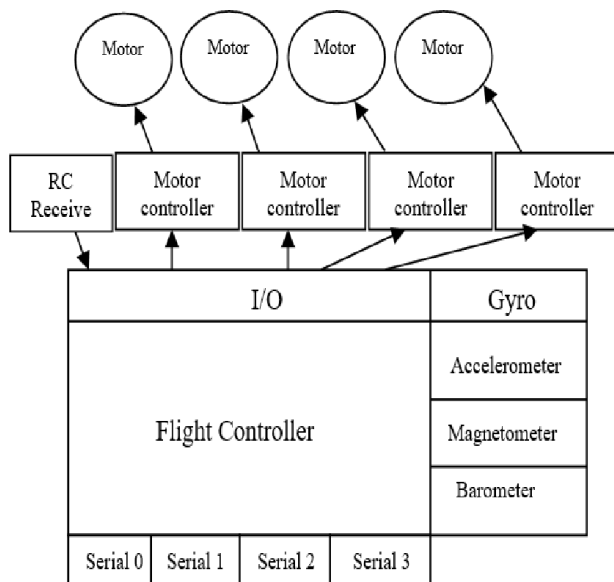


Figure 3.2 : Overview of System

VII. MATERIALS USED

Brushless DC Motor

A Brushless Dc electric motor (BLDC motor), also known as electronically commutated motor (ECM motor), and synchronous DC motors, are synchronous motors powered by direct current (DC) electricity via an inverter switching power supply which produces electricity in the form of alternating current (AC) to drive each phase of the motor via a closed loop controller. The controller provides pulse of current to the motor winding that control the speed and torque of the motor. The main advantages of brushless motor over brushed motor are high power to weight ratio, high speed electronic control, and low maintenance.

Electronic Speed Controller

An electronic speed controller (ESC) is an electronic circuit that acts as the interface between the pilot's commands and the individual drone motor. These craft depend entirely on the variable speed of the motors driving the propellers. This wide variation and fine RPM control in motor/prop speed gives all of the control necessary for a hexacopter (and all multirotors) to fly. There is several type of ESC, but brushless motors require a 3 phase ESC. This is fully programmable 30A BLDC ESC with 5V, 3A BEC. Can drive motors with continuous 30A load current. It has sturdy construction with 2 separate PCBs for Controller and ESC power MOSFETs. It can be powered with 2-4 lithium Polymer batteries or 5-12 NiMH / NiCd batteries.

It has separate voltage regulator for the microcontroller for providing good anti-jamming capability. It is most suitable for UAVs, Aircrafts and Helicopters. As per the manufactures guidance, 30A of Esc as been chosen based on the Moto 1000KV.

5.2.1 Connections:

BLDC ESC has three Blue wires coming out from the one end which are to be connected to the BLDC motor. On the other end, it has red and black wires which are to be connected to the battery. It also has a 3 pin servo connector which is used for receiving the throttle command and for giving out regulated 5V, 3Amp supply for the remote receiver and the servo motors.

Propellers

The physics behind a fixed pitch propeller, the kind typically found on all camera drones, is simple. when a motor spins, the propeller does well, causing wind to blow downwards. Once spinning fast enough, the wind is enough for the aircraft to ascend, and when the motors slow down it descends. It is made up of nylon plastic. But usage of Carbon-fibre propeller is preferable. Based on the Calculation of propulsion system that make us to choose 10*4.5 Propeller for the system. Which all together gives the needed load capacity for the system to propel in air.

Pixhawk (2.4.8) Flight Controller

Flight controller (FC) is a small circuit board of varying complexity. Its function is to direct the RPM of each motor in response to input. A command from the pilot for the multi-rotor to move forward is fed into the flight controller, which determines how to manipulate the motors accordingly.

The pixhawk flight controller is the open system and can do program according to the need of access. The benefits of the Pixhawk system include integrated multithreading, a Unix/Linux-like programming environment, completely new autopilot functions such as sophisticated scripting of missions and flight behaviour, and a custom PX4 driver layer ensuring tight timing across all processes. These advanced capabilities ensure that there are no limitations to your autonomous vehicle. Pixhawk allows existing APM and PX4 operators to seamlessly transition to this system and lowers the barriers to entry for new users to participate in the exciting world of autonomous vehicles.

As we looked for Semi-Automatic with open source, we have chosen PixHawk 2.4.8 as Flight controller which can be programmed easily and can change as required.

Transmitter and receiver

Hexacopter Radio Transmitter is an electronic device that uses radio signals to transmit commands wirelessly via a set radio frequency over to the Radio Receiver, which is connected to an aircraft or multi rotor being remotely controlled. In other words, it's the device that translates pilot's commands into movement of the multi rotor. In some radios there is an option to connect an external transmitter module. This makes it possible to use a different frequency (for instance, 900MHz in a 2.4GHz radio) or a different receiver from another brand/protocol (Flysky i6A receiver with s-bus support). Here as future proof we have selected Flysky T/R with 10 channels as we can use it on other model even in further development.

Tethered wire

Tether cable developed for aerial tethered drone. Its purpose is to transmit the power from the battery or power resources to the hexacopter as input power of the system.

Here we have utilized easily available electrical wire of following specification for the tether system. If we use power source as AC current and on board DC conversion Then we can use even thick wire to transmit the power to the hexacopter. In case of DC current suitable gauge wire need to be used for the supporting transmitting of the required electrical energy to the system as required. Based on the Current drawn test and voltage drop test we have chosen 12AWG wire suitable for tethered system.

Telemetry system

Telemetry works through sensors at the remote source which measures physical (such as on board information) or electrical (such as current or voltage) data. They form a data stream that is transmitted over a wireless medium, wired or a combination of both. Telemetry is the collection of measurements or other data at remote or inaccessible points and their automatic transmission to receiving equipment for monitoring. The word is derived from the Greek roots tele, "remote", and metron, "measure". Telemeters are the physical devices

used in telemetry. It consists of two modules: air module and ground module. Usually the air module is placed over the flight and connected to the Pixhawk flight controller. All the information is gathered from the flight controller is used to transfer to the ground by the ground module of telemetry system. As per the government norm we are approved to use telemetry system with 915 MHz so we have selected this telemetry for our system.

FPV system:

FPV cameras are small, light and it is mounted onto a drone to send real time video down to the ground using a video transmitter. The FPV camera allows you to see where the drone is flying and what it is seeing as if it had its own eyes. Depending on the drone, the FPV transmitter will send the live video signal to your Remote Control screen, monitor, smart phone device, tablet or FPV goggles.

FPV Transmitter and Receiver

The audio and video are transmitted from the on board system to the ground where the video and if necessary audio is received in the ground as live telecast. This system receives video output from the camera and converts to the Radio frequency and transmits to the ground where the signal of radio frequency is reversed to the video to the viewer. The transmitter receives 48 channels with bands A, B, C, D, E and F. The TS5828 transmitter 600 MW 5.8 GHz gives wider range and is blocked in the video. The receiver 5.8G UVC OTG Android Phone Receiver, you can connect it to your smartphone directly instead of a heavy monitor and good for those who feel dizzy when wearing FPV goggles. It has low latency around 100ms 150CH auto search allows covering all 5.8G frequency bands.

Telescopic Tower

The telescopic tower is used for elevating the tether wire to the level above certain height. Which is used to release the wire above the obstacle height time so that it can be play a freedom of access across the sky. It is portable can be fixed as requirement. According to the Indian standard average

height is 5 m. If operation exists above, it can be utilized. But prefer to have mobile vehicle attachment as telescopic tower, We have selected an aluminum telescopic stand for demonstration purpose.

VIII. TESTING AND DISCUSSION OF HEXACOPTER

Build of Hexacopter

Initially the hexacopter was built using Aluminium C-shape channel and Mica sheet, it was unsuccessful due to the selection of C-shape channel and unavailability of Square channel of 1 sq.cm. Finally the hexacopter the proposed system is used to take the application for its purpose. The Hexacopter was built by using the components listed in previous chapter. The main frame was selected that are easily available for the development of the hexacopter. Here the base of F550 Naza developed frame is used to build the frame. All the components are fixed on the frame.



Figure 6.1 F550 Hexacopter frame

Landing gear

The landing gear used for hexacopter is inspired of four leg supported system. The hinger are attached to the hexacopter base plate where it consists of four hinger screwed to the base plate. The shocker leg is selected such as that easily attached or detached when they are required. Even the shocker leg are supported to the ceramic coated rods to firmly support and protects from the impact. The whole landing gears prevent the sudden impact act on the vehicle. It absorbs by simplistic design of expanded leg to arrest sudden impact. It has a fabric layer for soft landing over the rods to ensure the softness and grip over landing the system.

Mission Planner

Mission Planner is a full-featured ground station application for the ArduPilot open source autopilot project. This page contains information on the background of Mission Planner and the organization of this site and it is a ground control station for Plane, Copter and Rover. It is compatible with Windows only. Mission Planner can be used as a configuration utility or as a dynamic control supplement for your autonomous vehicle. Here are just a few things you can do with Mission Planner

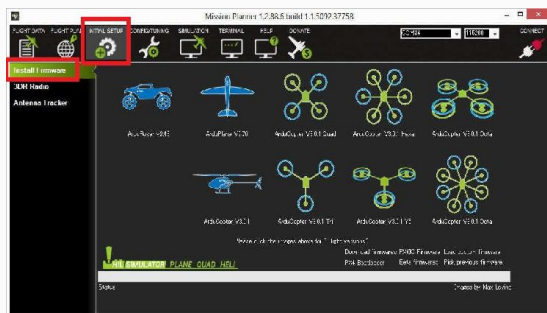


Figure 6.3 Mission planner Software

Loading Firmware

The autopilot using the Mission Planner ground station, which already has ArduPilot firmware installed. Once we installed a ground station on your computer, connect the autopilot using the micro USB cable as shown below. Use a direct USB port on your computer (not a USB hub).

In Mission Planner select the COM port drop-down on the upper-right corner of the screen (near the Connect button). Select AUTO or the specific port for your board. Set the Baud rate to 115200. On the Mission Planner's Initial Setup, Install Firmware screen select the appropriate icon of Hexacopter. Then the concern firmware will be loaded to the hardware automatically by using internet as recourse. The GCS detects which board you are using it will ask you to unplug the board, plug it back in and then press OK within a few seconds



Calibration

Calibration is required to be done for the proper response of the machine and adjustment of system as requirement

Esc Calibration

As we are using PIXHAWK flight controller which is programmable in the open source software Ardupilot which give the platform to calibrate the Esc for the BLDC Motor. The hardware need to be connected to the laptop or PC which have the software Ardupilot. By choosing the COM and port that hardware is connected to the laptop/PC. After connecting. Ensuring the propeller is detached before calibration. Throttle is raised to higher

position in Transmitter. As pixhawk comes with safety switch. It need to be trigger then after two beep sound, we need to stick down to the lowest position while doing three beep sound would occur, At last the stick raise will make movement of motor in simultaneously. Esc Calibration is done for simultaneous BLDC Motor Operation.

Compass Calibration

The hexacopter which has Pixhawk are require to be done Compass Calibration. Usually it done to define the direction of the system. The compass calibration is even done in mission planner software. In initial setup compass calibration is done. If we use External GPS then two compass are used for operation. one is internal and other is external.

ACC Calibration.

Accelerometer calibration is carried to define a level as it generates offsets in the parameters for proper identification of the level by the hardware. It set all the direction of the hardware component by calibration. The hardware which include complete hexacopter need to perform all direction face lift, to set its offset.



Figure 6.7 Direction turns for ACC calibration

Radio Calibration

As we are using mission planner and pixhawk, it can correct the offset and set the limits to the radio controller and for the stick movement. Ensuring the battery is disconnected to the system radio calibration is done in initial setup in mission planner software. Where this software set the offsets value to the stick movement. To do this calibration all stick and switches need to be moved in all possible directions. It is even done for safer handling.

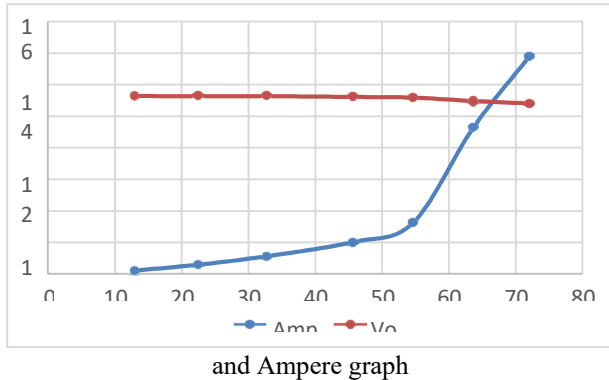
Testing of Hexacopter

At beginning of assembly phase and testing is done by 2200mah Lipo Battery. By using this battery motor, Esc, Flight controller, Gps system and telemetry system is tested.

Phase-I testing

In Phase-I, A whole motor is connected to the Esc with the propeller and tested with power source and current drawn from the power is tested by ammeter and voltage meter. Which is more important for the system. The below Table and Graph show the voltage and ampere relation with the impact of thrust load.

Figure 6.10 Onload Voltage



Phase-2 testing

In Phase-2, The Hexacopter is fixed with the water sprayer application with all its component given power source and tested its working nature. Similarly with second application that is Flame blowing even tested its working with the control and operation by using T/R from ground.

Phase-3 testing

Finally the whole setup is completely engaged with tethered system with a external battery on ground with the tethered cable connected to the drone and working of hexacopter and its application its tested.

IX. APPLICATION AND ITS SYSTEM

A. Water sprayer system

The water sprayer is the complete setup which spray water or any solution which is filled in the storage tank. The water or solution is sprayed over the area of cleaning to make it easier to work and function. It consist of servo motion for target the area than need to be sprayed. This application is developed over main focus towards the cleaning as it consist of variable spraying nozzle, where the flow intensity can be tuned based on the work and its process. It even depends on the fluid used for purpose of work.

B. Flame thrower system

This flame thrower is used to spray the fire by triggering the butane gas by ignited by the nichrome wire by 7-10 Voltage. This setup build over the wooden platform and it consist of copper tubing in 3 mm inner diameter used to extend the gas passage over a distance beyond the air flow. This system consist of components like butane gas cylinder, copper tube, wooden frame fixture, servo motor, nichrome winded wire and BEC.

C. Assembly of a hexacopter and application

The assembly of Tethered system is attached while the application are performing. As pre-assembly the

Hexacopter is integrated with both Flame thrower and Water sprayer. In watersprayer setup is mounted over the system and the power housing is attached to it where the water sprayer get power for pumping of the liquid which is used in application as an cleaning agent. The servo which activate pump is trigger by the push bottom on servo action.

From ground when the command is transfer to the system, system response the servo action which gives source to the pump to blowup liquid through the nozzle. Nozzle have a adjusting knob by which the reach of liquid can be controlled. In Flame thrower system is attached and power by flight controller and BEC for 5V. It consist of nichrome at tip which is glow to makeup fire with propane gas released from the cylinder by actuation of servo from the ground control moment

X. CONCLUSION

The development of a hexacopter and tether system that increases endurance of the flight will solve endurance problem and a Complete Hexacopter was developed by considering to the usage of application that could lift a weight of 2 kg which is sufficient for the purpose of application system of Water sprayer and Flame thrower. Water sprayer import on hexacopter with the tether system can fly for longer endurance than usual Lipo Battery. Same with flame thrower that can be integrated to the vehicle developed to perform the task implemented. Both the application would be product if brought further process for service to the world.

We could develop this sketched model into consumer product. This will bring a revolution in cleaning higher raised building, protecting massive disaster. By water sprayer. Another application i.e., Fire blower which could in controlled deforestation, prevention from deadly insects, removing debris and more. Both application can be commercialized and a startup could begin to reach out the proper audience. Tether system can really bring changes in the drone sector and its endurance. We have a big scope over surveillance as tether can make surveillance by aerial for longer time.

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ARTIFICIAL INTELLIGENCE IN AGRICULTURE

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ABSTRACT:The operation of Artificial Intelligence (AI) has been apparent in the agrarian sector lately. The sector faces multitudinous challenges in order to maximize its yield including indecorous soil treatment, complaint and pest infestation, big data conditions, low affair, and knowledge gap between growers and technology. The main conception of AI in husbandry is its inflexibility, high performance, delicacy, and cost- effectiveness. This paper presents a review of the operations of AI in soil operation, crop operation, weed operation and complaint operation. A special focus is laid on the strength and limitations of the operation and the way in exercising expert systems for advanced productivity.

1. INTRODUCTION

The world's population is assumed to be nearly 10 billion by 2050, boosting agrarian order-in a situation of humble fiscal development by nearly in the range of 50 varied with 2013 (FAO, 2017). At present, about 37.7 of total land face is used for crop product. From employment generation to donation to National Income, husbandry is important. It's contributing a significant portion in the profitable substance of the advanced nations and is playing an active part in the frugality of the developing countries as well. The addition of husbandry has redounded in a significant increase in the per-capita income of the pastoral community. Therefore, placing a lesser emphasis on agrarian sector will be rational and relative. For countries, like India, the agrarian sector accounts

for 18 of GDP and provides employment to 50 of the country's pool. Development in the agrarian sector will boost the pastoral development, further leading toward pastoral metamorphosis and ultimately performing in the structural metamorphosis

. With the arrival of technology, there has been observed a dramatic metamorphosis in numerous of the diligence across the globe (Kakkadetal., 2019). Unexpectedly, husbandry, though being the least digitized, has seen instigation for the development and commercialization of agrarian technologies. Artificial Intelligence (AI) has begun to play a major part in diurnal lives, extending our comprehensions and capability to modify the terrain around us (Kundaliaetal., 2020; Gandhi etal., 2020; Ahiretal., 2020). Plessen (2019) gave a system for crop planning grounded on the coupling of crop assignment with vehicle routing is presented. With this arising technologies the pool which were confined to only a minimum artificial sectors are now contributing to multitudinous sectors. AI is grounded on the vast disciplines like Biology, Linguistics, Computer Science, Mathematics, Psychology and engineering. Jhaetal. (2019) a brief overview of the current perpetration of agrarian robotization. The paper also addresses a proposed system for flower and splint identification and watering using IOT to be enforced in the botanical ranch (Patel etal., 2020; Albajietal., 2010). The introductory conception of AI to develop a technology which functions like a mortal brain (Parekh etal., 2020; Janietal., 2019) This technology is executed by studying how mortal brain thinks, how humans

learn, make opinions, and work while working a problem, and on this ground intelligent software and systems are developed. These softwares are fed with training data and further these intelligent bias give us with asked affair for every valid input, just like the mortal brain. Vast disciplines including Machine Literacy and Deep literacy are core part of AI (Patel et al., 2020a, 2020b);

2019; Sukhadia et al., 2020). While AI is the wisdom of making intelligent machines and programs, ML is the capability to learn commodity without being explicitly programmed and DL is the literacy of deep neural networks.

AI-based equipment and machines, has taken today's agriculture system to a different level. The latest technologies of automated systems using agricultural robots and drones have made a tremendous contribution in the agro-based sector. Various hi-tech computer based systems are designed to determine colorful important parameters like weed discovery, yield discovery and crop quality and numerous other ways (Liakos et al., 2018). This paper encompasses the technologies used for the automated irrigation, weeding and scattering to enhance the productivity and reduce the work cargo on the growers. Colorful automated soil seeing ways are banded (Wall and King, 2004). Hemalatha and Sujatha (2015) brought together temperature and humidity detectors to close the circle holes of the vehicle prognostications. The robots used in seeing were localized by GPS modules and the position of these robots was tracked using the google charts. The data from the robots was brought through Zigbee wireless protocol. The rearmost automated weeding ways are banded and the perpetration of drones for the purpose of scattering in the fields is banded followed by the types of sprayers employed on UAVs. Further speaking about drones, yield mapping and monitoring is banded beginning with the an figure of the yield mapping process followed by the programming of the software and briefing about the computation as well as estimation process. Eventually the processing of these yield maps is illuminated.

2. IMPACT OF AI ON HUSBANDRY

The technologies which AI- grounded help to ameliorate effectiveness which are all the fields and also manage the challenges faced by colorful diligence including the colorful fields in the agrarian sector like the crop yield, irrigation, soil content seeing, crop-monitoring, weeding, crop establishment (Kim et al., 2008). Agrarian robots are erected in order to deliver high valued operation of AI in the mentioned sector. With the global population soaring, the agrarian sector is facing a extremity, but AI has the implicit to deliver much-demanded result. AI- grounded technological results has enabled the growers to produce further affair with lower input and indeed bettered the quality of affair, also icing briskly go-to- request for the yielded crops. By 2020, growers will be using 75 million connected bias. By 2050, the average ranch is anticipated to induce an normal of 4.1 million data points every day. The colorful ways in which AI has contributed in the agrarian sector are as follows

2.1. Image recognition and perception

Lee et al. (2017) said that in recent times, an adding interest has been seen in independent UAVs and their operations including recognition and surveillance, mortal body discovery

and geo localization, hunt and deliverance, timber fire discovery (Bhaskaranand and Gibson, 2011; Doherty and Rudol, 2007; Tomic et al., 2012; Merino et al., 2006). Because of their versatility as well as amazing imaging technology which covers from delivery to photography, the capability to be piloted with a remote regulator and the bias being dexterous in air which enables us to do a lot with these bias, drones or UAVs are getting decreasingly popular to reach great heights and distances and carrying out several operations.

2.2. Chops and pool

Panpatte (2018) said that artificial intelligence makes it possible for growers to assemble large quantum of data from government as well as public websites, dissect all of it and give growers with results to numerous nebulous issues as well as it provides us with a smarter way of irrigation which results in advanced yield to the growers. Due to artificial intelligence, husbandry will be plant to be a blend of technological as well as natural chops in the near future which won't only serve as a better outgrowth in the matter of quality for all the growers but also minimize their losses and workloads. UN states that, by 2050, 2/3rd of world's population will be living in civic areas which arises a need to lessen the burden on the growers. AI in husbandry can be applied which would automate several processes, reduce pitfalls and give growers with a comparatively easy and effective husbandry.

2.3. Maximize the affair

Ferguson et al. (1991) said in his wok that Variety selection and seed quality set the maximum performance position for all shops. The arising technologies have helped the stylish selection of the crops and indeed have bettered the selection of cold-blooded seed choices which are best suited for planter's requirements. It has enforced by understanding how the seeds reply to colorful rainfall conditions, different soil types. By collecting this information, the chances of factory conditions are reduced. Now we're suitable to meet the request trends, monthly issues, consumer requirements. It has enforced by understanding how the seeds reply to colorful rainfall conditions, different soil types. By collecting this information, the chances of factory conditions are reduced. Now we're suitable to meet the request trends, monthly issues, consumer requirements, therefore growers are efficiently suitable to maximize the return on crops.

2.4. Chatbots for growers

Chatbots are nothing but the conversational virtual sidekicks who automate relations with end addicts. Artificial intelligence powered chatbots, along with machine knowledge ways has enabled us to understand natural language and interact with addicts in down further substantiated way. They're substantially equipped for retail, trip, media, and husbandry has used this installation by abetting the growers to admit answers to their unanswered questions, for giving advice to them and furnishing colorful recommendations also.

3. ROBOTS IN AGRICULTURE

Robotics and Autonomous Systems (RAS) are introduced in large sectors of the frugality with fairly low productivity similar as AgriFood. According to UK-RAS White papers (2018) the UK Agri-Food chain, from primary husbandry through to retail, generates over£ 108bn sire, and with 3.7 m workers in a truly transnational assiduity yielding£ 20bn of

exports in 2016. Robotics has played a substantial part in the agrarian product and operation. The experimenters have now started emphasizing on technologies to design independent agrarian tools as the conventional husbandry ministries demanded in effectiveness (Dursun and Ozden, 2011). The main purpose of coming up with this technology is to replace mortal labor and produce effective benefits on small as well as large scale products (Manivannan and

Priyadharshini, 2016). In this sector, the room for robotic technologies has amplified productivity immensely (Pedersen et al., 2008). The robots are performing colorful agrarian operations autonomously similar as weeding, irrigation, guarding the granges for delivering effective reports, icing that the adverse environmental conditions don't affect the product, increase perfection, and manage individual shops in colorful strange ways.

The idea of coming up with such a technology came with the foreword of a machine called Eli Whitney's cotton gin. It was constructed in 1794 by U.S.-born innovator Eli Whitney (1765 – 1825), a device which revolutionized cotton product by significantly accelerating the process of lodging seed from cotton fiber. It created 50 pounds of cotton in one day. Therefore this gave birth to the independent agrarian robots. A introductory automated model was introduced to determine the factual position of seeds (Griepentrog et al., 2005). Ultra high perfection placement of seed was also established. Mechanisms that insure that the seeds planted has zero ground haste (Griepentrog et al., 2005). This is important as it ensures that the seed doesn't bounce from its factual position after the soil impact. The status or the development of factory was recorded by automated machines. Colorful biosensors were established to cover the factory growth and also to descry factory conditions (Tothill, 2001). The process of homemade weeding was replaced by the shaft weeding technology, where a mobile focused infra-red light disrupts the cells of the weeds, this shaft was controlled by computers

(Griepentrog et al., 2006). For the proper use of water, automated irrigation systems were also established.

3.1. Irrigation

The husbandry sector consumes 85 of the available brackish coffers across the world. And this chance is adding fleetly with the population growth and with the increase in food demand. This leaves us with the need to come up with farther effective technologies in order to insure proper use of water coffers in irrigation. The homemade irrigation which was rested on soil water dimension was replaced by automatic irrigation scheduling ways. The factory evapotranspiration which was dependent on colorful atmospheric parameters similar as moisture, the wind speed, solar radiations and indeed the crop factors similar as the stage of growth, factory viscosity, the soil parcels, and pest was taken into consideration while administering independent irrigation machines.

Kumar (2014) discusses about the different irrigation styles with the primary motive of developing a system with reduced resource operation and increased effectiveness. Bias like fertility cadence and PH cadence are set up on the field to determine the fertility of the soil by detecting the chance of the primary constituents of the soil like potassium,

phosphorous, nitrogen. Automatic factory irrigators are planted on the field through wireless technology for drip irrigation. This system ensures the fertility of the soil and ensures the effective use of water resource.

The technology of smart irrigation is developed to increase the product without the involvement of large number of man power by detecting the position of water, temperature of the soil, nutrient content and downfall foretelling. The actuation is performed according to the microcontroller by turning ON/OFF the irrigator pump. The M2M that is, Machine to Machine technology is been developed to ease the communication and data sharing among each other and to the garçon or the pall through the main network between all the bumps of the agrarian field (Shekhare et al., 2017). They (2017) developed an automated robotic model for the discovery of the moisture content and temperature of the Arduino and Raspberry pi3. The data is tasted at regular intervals and is transferred to the microcontroller of Arduino (which has an edge position attack connected to it), it further converts the input analog to digital. The signal is transferred to the Jeer pi3 (bedded with KNN algorithm) and it sends the signal to Arduino to start the water source for irrigation. The water will be supplied by the resource according to the demand and it will also contemporize and store the sensor values. Jha et al. (2019) also developed an automatic irrigation system with the technology of Arduino for reducing the person power and time consumption within the process of irrigation.

Savitha and Uma Maheshwari (2018) also developed the idea of effective and automated irrigation system by developing remote sensors using the technology of Arduino which can increase the product up to 40. Another system for automatic irrigation was given by Varatharajalu and Ramprabu (2018). In this approach different detectors were erected for different purposes like the soil humidity detector to descry the humidity content in the soil, the temperature detector to descry the temperature, the pressure controller detector to take care of pressure and thus the molecular detector for better crop growth. The installation of digital cameras. The affair of all these bias is converted to digital signal and it's transferred to the multiplexer through wireless network similar as Zigbee and hotspot.

The first fashion was the subterranean drip irrigation process, which minimized the quantum of water loss due to evaporation and runoff as it's directly buried beneath the crop. Latterly experimenters came with different detectors which were used to descry the need of water force to the fields as soil humidity detector and rain drop detector, which were controlled through wireless broadband network and powered by solar panels. The rain drop detector and soil humidity detector informs the planter about the humidity content within the soil through SMS in their telephone using GSM module. Consequently the planter can give commands using SMS to ON and OFF the water force. Therefore we can consider that this system will descry part or area in the fields which demanded more water and could hold off the planter from soddening when it's raining.

Soil humidity detectors use one among the several technologies habit to measure the soil humidity content. It's buried near the root zones of the crops (Duke et al., 2009). The

detectors help in directly determining the humidity position and transmit this reading to the regulator for irrigation. Soil humidity detectors also help in significantly conserving water (Quailsetal.,2001). One fashion of humidity detectors is the water on demand irrigation in which we set the threshold according to the soil's field capacity and these detectors permits your regulator to water only when demanded. When the listed time arrives, the detector reads the humidity content or position for that particular zone, and watering will be allowed in that zone only if the humidity content is below the threshold. The other was the suspended cycle irrigation which needs irrigation duration unlike the water on demand irrigation. It requires the launch time and the duration for each zone (Yongetal.,2018).

3.1.1. Dielectric system

The humidity in the soil is calculated by the detectors which principally estimate the humidity content in the soil rested on the dielectric constant (soil mass permittivity) of the soil. The quantum of irrigation demanded can also be determined on the base of the dielectric constant (Gebregiorgis and Savage, 2006). Kuyper and Balendonck (2001) proposes an automatic system that uses dielectric soil humidity detectors for real time irrigation control. The dimension system supported the dielectric parcels is taken into account to be the foremost implicit one (Zhen etal., 2010). Hanson et.,al. (2000) gave the knowledge regarding how soil types affect the delicacy to dielectric humidity detectors. The dielectric steady is simply the capacity of soil to transfer power or electricity. The soil is comprised of varied corridor like minerals, air and water, latterly the estimation of its dielectric harmonious is decided by the overall commitment of each one among these parts. Since the estimation of the dielectric value of water ($K_{aw} = 81$) may be a lot bigger than the estimation of this harmonious for the contrary soil corridor, the estimated value of permittivity is primarily represented by the nearness of humidity within the soil. One system to calculate the relationship between the dielectric constant (K_{ab}) and volumetric soil humidity (VWC) is the equation of Toppetal.

$$VWC = 53 - 5.310^{-2} K_{ab} + 2.22 \times 10^{-4} K_{ab}^2$$

The other system used for determining the dielectric constant is that the by the Time Domain Reflectometry (TDR). It's determined on the idea of the time taken by an electromagnetic radiation to propagate along a string that is girdled by the soil. As we presumably are apprehensive, the propagation haste (V) is a element of the dielectric constant (K_{ab}), thus it's legitimately like the forecourt of the TRM (t during a flash) down and back along the transmission line

$$K_{ab} = \frac{4L}{c} \left(\frac{1}{t} - \frac{1}{t_0} \right)$$

where c is the speed of electromagnetic swells in a vacuum ($3 \cdot 10^8$ m/s or afar/s) and L is the length of the TL in the soil (in m or ft).

3.1.2. Neutron temperance

This is another fashion for deciding the humidity content within the soil. In this strategy fast neutrons are launched out from a putrefying radio dynamic source like $^{241}\text{Am}/^{90}\text{Sr}$ (Long and French, 1967) and when these neutrons slam into patches having a analogous mass as theirs (protons, H), they

drastically hinder, making a "pall" of "thermalized" neutrons. As we formerly know that water is that the primary wellspring of hydrogen in soil, the consistence of thermalized neutrons round the test is about like the division of water present in the soil. The arrangement of the test is as an extended and limited chamber, comprising of a source and a finder. The estimations are taken during this test by bringing the test into an entrance tube, which is as of now presented within the soil. One can decide soil quantum of humidity within the soil at colorful profoundness by balancing the test within the cylinder at colorful profoundness. The humidity substance is gotten with the help of this contrivance hooked in to an immediate alignment between the check pace of thermalized neutrons read from the test, and the soil humidity substance got from conterminous field tests.

The installation of sensors plays a crucial role within the efficient implementation of irrigation robotics. One can use one sensor to regulate the irrigation of multiple zones within the fields. And one also can set multiple sensors to irrigate individual zones. In the first case where one sensor is employed for irrigating multiple zones, the sensor is places within the zone which is that the driest of all or we will say the zone which needs maximum irrigation so as to make sure adequate irrigation within the whole field. The placement of the sensors should be within the root zone of the crops (ensuring that there are not any air gaps round the sensor) from where the crops extract water.

4. CONCLUSION

The agricultural industry faces various challenges such as lack of effective irrigation systems, weeds, issues with plant monitoring due to crop height and extreme weather conditions. But the performance can be increased with the aid of technology and thus these problems can be solved. It can be improved with different AI driven techniques like remote sensors for soil moisture content detection and automated irrigation with the help of GPS. The problem faced by farmers was that precision weeding techniques overcome the large amount of crops being lost during the weeding process. Not only do these autonomous robots improve efficiency, they also reduce the need for unnecessary pesticides and herbicides. Besides this, farmers can spray pesticides and herbicides effectively in their farms with the aid of drones, and plant monitoring is also no longer a burden. For starters, shortages of resources and jobs can be understood with the aid of man-made brain power in agribusiness issues. In conventional strategies huge amount of labor was required for getting crop characteristics like plant height, soil texture and content, in this manner manual testing occurred which was tedious. With the assistance of various systems examined, quick and non-damaging high throughput phenol typing would occur with the upside of adaptable and advantageous activity, on-request access to information and spatial goals.

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ARTIFICIAL INTELLIGENCE IN AGRICULTURE-II

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ABSTRACT: The Food and Agriculture Organization of the United Nations (FAO) says the world's population will increase by an additional 2 billion in 2050, while the additional cultivated area will only reach 4% by then. In such circumstances, more efficient farming practices may be relevant using recent technological advances and solutions to current agricultural bottlenecks. A direct application of artificial intelligence in the agricultural sector could represent an example of a change in the way agriculture is practiced today. Agricultural solutions based on artificial intelligence make it possible to do more with less, improving quality, while ensuring a rapid go-to-market strategy (GTM) for crops. Today, there is an urgent need to decipher issues such as the use of harmful pesticides, controlled irrigation, pollution control, and environmental effects in agricultural practices. Automating agricultural practices has been shown to increase soil gain and also improve soil fertility. Therefore, smart agriculture and IOT -driven agriculture are paving the way for what can be called a third green revolution.



INTRODUCTION:

With the advent of technology in this digital world, we humans have pushed the boundaries of our thinking process and are trying to fuse the normal brain with an artificial brain. This continuous exploration has given birth to a whole new field of artificial intelligence. The new technological frontier, artificial intelligence (AI), can have a huge positive impact, making agriculture

more productive and sustainable. It is the process by which a human being can create an intelligent machine.

AI falls under the IT realm that may be able to discern its environment and should thrive to maximize the success rate. AI should be able to work on the basis of previous learning. Deep learning, CNN, ANN, machine learning are some areas that improve the working of machines and help to develop more advanced technology. The term IOT is clarified as a “what to what” communication.



The three main goals are communication, automation and system cost reduction. K.Sreekantha, Kavya.A.M provides an in-depth application of IOT in the field of agriculture and its usefulness to humans. AI has penetrated medical sciences, education, finance, agriculture, industry, security, and many other sectors. The implementation of artificial intelligence involves the process of machine learning. This brings us to a subdomain of artificial intelligence "Machine Learning".

The sole purpose of machine learning is to feed the machine with data from experiences and statistical data so that it can perform the task assigned to it to solve a particular problem. Today there are many applications that include data analysis from past data and experiences, voice and facial recognition, weather forecasting, medical diagnostics. It is thanks to machine learning that the field of big data and data science has evolved so much.

Over the past 50 years, artificial intelligence has experienced sustainable development due to its robustness in its applications and its ubiquity in all fields. One of those areas is agriculture. Agriculture faces many challenges on a daily basis and it is not a streamlined process. Some of the pith problems that farmers face from sowing to harvesting crops are as follows:

1. Crop disease infestations.
2. Lack of storage management.
3. Control of pesticides.
4. Weed management.
5. Lack of irrigation and drainage systems.

Artificial intelligence and machine learning have entered all the categories mentioned above. Banerjee et al. (2018) separated advancements in the AI category and provided a brief overview of different AI techniques. Computers and technology began to enter this industry from 1983. Since then, many suggestions and systems have been offered to improve agriculture, from database to decision-making. By filtering each process, only systems based on artificial intelligence have proven to be the most feasible and reliable. The method based on artificial intelligence does not generalize the problem and provides a particular solution to a complex problem defined as particular. The bibliographic survey covers the main agricultural findings from the early 1980s to 2018.



Artificial Neural Networks (ANNs) have been incorporated several times in the agricultural sector due to their advantages over traditional systems. The main advantage of neural networks is that they can predict and predict based on parallel reasoning. Instead of programming with precision, neural networks can be trained. Griener and Slaughter (2001) used ANN to differentiate weeds from crops. Maier and Dandy (2000) used neural networks to predict water resource variables.

The pressure on the agricultural sector will increase as the human population continues to increase, and therefore agriculture and precision farming have gained a lot of importance in today's world. These are also called digital agriculture, which means using high-tech computer systems to calculate different parameters such as weed detection, crop forecast, yield detection, crop quality and many other machine learning techniques. With the advent of technology in other industries, the implementation of automation in agriculture is a crucial point. The agricultural sector is one of the most sensitive sectors of the Indian economy, supporting all other sectors and spreading its importance to large areas. The concept of cognitive computing is one that mimics the human thought process as a model in a computer. The result is a turbulent technology in agriculture powered by artificial

intelligence, rendering its service in interpretation, acquisition and reaction to different situations (based on acquired learning) to improve efficiency. To reap the rewards on the ground by catching up with recent advances in the agricultural sector, farmers may be offered solutions through platforms such as chatterbots.

Huge volumes of data are generated every day in a structured and unstructured format. This data covers weather conditions, soil reports, new research, rainfall, vulnerability to pest attacks, drone and camera imagery. Cognition-related IOT solutions would perceive, recognize and produce smart solutions to improve cultures. With the geometric increase of the world population, it becomes imperative to review agricultural practices with the aim of proposing innovative approaches to support and improve agricultural activities.

The introduction of AI in agriculture will be made possible by other technological advances, including big data analytics, robotics, the Internet of Things, the availability of affordable sensors and cameras, drones and even large-scale internet coverage over geographically dispersed fields. Sources of soil management data such as temperature, weather conditions, soil analysis, humidity and historical crop performance, artificial intelligence systems will be able to provide predictive information about the crop to plant in a given year and optimum sowing and harvest dates in a specific area, thereby improving yields and reducing the use of water, fertilizers and pesticides. Through the application of artificial intelligence technologies, the impact on natural ecosystems can be reduced, and worker safety can be increased, which in turn will keep food prices low and ensure that food production follows. The rate of population growth.

Agriculture involves many choices and uncertainties from one season to the next; weather varies, agricultural commodity prices fluctuate, soil degrades, crops are not viable, weeds choke crops, pests damage crops and climate change - farmers face these uncertainties. It is crucial to examine the application of AI to agriculture with regard to soil, crops, disease and pest management.

Soil is a key component of successful agriculture and is the original source of nutrients used to grow crops. Soil is the basis of all production systems in agriculture, forestry and fisheries.



Soil stores water, nutrients and proteins in order to make them available for proper crop growth and development. Proper tillage practices has to be practiced to maintain the

fertility of soil using power tillers and other AI systems ensuring the fertile nature of land.



Agricultural production plays a crucial role in the Nigerian economy. It provides food, raw materials and employment. In modern times, marketing, processing, distribution and after-sales service are also accepted as part of agricultural production. In places where real per capita income is low, the focus is on agricultural production and other primary industries. More emphasis should therefore be placed on the further development of agricultural production. We need to understand these impacts and try to maximize the benefits while minimizing the potential risks.

As agriculture struggles to support rapid population growth, plant diseases reduce the quantity and quality of agricultural production. Agricultural losses due to post-harvest diseases can be disastrous. Weeds are a major threat to all agricultural activities. invade crops, suffocate pastures and in some cases harm livestock. They aggressively compete with crops for water, nutrients, and sunlight, resulting in reduced yields and poor crop quality. Better aggregation indicates the addition of organic matter which plays an important role in preventing the formation of soil crust. Alternative tillage systems can be adopted to avoid physical degradation of the soil. Expert systems are farm management tools because they can provide specific, integrated and interpreted advice. However, the development of expert systems for agriculture is quite recent and the use of these systems in commercial agriculture is rare today.

Although AI has made significant improvements in the agricultural sector, it still has a below average impact on agricultural activities compared to its potential and impacts in other sectors. Much remains to be done to improve farming activities using AI, as its implementation has many limitations.

The government can support farmers by designing a web service that allows low rate device to work only with AI systems for farmers. In addition, some form of 'how to'

orientation (training and retraining) will really help farmers adapt to using AI on the farm.

An important attribute of an intelligent or expert system is its ability to perform tasks accurately in a very short time. Most systems don't measure response time or accuracy, or even both. A system delay affects the user's selection of the activity policy. It is assumed that the selection of the strategy is based on a cost function which combines two factors:

The effort required to synchronize the availability of the entry system. The level of precision offered. People seeking to minimize effort and maximize accuracy choose between three strategies:

Automatic performance
Rhythm
Monitoring

It is well known that a large amount of pollution occurs everywhere in the world due to the use of fertilizers and pesticides. In an attempt to industrialize agriculture, increase production, the need for products of a certain size, color, etc., a large amount of food is wasted, while on the other hand, many are those who do not get a daily square meal. There is growing support for the idea that it is not important to have a large quantity of products with little or no nutritional value. On the contrary, it is necessary to have a reasonable amount of products with less pollutants and more nutrition.

Awareness of emerging issues, coupled with a pressing desire to integrate AI into larger applications, has led to the development of responsive AI systems.

AI coding is based on learning (data acquisition then creation of algorithms to transform them into usable information), reasoning (choice of the right algorithm to obtain a desired result) and self-correction (adjustment continuous designed algorithms and ensure that they provide maximum accurate results) as three cognitive skills. In machine learning, statistical and mathematical methods are used to learn from datasets in order to make predictions / decisions based on the data. There are several methods for this. The general distinction can be made from two systems; the first is the symbolic approach (the rules and induced examples are explicitly represented) and the second is the sub-symbolic approach (artificial neural networks: ANN). The ML approach is categorized into three main tasks: supervised, unsupervised and reinforcement learning.

The algorithms used in supervised learning techniques are numerous, including decision trees, Bayesian networks, and regression analysis. As for unsupervised learning, it includes algorithms such as artificial neural networks (ANN), clustering, genetic algorithm, and deep learning, and uses unlabeled data

sets without prior knowledge of the variables. entry and exit. Recently, AI technology has opened the door to its implementation in the food industry. In fact, AI approaches offer important contributions and aids in understanding the processes of identifying patterns, creating services, and making decisions to support different applications and phases of the agrifood chain.

The main objective of AI in agriculture is to provide precise and predictive decisions in order to improve productivity with conservation of resources thanks to this, artificial intelligence tools offer algorithms to evaluate performance, classify models and predict problems or unforeseen phenomena in order to solve comprehension problems in the agricultural field and for the identification of pests and the associated treatment method, as well as the management of the irrigation process and the consumption of water through the creation of intelligent irrigation systems. Abiotic and biotic factors are evaluated by remote sensing and sensors in order to optimize crop and livestock management.



In addition, the implementation and applications of AI have huge benefits that could revolutionize the food industry and related businesses.

First, artificial intelligence provides more efficient means of producing, harvesting and selling agricultural products, while focusing on controlling faulty crops and improving the potential for healthy agricultural production. In addition, artificial intelligence is used in applications such as automated adjustments of weather forecasting machines and the identification of diseases or pests with 98 percent accuracy. In fact, recently, Sujatha et al. compared the performance of methods (ML) and (DL) to detect and identify leaf diseases in citrus fruits.



Second, advancements in AI technique have enabled farms to operate more efficiently by improving crop management practices, thus helping many tech companies to invest in algorithms that become useful in agriculture and to solve conflicts farmers face with climate change and a pest and weed infestation that reduces yields. Third, by using artificial intelligence tools, farmers can be able to stay up to date with weather forecast data, and therefore forecast weather data helps farmers increase yields and profits without risking the harvest, and Therefore, after analyzing the generated data, artificial intelligence enables farmers to better understand and learn and therefore to take precautions by implementing practices to make a timely and intelligent decision.

Agriculture can benefit significantly from artificial intelligence in all regions and agricultural structures. Agriculture, transportation, food processing and marketing give rise to complex value chains and artificial intelligence can help make them more efficient and sustainable.

An example of the application of artificial intelligence by FAO for the benefit of small landowners is, for example, the use of machine learning and artificial intelligence, and has helped fight armyworm fall in sub-Saharan Africa, which threatened to wreak havoc on crops and farmers' livelihoods. The FAO Earth Observation System (SEPAL) helps countries measure, monitor and report on forest and land use. It uses advanced cloud computing, artificial intelligence, and machine learning to enable detection of small-scale changes in forests, such as those associated with illegal or unsustainable logging.

Precision farming methods applied on farms in developed countries and emerging economies are based on artificial intelligence. They are intelligent machines such as drones, sensors, robots and autonomous tractors. These machines are supplemented with data and software that can "think" like the farmer, "learn" like the farmer, and "solve" problems like a farmer. This is very different from what we know: Farmers produce food using knowledge gained through experience supported by scientific evidence provided by extension. Farmers also play a key role in the provision, exchange and use of agricultural data and information. All of this can have a huge impact on productivity, better management of

natural resources, such as soil and water, reduced pollution and environmental impacts, and increased food security.

At the same time, artificial intelligence will have a deep impact further down the food value chain: transportation, food processing and food marketing and trade will also be affected by automated systems. In agriculture and across industries, traders are increasingly relying on computer algorithms to learn from economic data and identify opportunities.

Despite all of these advantages, AI technology also has drawbacks that pose challenges. First, the most important social challenge is unemployment, which could pose a threat. Indeed, intelligent machines and robots could replace most of the repetitive tasks and jobs; therefore, human interference decreases, which will cause big problem in occupancy standards. Other technological challenges, for example, machines can only perform the tasks for which they are programmed or developed, and anything outside of that tends to get stuck or give irrelevant results could be a hindrance. important plan.

DIFFICULTIES ENCOUNTERED IN THE IMPLEMENTATION OF AI

The use of AI can be complex for farmers because they are not aware of its implementation.

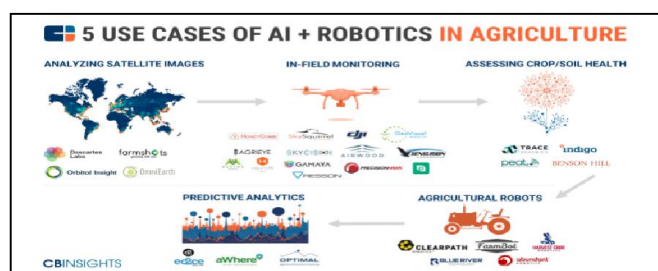
Farmers would need help to adopt it.

AI technology companies, in addition to selling the product, will need to provide adequate advice on its use. Threats to privacy and security can cause serious problems for farmers.

There are no clear policies and regulations on the use of AI in general.

Precision agriculture and smart agriculture raise several legal issues.

In addition, the high costs of creating and maintaining smart machines and clever computers could be seen as technological limitations of AI technologies, especially that AI is updating every day and that is why hardware and software need to be updated over time to meet the latest requirements. . Machines need to be repaired and maintained, which is expensive. The creation requires huge costs because they are very complex machines. Other problems associated with these applications are their high cost which could increase the price of the products.



In addition, beyond the opportunities offered by smart and information technologies, some risks and concerns about sustainability may arise, including massive energy consumption, e-waste problem, market concentration, displacement workforce and even the ethical framework.

The most popular applications of AI in agriculture seem to fall into three main categories:

CROP AND SOIL MONITORING

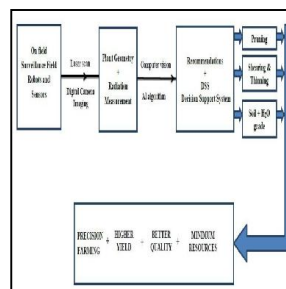
Companies use computer vision and deep learning algorithms to process data captured by drones and / or software technology to monitor crop and soil health.

PREDICTIVE ANALYTICS

Machine learning models are being developed to track and predict various environmental impacts on crop yields, such as climate change.

FARM ROBOTS

Companies develop and program autonomous robots to handle essential farming tasks such as harvesting crops at a greater volume and at a faster rate than human workers.



BLUE RIVER TECHNOLOGY - Weed Control The ability to

control weeds is a top priority for farmers and an ongoing challenge as herbicide resistance becomes more common. Today, around 250 weed species have become resistant to herbicides. In a study conducted by the Weed Science Society of America on the impact of uncontrolled weeds on corn and soybean crops, annual losses to farmers are estimated at \$ 43 billion.

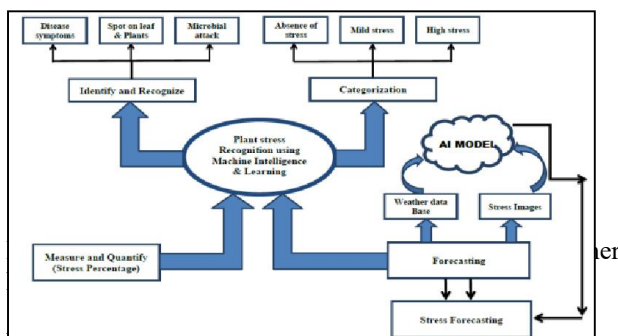
Companies are using automation and robotics to help farmers find more efficient ways to protect their crops from weeds. Blue River Technology developed a robot called See and Spray that would use computer vision to accurately monitor and spray weeds on cotton plants. may help prevent herbicide resistance. Harvest CROO Robotics - Crop harvesting automation is also emerging in an effort to help meet workforce challenges. The industry is expected to experience a 6% drop in the number of farm workers from 2014 to 2024. Harvest CROO Robotics has developed a robot to help strawberry growers harvest and pack their crops. Labor shortages have reportedly resulted

in millions of dollars in lost income in key agricultural regions such as California and Arizona. In Hillsborough County, Florida, which has been described as the “national winter strawberry capital,” between 10,000 and 11,000 acres of strawberries are typically harvested in a single season. Harvest CROO Robotics claims its robot can harvest 8 acres in a single day and replace 30 human workers.

PEAT - Computer vision for the diagnosis of pests / soil defects:

Deforestation and degradation of soil quality remain major threats to food security and negatively impact 'economy. Nationally, the USDA has estimated the annual cost of soil erosion at around \$ 44 billion. The image recognition application enhanced by Deep Learning is called Plantix. Detect possible defects with images and provide users with soil restoration techniques, advice and other meaningful solutions. PEAT claims that Plantix can quickly achieve pattern detection with an accuracy of around 95%.

PEAT, a Berlin-based agricultural technology start-up, has developed a deep learning app called Plantix that would identify potential defects and nutrient deficiencies in the soil. Analysis is performed by software algorithms that relate particular foliage patterns to certain soil defects, pests and plant diseases. The image recognition application identifies possible faults through the images captured by the user's smartphone camera. Monitoring of crop and soil health



where, a Colorado-based company uses machine learning algorithms in conjunction with satellites to predict weather, analyze crop sustainability, and assess farms for presence diseases and parasites. For example, daily weather forecasts are tailored to the needs of each client and range from hyper local to global. The types of clients mentioned on the company's website include farmers, agricultural consultants, and researchers.

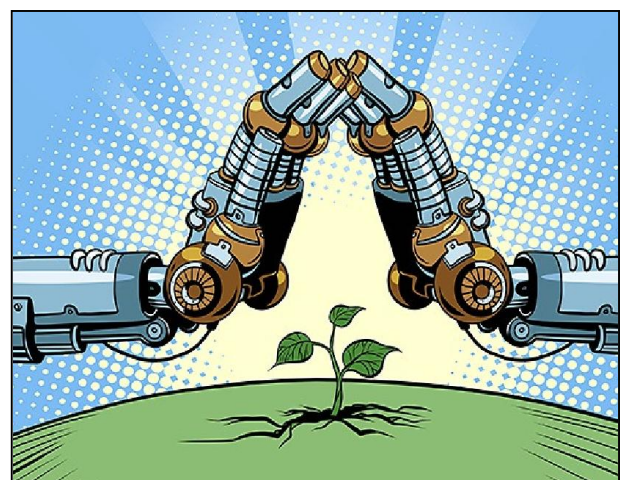
FarmShots: Satellites for monitoring crop health and sustainability.

Based in Raleigh, North Carolina, FarmShots is another startup focused on analyzing agricultural data derived from images captured by satellites and drones. More specifically, the company aims to "detect diseases, pests

and poor plant nutrition on farms."The software is released for use on mobile devices.

CONCLUSION:

Artificial intelligence in agriculture not only helps farmers automate their farming but also moves to precise farming for higher yields and better quality using fewer resources. Companies involved in improving machine learning or AI-based products or services, such as training data for agriculture, drones, and automated machine manufacturing, will realize technological advancements in the future and provide more useful applications to this industry in helping the world solve the problems of food production for the growing population.



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DATA ANALYSIS IN AGRICULTURE

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ABSTRACT: In addition, it also recognizes the basic computational and analytical capacity of big data in preparing colossal volumes of information based on constantly valuable circumstances. The aim of this document is to present the reviews in the rural area and to support the dialogues on how the government can foster the developments in the scrutiny of information to improve the rustic agricultural framework.

Keywords:Big Data Analytics,Rural farming systems,Precision farming, Electronic farming records.

INTRODUCTION

India is a fearless nation with over billions of dollars or more, and one of the fastest growing economies in the world. Of the extraordinary population, 58.4% is an open agricultural harvest.

Only 30% to 60% of the best product yields available on the ranches of created nations and in addition to other creative nations.

Today, India ranks second in the world for ranch performance. Agriculture and unitary divisions represented 13% of aggregate GDP in 2014

About half of the total workforce.Agriculture is geographically the largest area and takes a typical part in the complete financial house of India. The existing report indicates that the agricultural zone continues to follow India.



The financial expansion of agriculture to Indian GDP indirectly decreases with the growth of the nation's monetary development.

I. PRECISION AGRICULTURE (PA)

It is a farming idea that cultivates in light of observation, measurement and response to landfill and within-field variability in crops.

Crop variability regularly has both a spatial and a transient segment that makes measurable / computational drugs fully included. Some agro-industry specialists saw the interest in sensor information reaching the rural context and figured out how to gain reasonable suggestions, including government and its approaches. .

According to the above exchanges, the information from the eAgriculture administration can be considered Big Data due to its assortment of information with huge volumes of high-speed streaming.Part of the big data responses of the eAgriculture service includes current predominant technologies such as HDFS, Map Reduce, Hadoop, STORM, etc

1. Measure, store and analyze data to improve the quality of output.
2. Manage income costs by reducing the likelihood of crop failure.

The adoption of big data in agriculture greatly reduces the likelihood of crop failures and the main concerns of farmers and recommends that information on soil detection and crop yields be stored in data centers.

This article is organized as follows: in section II we describe the current agricultural system in India, section III deals with big data in general, section IV focuses on the problems of the existing agricultural system, section V talks about the use of big data analytics in the farming system and Section VI provides the description of technologies for precision farming and Section

VII concludes the work.

II CURRENT AGRICULTURAL SYSTEM IN INDIA

Agricultural systems in India are carefully adapted, according to their most appropriate positions. That is, crops are developed as indicated by ranch or dirt conditions present on a specific area or area. The districts of India vary according to the type of culture they use; some depend on agriculture, agro-rangers and others.

The geological site of India causes different parts to encounter unmistakable atmospheres, which particularly affect the agricultural profitability of each district. India now occupies the second place in the agricultural generation on the planet. 2007, agriculture and other industries accounted for over 16% of India's GDP. Despite the sustained decline in the commitment of agriculture to the country's GDP,

Indian agribusiness is the country's largest enterprise and plays a key role in the country's financial development. It is also the second largest collector of vegetables and organic products, speaking of 8.6% and 10.9% of the overall creation, individually. India also has the highest number of pets on the planet, with 281 million. About a sixth of the region has real crop yield problems, for example, disintegration, water stagnation, drought, causticity, salinity and alkalinity.

The practices of the irrigation system were presented, in a few years, the problems of salinity and water stagnation had been stimulated. Obviously 7 Mega hectares of surface are affected by alkalinity and salinity. Based on the soil conditions of the particular agricultural area, the crops to be grown are decided on the basis of moisture content, humidity, degree of nutrients present, etc. It is therefore very important to keep a record of all soil quality properties (for which big data can be used).

III. BIG DATA IN GENERAL

VOLUME:

The amount of data generated as big data varies from terabyte to exabyte and zettabyte of data. Data is already generated and stored every day. This is expected to double by the end of 2015.

SPEED:

Big data grows rapidly, generating an bizarre amount of amounts that need to be stored, transmitted and processed quickly. It deals with the speed at which data flows from sources like business processes, machines, networks, and human interaction with things like social media sites, mobile devices, etc.

VARIETY:

Variety refers to the many sources and types of both structured data. We used to store data from sources such as spreadsheets and databases. Now data comes in the form of emails, photos, videos, trackers, PDFs, audio files, etc.

TRUTH: Truthfulness refers to predisposition, emotion and irregularity of information. The accuracy of the review is based on the veracity of the source information. Unlike the volume and speed of big data, veracity is the hardest mark to examine information.

VALUE:

If we produce so much information, what is its real value? Understanding the estimation of this information is essential to simplify the procedure. Putting assets into big data deals is expensive, so ensuring that the information removed is of quality to the organization is critical.

IV. PROBLEMS EXISTING IN THE CURRENT AGRICULTURAL SYSTEM IN INDIA

Over 68% of the total population of India lives in rural areas and about three quarters of the inhabitants of the provincial regions are subjected to agriculture for their work. Public Policy at the Indian Institute of Management, Bangalore, raised some fundamental questions in one of its meetings:

At present, the problems plaguing Indian agriculture are insufficient learning and Legitimate Structure in Regions Rustic Problems Identified with Irrigation The system, market foundations and transportation facilities add huge expense to the farmer's operations. Another problem is the lack of transportation systems.

There are various plans to create horticulture. We do not have successful transportation systems that can interpret them as a powerful grassroots aid, in terms of increasing efficiency or reducing costs or expanding recognition of value.

Lack of government support exacerbates these problems. Government failure is a notable concern in agriculture in light of the fact that the high dangers included make aid and assistance vital. Like some other business ventures, horticulture is prone to high dangers due to unpredictability.

V. USE OF BIG DATA ANALYTIC IN AGRICULTURAL SYSTEMS

We have entered the age of enormous information. Enormous information allows us to collect, store and break down information to uncover as yet unknown data by intelligently using the ever-increasing amount of available data that we could develop a new vision by examining the information or combining it with other data. accessible. In agriculture, this does not simply involve mining crop data, rainfall maps and symptom reports, etc. moment in time.

The aim of this document is to provide first-rate agricultural methods, furthermore, means of ensuring greater yield efficiency for hardy individuals and of overcoming problems in rural

structures such as the use of harmful pesticides, the exorbitant use of compost, providing appropriate irrigation system offices and the administration of extortions in the horticultural setting.

The proposed idea allows farmers, huge information reviewers and staff to have access to partial construction data in light of electronic farm records.

VI. TECHNOLOGIES FOR PRECISION AGRICULTURE

In order to collect and use information effectively, it is important that anyone considering precision agriculture is familiar with the modern technological tools available. The wide range of tools includes hardware, software and best management practices. These are briefly described in the following paragraphs.

Global Positioning System and # 40, GPS and # 41; receivers: Global Positioning System satellites transmit signals that allow GPS receivers to calculate their position. This information is provided in real time, which means that continuous position information is provided during movement.

Having accurate location information at all times allows you to map soil and crop measurements.

GPS receivers, both carried in the field and mounted on tools, allow users to return to specific locations to sample or treat those areas. Incorrect GPS signals have an accuracy of approximately 300 feet. To be useful in agriculture, incorrect GPS signals must be easily compared to a terrestrial or satellite signal that provides a positional correction called differential correction. The correct locating accuracy is typically 6310 feet. When purchasing a GPS receiver, the type of differential correction and area coverage should be taken into account.

(VRT): VARIABLE RATE TECHNOLOGY

It refers to technology that enables variable rate application of materials in precision agriculture. Variable rate fertilizer application allows crop producers to apply different rates of fertilizer to each location across fields. variable rate fertilization includes a computer in the cabin and software with a field area easily.

Better understanding of environmental challenges Unpredictable weather conditions, severe storms, drafts and changes in insect behavior due to weather conditions are all environmental factors that affect the agribusiness supply chain.

Managing changing environmental conditions can help farmers prepare for challenges and maximize opportunities, all without wasting resources. Data analysis can help farmers monitor crop health in real time, create predictive analytics for future harvests, and make resource management decisions based on proven trends.

Reduce waste and improve profits. To remain profitable, farms must continue to innovate and find ways to demonstrate real added value. By incorporating a data analytics strategy, farms gain the ability to answer sales-related questions with data from

a single platform, creating the ability to make timely, evidence-based decisions.

They also benefit from price visibility, which allows them to make profit-based decisions. In addition, correct analyzes will uncover opportunities at the customer level and inform the sales team in order to increase market share.

Improved supply chain management:

The current agribusiness value chain is very isolated and needs improvements for both communication and collaboration. The transformative impact of precision farming technologies, such as data analytics, makes it easier for farmers to trace their products through the supply chain. This enables every farmer to communicate valuable information to retailers, distributors and other key stakeholders about product offerings and services.

Getting Started:

The ability to extract information from data, create algorithms and invent new technologies continues to advance at astonishing speed. The combination of shared information, smart technologies and ambitious innovations can achieve extraordinary feats for the food industry. When analyzing data and creating a competitive advantage, it is important to consider the strategy and long-term goals of this business.

First of all, a farm organization must have the right tools before it can implement a data analysis strategy:

DATA COLLECTION:

This will allow you to aggregate data from your trusted and selected sources and simplify operations by archiving data in a secure location.

STANDARDIZE DATA:

The ability to combine multiple datasets into a single data structure will create the ability to perform comparisons, track trends in real time, and discover patterns in the data to help identify new opportunities.

CLEAN DATA:

Ensuring that your data is clean, accurate and complete will give you the confidence to make decisions based on that data.

ENRICH DATA:

Having the ability to connect to external information - weather data, local soil analysis, insect monitoring - will allow you to improve forecasts and identify potential challenges.

ANALYZE DATA:

The ability to analyze data is critical to getting value from the information you collect. Having the ability to connect to external information - weather data, local soil analysis, insect monitoring - will allow you to improve forecasts and identify potential challenges.

Find out what tools are available to build your analysis and make sure they support the results you want to achieve. Once the right

technology and the right communication tools are in place, it's time to think about your business strategy.

Here are the key steps to take before implementing a data analytics platform: The future of big data farming - The future of big data farming is really bright and full of potential. The agricultural big data analytics market alone is projected to reach \$ 1.4 billion by 2025, which speaks volumes about the interest in the segment.

Data for the future of smart agriculture: For the longest time in our history, our collective decisions have been largely made by instinct or our best guess. Mankind has never had the luxury of precision, which is why big data has such an important role to play in agriculture.

By eliminating variables and allowing farmers to stay one step ahead of their own ecosystem, big data can ensure that agriculture remains a stable and viable line of work for the farmer.

The information ingested by different executives can be continuously evaluated to point out the core values that play a vital role in the framework of grassroots leadership.

The geological maps thus produced are of great determination recognizing the variety of soil moisture. It would lead to the final use of the irrigation system.

However, the vast horticultural informative survey takes an urgent role in giving better agricultural administrations, examines genuine information to reveal hidden data. The enormous search for information presents challenges such as heterogeneity and fragmentation of information, scale, security and the union of human effort. Precision agriculture gives farmers the opportunity to use agricultural inputs more successfully, including fertilizers, pesticides, cropping systems and irrigation systems.

VII. CONCLUSION AND FUTURE WORK

It shown that hardly determine the money saving benefits of accurate agribusiness administration. For the moment, some of the innovations used are part of the first stages and the evaluation of equipment and administrations is difficult to constrain. This can present our current financial expressions on a specific dated innovation. Agribusiness can solve both monetary and natural problems that encompass artificial agriculture today. Questions remain about cost-effectiveness and the best approaches to use.

The advancement of scrutiny of agricultural information prompts the understanding of new improvement results from these sets of background information. Currently, the detection of dirt and commodities has changed the rural setting to become much more skillful, less expensive, and to achieve preferable quality for quite some time recently.

Meanwhile, many new companies are creating both physical and satellite sensors that are accelerating the shift to "connected" agriculture. The spread of smart sensors with the compelling investigation of big data will take us a step forward towards freeing farmers from the constraints of uncertain time.

The use and selection of Big Data, within the framework of legislative procedures, is advantageous and allows efficiency gains in terms of costs, profitability and progress. Either way, this scrutiny of information often requires many parts of government (central and local) to work cooperatively and create new and imaginative procedures to convey the imagined result.

By running this document using Hadoop HDFS and Map Reduce, we were able to reveal the data found in the huge agrifood information sets. Finally, the accuracy of the food industry largely depends on the quality and speed with which the information expected to manage new innovations can be found.



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DRONE AGRICULTURE DRONES FOR SMART AGRICULTURE

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ABSTRACT: One of main source of income in of India is Agriculture. The product rate of crops in husbandry is grounded on colorful parameters like temperature, moisture, rain, etc. Which are natural factors and not in growers control. The field of husbandry is also depends on some of factors like pests, complaint, diseases, etc. Which can be control by giving proper treatment to crops. Fungicides may increase the productivity of crops but it also affects on mortal health. So the main end of this paper is to design husbandry drone for scattering fungicides. In this paper, we're going to discuss different armature grounded on unmanned upstanding vehicles (UAVs). The use of fungicides in husbandry is veritably important to husbandry and it'll be so easy if will use intelligent machines similar as robots using new technologies. This paper gives the idea about colorful technologies used to reduce mortal sweats in colorful operations of husbandry like discovery of presence of pests, scattering of UREA, scattering of diseases, etc. This paper describes the development of quadrangle helicopter UAV and the scattering medium. In this paper we also bandy integration of sprayer module to quadrangle helicopter system. The bandied system involves designing a prototype which uses simple cost effective outfit like BLDC motor, Arduino, ESC cables, etc

KEYWORD: *Unmanned Arial vehicles, Brushless motors, remote seeing, ESC cables, Li pro wireless bowl.*

I. INTRODUCTION

Agriculture in India constitutes further than 60 of occupation. It serves to be the backbone of Indian frugality. It's veritably essential to ameliorate the productivity and effectiveness of husbandry by furnishing safe civilization of the planter. The colorful operations like scattering of fungicides and smattering toxin are veritably important. Though scattering of fungicides has come obligatory it also proves to be a dangerous procedure for the growers. Farmers especially when they spot urea, take to numerous preventives like wearing applicable outfit masks and gloves. It'll avoid any dangerous effect on the growers. Avoiding the fungicides is also not fully possible as the needed result has to be met. Hence fore, use

of robots in similar cases gives the stylish of the results for this type of problems, along with the needed productivity and effectiveness of the product (1). According to check conducted by WHO (world health association) it's estimated that every time about 3 million workers are affected by poisoning from fungicides from which 18000 bones. This systems aims to overcome the ill-effect of the fungicides on mortal beings and also use to spot fungicides over large area in short intervals of time compare to conventional spraying by using automatic toxin sprayer. This device is principally combination of scattering medium on a Quadcopter frame (3). This model is used to spot the fungicides content to the areas that cannot fluently accessible by humans

II. LITERATURE SURVEY

Prof. P. P. Mone, ChavhanPriyankaShivaji, JagtapKomalTanaji, NimbalkarAishwarya Satish has published a paper entitled "Agriculture Drone for Spraying fertilizer and Pesticides". In this paper authors has given detail about implementation of Agriculture drone for automatic spraying mechanism. In this paper, they gave problem statement of World Health Organization where it estimates that there are 3 million cases of pesticide positions in each year and upto 220,000 deaths, primarily in developing countries. In this paper they also explain what precautions the farmer should have to use to avoid harmful effects of pesticides and fertilizing effects as well as cost effective technology using components such as PIC microcontroller for the control of agriculture robots. The published paper is available at IJRTI, Volume2, Issue6,2017.

[1]Prof.S.MeivelM.E.,Dr.R.MaguteeswaranPh.D., N.GandhirajB.E.,G.SrinivasanPh.D.has published a paperentitled"Quadcopter UAV based Fertilizer and Pesticide Spraying System". In this paper authors has given detail about implementation of Agriculture wonder drone. They gave detail aboutQuadcopter UAV and sprayer module and also discuss pesticide content to the areas that can't easily accessible for human beings. They discussed used of multispectral cameras which is used to capture remote sensing images to identify the green field as well as the edges of crop area. Total pay load

lift of their quad copter is 8 kg. They used QGIS software for the purposed of analysing the remote sensing images. The published paper is available at International Academic Research, Journal of Engineering

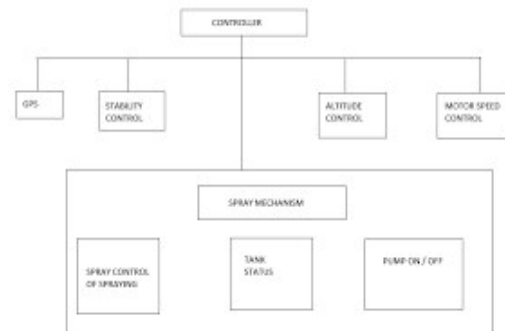
Sciences, Volume 1, Issue 1,

III. STYLES AND ALGORITHMS

A. Husbandry Wonder Drone System using microcontroller 8051 The proposed system is an bedded system which will nearly cover and control the microclimatic parameters of a hothouse on a regular base round the timepiece for civilization of crops or specific factory species which could maximize their product over the whole crop growth season and to exclude the difficulties involved in the system by reducing mortal intervention to the stylish possible extent. The system comprises of detectors, Analog to Digital Converter, microcontroller and selectors. When any of the below mentioned climatic parameters cross a safety threshold which has to be maintained to cover the crops, the detectors smell the change and the microcontroller reads this from the data at its input anchorages after being converted to a digital form by the ADC. The microcontroller also performs the demanded conduct by employing relays until the erred-out parameter has been brought back to its optimum position. Since a microcontroller is used as the heart of the system, it makes the set- over low- cost and effective nonetheless. As the system also employs an TV display for continuously waking the stoner about the condition inside the hothouse, the entire set-up becomes stoner friendly. Therefore, this system eliminates the downsides of the being set-ups mentioned in the former Section and is designed as an easy to maintain, flexible and low cost result (21). But unfortunately microcontroller has some downsides that can be overcome with use of ARM processor 2) (4). Limitations of ARM7 are Cost is high, Complex instruction set, Complicated to designs because number of leg is further (16)

B. Agriculture Drone system using GPS

The Husbandry Wonder Drone System is designed by making use of GPS where the automatically controlled drone grounded on upstanding fungicides sprayer substantially conforming of two corridor the quadrangle helicopter and scattering medium. Originally quadrangle helicopter is assembled using necessary factors similar as flight controlled board (FCB), GPS, BLDC motor, ESC regulator and battery, etc. Where the drone was conducted at needed altitude, and also it's switch to altitude hold mode, which maintains the same altitude until it's switched back



C. Agriculture wonder drone system using Atmega 328

All the limitation banded in above systems can be overcome if the system is enforced using Atmega 328. This system is will used BLDC motors which are multiphase, typically 3 phases, so direct force of DC power won't turn the motor ON. Electronic speed regulator (4 used for the generating high frequency signals with different but controllable phases to keep the motor turning. The ESC regulator is also suitable to reference a lot of current as the motors can draw a lot of power. 30 PRM 12V DC geared motors for robotic operations are veritably easy to used and available in standard size. To measure acceleration accelerometer used and to measured angular haste gyro cadence is used. LiPo battery can be plant in single cell of 3.7 V to in a pack of over 10 cell connected in a series (37V). Where the communication with the HMC5883L is simple and each done are through an I2C interface. There's board controller. The rout board includes the HMC5883L detector and all filtering capacitor.

D. Agriculture Wonder Drone using ATMEGA 644PA

The Husbandry Wonder Drone system is designed by making used of Microcontroller Atmega 644PA. In this block illustration of Agriculture wonder drone accelerometer and gyrometer detectors are used for the purpose of measuring accelerations and force so the downcast graveness will also be tasted. A gyro cadence is used for measuring angular haste, in other words the rotational speed around the three axes.

There are different sections of transmitter and receiver. In this block illustration the transmitter section correspond of signal slice block which is used for quantization and slice of signal. Frequency modulator is used for modulation purpose and filtering part done by band pass sludge. The receiver section conforming of battery, ESC regulator, motors and sprinklers. Smattering has two sections contemporaneously remote regulator and sprayer regulator. The remote regulator section is used to control the selector of sprinkler. The snoot of sprayer module was get actuated by remote regulator. Wherever there was a need to spark a

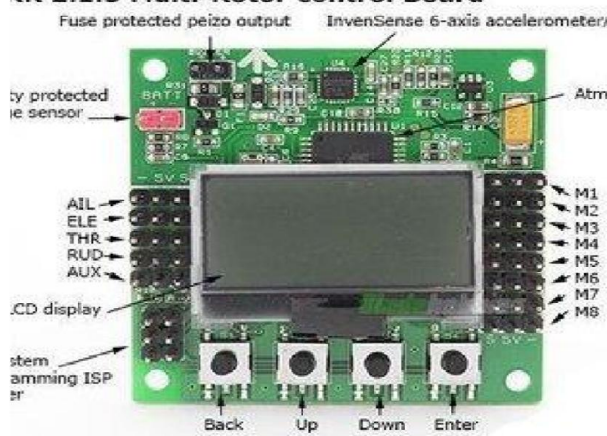
sprayer by RF transmitter remote. Sprayer model contains two modules scattering and regulator module. Fungicide was get spray and the regulator section actuated the snoot of the section. Tank status also gets vindicated.

E. ATMEGA 644PA

It takes the signal from 6050 MPU Acc/gyro (roll pitch/yaw) then passes the signal to Atmega 644PA IC. The Atmega 644PA IC unit processes this signal according to user selected firmware and passes control signal to ESC. This signal instructs to make fine

adjustment to rotor rotational speed which in turn stabilizes multi rotor craft. Hobby king 2.1.5 multi rotor control board which uses the signal from radio system (RX) and passes the signal to the Atmega 644PA/IC via aileron, elevator, throttle and radar input. Once the information has been proceed, The IC will send varying signal to ESC in which in turns adjust the rotational speed of each rotor to induce controlled flight (up, down, forward, reverse, left, right and yaw).

KK 2.1.5 Multi-Rotor control Board



F. LiPo battery

Nominal voltage is the default, resting voltage of battery pack. ... LiPbatteries are fully charged when they reach 4.2v/cell, and their minimum safe charge, as we will discuss in detail later, is 3.0v/cell. 3.7v is pretty much in the middle, and that is the nominal charge of the cell.

G. ESC controller

An electronic speed control or ESC is an electronic circuit with is used to control the speed of servo-motor, its direction and possibly also to act as a dynamic brake. ESCs are often used on motors essentially providing an electronically-generated three-phase electric power low voltage source of energy for the motor. It also allows much smoother

and more precise variation of motor speed in a far more efficient manner than the mechanical type with a resistive coil and moving arm once in common use.

H. BLDC motors

Brushless DC electric motor (BLDC motors, BL motors) also known as electronically commutated motors (ECMs, EC motors), or synchronous DC motors, are synchronous motors powered by DC electricity via an inverter or switching power supply produces an AC electric current to drive each phase of the motor via a closed loop controller.



I. RF 2.4 GHz remote controller

Many embedded devices use handheld IR and RF remote controls. TVs and radios typically have Infrared (IR) remote controls. Most cars now have a radio frequency (RF) remote key fob. Wireless keyboards and mice use RF links at 27 MHz or 2.4 GHz. .



IV. EXPERIMENTATION AND EXPECTED RESULT

The Agriculture drone has the potential to improve the crops. Agriculture Drone can helps the farmers to transform the agriculture industry. Now a day's

farmers use a hand pump for spraying pesticides. Human beings take large amount of time to spray the crops and they don't uniformly spray the pesticides. But by using drone we can complete the spraying work in less amount of time as compare to human. Human being charges 100/- to 200/- rupees per day for pesticides spraying, as compared to them drone takes 3 watt of power then it will charge 10/- rupees only of electricity. Drone will uniformly spray the fertilizers hence; there is no possibility of damaging crops. Drone will save the time of spraying pesticides and also it will reduce the diseases caused by fertilizer to the human body such as skin diseases as per the research of World Health Organization (WHO). Hence, drone will minimize the efforts of farmers for agriculture purpose. While designing the required circuitry it is very necessary to follow all the design and development steps for PCB designing [8].

V. CONCLUSION

In this manuscript different types of system useful for Agriculture wonder drone system using microcontroller 8051, Agriculture wonder drone system using Atmega 328 microcontroller and Agriculture drone system using GPS were discussed. Mainly the paper focused on selection of best compatible design for Drone system for Agriculture purpose. Some of the exiting implementation was discussed with their advantages and disadvantages. Finally it is conclude that if the system design with the use of Atmega 644PA then it will be the more efficient implementation. In line to this the experimentation and expected result also discussed for further implementation.

VI. ACKNOWLEDGMENT

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FABRICATION OF ECO-FRIENDLY SEEDLINGS POT TRANSPLANTER

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ABSTRACT:Transplanting is the process that which 15-25 days old seedlings are transplanted from nursery to main field. Vegetable Transplanting are now carried out all the countries. While Transplanting is done manually, roots are oppressively damaged in the process of broadcasting. So, the plants take time to establish their roots after broadcasting longer. Eco-friendly Seedling pot Transplanting system is an new innovative, labour saving technology. It relies on using Eco-friendly pot that are connected in a chain so that they feed themselves through the transplanter. The transplanter itself is hand pull with it. It takes lower than a nanosecond to transplant the seedlings to the main field. All while walking upright (no kneeling, crawling or condescending). We use Germination sheets or Papers an Eco-friendly Seedling pot, Which is fluently degradable. They give water, air and some nutrition to their seedlings.

Key Words :Eco-Friendly Seedling Pots, Seedlings, Transplanter, Furrow.

1. INTRODUCTION

Agriculture is the backbone of Indian frugality. Moment, India ranks second worldwide in ranch affair. About 175 types of vegetables are grown in India, produce 14 of the vegetables crops like tomato, onion, chili, brinjal, cauliflower, cabbages'. Are scattered. Transplanting is practice which involves the placing of seedlings either on crest or well set seedbed, similar that they starts establishing their roots and survive as a separate plant.

Seedlings for broadcasting purposes are raised on beds in which seeds are broadcasted or dibbled in lines. According to the demand of the procedure followed for broadcasting of a particular crop or system. Seedlings are also pulled manually when they're about 4-10 weeks old and scattered in fields, broadcasting of seedling is a homemade and labor-ferocious operation.

Timely broadcasting of vegetable crops is essential for advanced yields. A check conducted to pierce robotization gaps in the sowing, planting and broadcasting of vegetable crops indicated that Indian vegetable transplanter.



Fig.1: Plants in trays



Fig.2: Manual planting

The average vegetable farmer in India substantially belong to small and medium order of growers. (146.55 million tons) of world's vegetables and have 15 (8.5 million hectares) of world's area under vegetables. Productivity of vegetables in India (17.3 tons/ hectare) is lower than the world average productivity (18.8 tons/ hectare) in 2013-2014. Seeds of crops like cowpea, okra, carrot etc. are moreover drilled or planted directly still, utmost of the vegetables crops like tomato, onion, chili, brinjal, cauliflower, cabbage etc. are scattered.

1.1Eco-Friendly Seedlings Pot Transplanter

Eco-Friendly Seedlings pot is for seedling material and comported of special paper,

and each pot is in chain. These pot is made by paper only, so it can supply air and water quality to plant root. It's fluently make healthy seedlings.

When broadcasting, seedling put in field with seedlings pot. It means that do n't remove paper. So it protects a root and it help to be original growing, especially fornnon-healthy seedlings and youthful seedlings. Transplanter is a manually operated machine. So, its veritably simple and easy to use, also no need conservation. It'll be easy working for transplanter, as well as good for body.

1.2 Working

The seedlings pot transplanter works on also to a direct seeder in design. There's a furrower in the front that makes a trough, the plants are fed through a channel to drop into trough, and there are two bodies that push the soil back around the shops, two bus at the tail end smoothly compact the soil around the shops.

Rather of a seed hopper, there's a large charger space for charger of transplant to feed out of the crucial part, and namesake, of this design is seedlings pot tray that the seeds are planted into these little seedlings pots are actually circles attached into a chain that looks analogous to a honeycomb. The seedlings pots unchain as you move the transplanter, feeding themselves through the transplanter.



Fig.3: Working of Eco-friendly seedlings pot transplanting machine

2.SUMMARY OF LITERATURE SURVEY

With reference to literature check we came to know that factory Transplanting machine works either manually operating or connected together with the mini tractor as well as to the tractor with provision handed in the machine. Broadcasting of factory is actuated by colorful mechanisms like slider coil medium through chain and sprocket arrangement etc. By using this type of arrangement bone can achieve broadcasting of factory with good effectiveness, consuming lower time compared to traditional

planting system and accurate in-row distance is attained.

3. PROBLEM DESCRIPTION

The average yield of vegetables in India is still lower than that in numerous Asian countries. Broadcasting of shops in primer is labour-ferocious operation. In peak seasons due attainability of labours, timely broadcasting isn't possible. Cost of labours being increased day by day and thus homemade broadcasting is getting uneconomical. Proposed transplanter was designed on the base of morphological parameters of seedlings, agronomical conditions and ergonomicalconsideration for broadcasting shops at a time.

4.OBJECTIVES

- Design of Eco-Friendly Seedlings pot for desired planting conditions.
- Design and fabrication of manually operated Eco-friendly seedlings pot transplanting machine.

5.METHODOLOGY

The procedure mentioned in flow chart will be followed during design and fabrication of the product

- ✓ Design
- ✓ Material Selection
- ✓ Fabrication
- ✓ Assembly
- ✓ Testing

5.1 Design calculation

Design of Eco-friendly seedlings pot transplanter

Load due to weight of transplanter

Load due to digging of soil

Load to pull transplanter

Design of tray

Selection of material

Mild steel 20gauge,

$\sigma_{yt1}=150\text{Mpa}$

Density= 7891.093 Kg/m^3

20 gauge= 0.953 mm

Assume total 264 paper pot contains in tray

One paper pot mass= 30 grams

Mass of total pots $F_0=264*30$

$=7920\text{ grams}$

$=7.92\text{kg}$

$=77.6952\text{ N}$

Area of tray containing seedlings pots, $A_0= L*B$

$=24*12$

$=288\text{ sq inch}$

$=185806.08\text{ mm}$

Compressive stress on frame $= F_0/A_0$

$=77.6952/185806.08$

$= 4.1815*10^{-4}\text{ N/mm}^2$

Therefore, yield stress is greater than induced stress tray design is safe.

- Force required to pull the tray
a. Friction force in rolling

Force due to rolling tire in loose sand = 0.2-0.4

Lets radius of front tire = 101.6mm

Total load = load of seedlings pot + load of tray

Load of tray = 1kg = 9.81N

It is distributed on two front wheel

= $9.81/2 = 4.905 \text{ N}$

Load of seedlings pot on each wheel

= $77.6952/2 = 38.8476 \text{ N}$

Therefore, Total load

$W1 = 4.905 + 38.8476$

= 43.7526N

Force required to overcoming the rolling friction of front wheel

$F1 = f \cdot W1/r1$

= $0.4 \cdot 43.7526/101.6$

= 0.1722N/mm

= 172.25 N/m

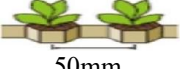
Total two front wheel required = 172.25 N/m force

Let radius of rear tire $r2 = 76.2 \text{ mm}$

Load due to tray and support on rear wheel $W2 = 1 \text{ kg} = 9.81 \text{ N}$

Force required to overcome the rolling friction by rear wheel $F2 = f \cdot W2/r2$

= $0.4 \cdot 9.81/76.2$

Parameters	Dimensions
In Row Planting Distance	 50mm
Pot Diameter	30mm
Pot Height	30mm
Pot Length	1400mm
The Number of Pots Per Tray	264pots

= 0.0514N/mm

= 51.49 N/m

Load required to digging the soil

Design of soil anchor

Force required to pull the anchor = $F3 = m \cdot a$

Where, m = load of transplanter + load of seedlings pots

= 15kg + 8 kg

= 23kg

= 225.63 N

a = average man walking speed

= 1.5km/hour

= 0.416 m/s

$F3 = 225.63 \cdot 0.416$

= 93.86

= 94 N

F = Total horizontal force

Therefore, $F = F1 + F2 + F3$

= $172.25 + 51.49 + 94$

= 317.74 N

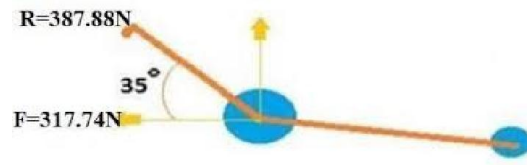


Fig -4: Resultant force acting on handle

Total resultant force on handle,

$F = R \cdot \cos \theta$

$R = 317.74 / \cos 35$

= 387.88 N

Design of handle

Handle is made up 1 inch round pipe

Handle length = 457.2 mm

Handle is pull by hand therefore pipe is subjected to tensile force.

Therefore, $\sigma = R/A1$

Where, $A1$ = surface area of handle

= $\pi D L1 = \pi \cdot 0.0254 \cdot 0.4572$

= 0.03648 m^2

$\sigma = 387.88 / 0.03648$

= 10632.675 N/mm^2

= 10.63267 N/m^2

Handle is made up of material galvanized steel,

$\sigma_{yl} = 55000 \text{ psi} = 379.212 \text{ Mpa}$

$FOS = \sigma_{yl} / \sigma_{all}$,

Consider $FOS = 3$

Therefore,

$\sigma_{all} = \sigma_{yl} / FOS$

= $379.212 / 3$

= 126.404 N/mm^2

= 126.404 * 106 N/m^2

$\sigma_{all} > \sigma$

Design of seedlings pot for desire planting condition

Table.1: Design parameter of seedlings pots (Radish seedlings)

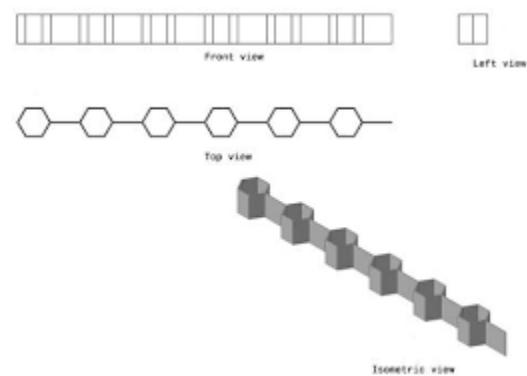


Fig.5: All views of seedlings pot

6.FABRICATION DETAILS

Fabrication involves a process of building machine, structures and other equipment's by deploying various process and operations like cutting, forming, setup, full welding and assembling components made from

raw material. A brief description of selection of raw material is given below.



Fig.6: Fabrication

6.1 Material Details

In this project, a material for different parts are used in building of transplanter is mild steel. The selection of appropriate material for respective components was based on following mechanical properties such as,

- Tensile strength
- Bending strength
- Compressive strength
- Shear strength
- Yield strength
- Hardness

6.2 Components of the Planting Machine



Front Wheel



Handle

Fig.7: Front wheel and Pull handle

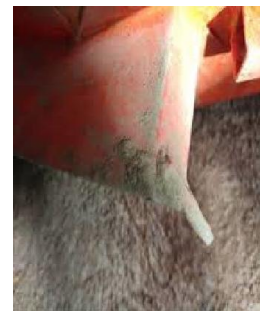


Tray



Ramp

Fig.8: Tray and Ramp



Furrower



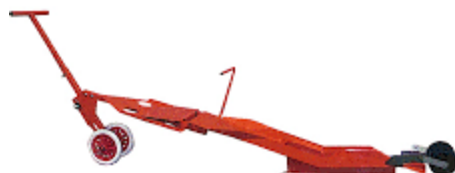
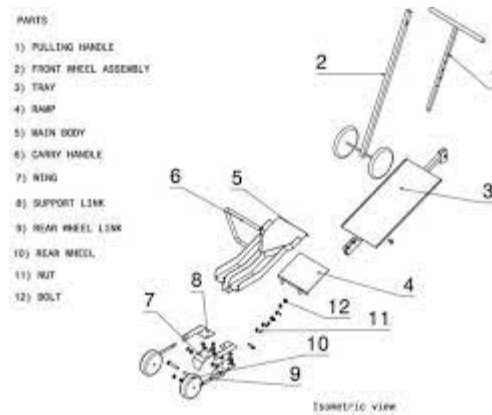
Main Body

Fig.9: Main body and Furrower



Support link**Wings****Fig.10: Wings and Support link****Eco-Friendly seedlings Pot****Rear Wheel****Fig.11: Rear wheel and Eco-friendly seedlings pot chain**

6.3 Machine assembly

**Fig.12: 3D rendered diagram of assembled transplanter****Fig.13: 3D diagram of exploded view of transplanter**

After all the corridor are fabricated according to the delineations, all the corridor are assembled in the following sequence.

- A frontal wheel assembly carries charger and pull handle in which charger is slides on external body for suitable depth of digging soil and is fixed using nut and bolt and pull handle slide in inner part of the body for conforming suitable height and fixed at suitable height using nut and bolt.
- Once charger is fixed to frontal wheel assembly, also main body is joined to charger using nut and bolt of drilled hole handed in charger.
- A carry handle is fixed to lower part frame handed in main body part using nut and bolt.
- A ramp is simply place between charger and main body that connects between them for easy move of paper pot seedlings.
- A sect is fixed in main body at both sides for distributing the soil around the shops.
- A support link is placed and fixed at the same hole for connecting hinder bus.
- A hinder wheel link is fixed to support link at the both side.
- A hinder wheel is joined to hinder wheel link at the both side using nut and bolt.

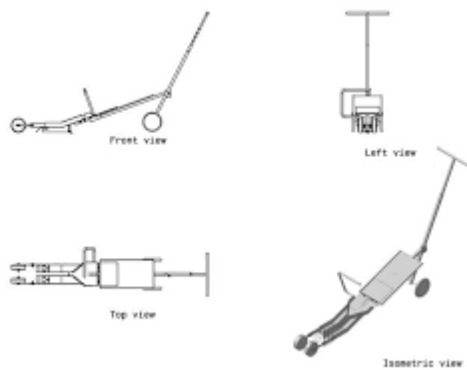


Fig.14: All views of transplanter

6.4 Preparing and seeding the Eco-friendly seedlings pottray .



Seedlings Pot

Fig.15: Preparation of Eco-friendly seedlings pot with seed sequence

- Readily made seedlings pot chain is taken and it is arranged properly in germination tray of dimension 60*30 cm.
- Eco-friendly seedlings pot containing cell which must filled with well mixed soil and cocopeat.
- Soil-cocopeat mixture is to be filled in the Eco-friendly seedlings pot cell up to half volume of seedlings pot cell.
- Each seed must be sowed inside the eco-friendly seedlings pot cells, after its completion remaining volume of seedlings pot cell is to be filled with soil-cocopeat mixture.
- After completion of sowing, then it should be watered properly.
- After some time say 2-3 week of sowing, depending on the baby plant condition it is taken for transplanting.

7.RESULTAND DISCUSSIONS



Fig.16: After transplanting 40 seedlings of radish



Fig.17: Accurate 2.5 inch in row spacing

- The eco-friendly seedlings pot plant transplanter works satisfactorily and seedlings chain is made with double layer of paper and it unchain properly without any damage and moves in path provided in main body and it is tested with radish baby plant and it is transplanted successfully as shown in the figure11 with maintaining the proper in row spacing.
- It took less than 50 seconds to transplant 40 seedlings pot seedlings in a single stretch.

Table.2: Result

Space	Man Work	Machin e Work	Man Time	Machin e Time
33*33	260	260	31min	6min
1acre	8184	8184	16hr	4hr

7.1 Advantage

- The Eco-friendly seedlings pot is that can use it for many different crops.
- Maintains the uniform spacing between rows while operation.
- The seedlings chain pots can be made in 2,4 or 6 inch in row spacing
- Transplant about 264 seeding's in less than a 5minute.

- The paper is organic, holds up well until transplanting, then decomposes once in ground.
- It can be operated by single person and avoids human errors.

7.2 Disadvantage

- The Eco-friendly seedlings pot transplanter works best in loose soil that doesn't have too many rocks or detritus.
- Occasionally, if chain will break or detritus will have stuck under furrower and slow down the transplantation.
- Minor manual operational adjustments are required.

7.3 Application

- Eco-friendly seedlings pot transplanter can be used for both small scale farming and large agricultural fields.
- The eco-friendly seedlings pot transplanter can be used for radish, cabbage, cauliflower, onion, and herbs etc.

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8.CONCLUSION

- The Eco-friendly seedlings pot transplanting machine works satisfactorily with transplanting rate of 40 seedlings in just 50 seconds compared to 8 a 5 seedlings/min in case of manual transplanting for raised bed condition.
- Weight of transplanter is less than 25kg so that it can easily handled by single operator and it is simple, low cost and found suitable for transplanting of various vegetable , herbs and flower seedlings.

9.FUTURE SCOPE

- The machine is driven by man power but engine can be coupled to enhance the performances.
- Eco-friendly seedlings pot chain of different in row spacing can prepared for different seedlings.
- Machine can be developed to transplant several rows simultaneously

IMPLEMENTS OF SOLAR POWER IN AGRICULTURE

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ABSTRACT - The combo of agriculture and renewable energy is a winning duo. In this paper we are discussed the various implements of solar energy in agriculture. Here we discussed what solar energy is, how the solar photovoltaic technology works, and how it can be applied in farming. The excessive use of fossil fuels and deforestation has increased the amount of green house gases in atmosphere, which hiked the global warming rate as result of that we are facing adverse climatic change in earth. Adapting to renewable energy is the only way to reduce green house gas in atmosphere. By applying the solar technologies in agriculture we can achieve the sustainable development in agriculture. More over here we also discussed about agrivoltaics which is the emerging technology all over the world.

Keywords—*solar photovoltaic technology, agrivoltaics, sustainable agriculture, climatic change*

Introduction

In order to promote sustainable agriculture we need to adapt renewable energy sources for agricultural activities. year by year human energy consumption it's getting peak so the fossil is running out faster and the extreme use of fossil fuels hiked global warming which adversely changed the climatic pattern as a result of that we are facing frequent natural calamities today. To save our earth from this extreme condition we have to adapt solar power instead of using fossil fuels. The use of solar energy in agriculture has many applications. Implement of solar energy also include power generation for farming activities, pumping water for irrigation, in rearing of live stocks, or for domestic use, electricity for processing and drying operations. Taking into consideration the importance of solar energy to reduce global warming rate and overcome from climatic changes this paper explores the implements of solar power in agriculture.

Importance of electricity in farming

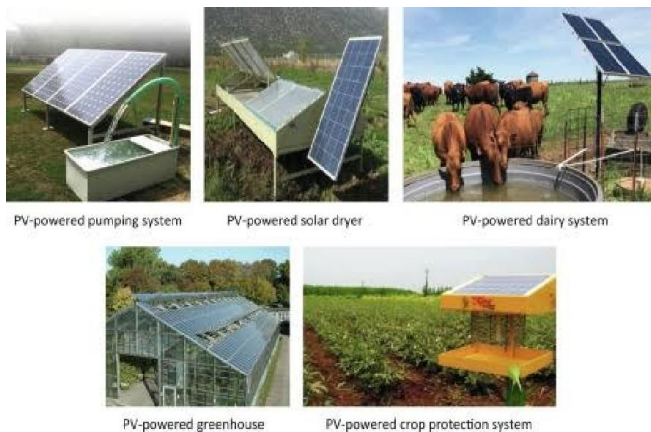
All activities in modern agriculture require electricity. Farming operations like irrigation, machinery operation, food processing, storage and transportation consumes more amount of electricity. In India about 20% of national consumption is used by farming activities. The data reached an all time high of 228,172 GWH In 2020 and this data it's going to increase in upcoming years. India is Spending Nearly 91000 crores for agriculture electricity subsidies. Electricity consumption and its expenditure is going high year by year, moreover electricity from conventional sources is not good for atmosphere. To resolve these problems solar energy it's going to be the best solution.

(Rs. Crores)

Central Government Subsidies	Amount
Fertilizer	70,000
Credit	20,000
Crop Insurance	6,500
Price Support	24,000
Total	1,20,500
State Government Subsidies	
Power	91,000
Irrigation	17,500
Crop Insurance	6,500
Loan Waivers	1,22,200
Total	2,37,200

Solar technologies

There are two ways to convert solar energy into electrical energy; the system Using photovoltaic technology and another that uses solar capture heating system. In photovoltaic system when the photons emitted by sunlight hit the electron in the photovoltaic cell, the electron starts to move in the circuit, this is how the solar energy is converted directly into electricity. Either we can use the DC output directly in the desired object, or it can store the energy in batteries for later use. Solar energy can also be converted to alternating current using inverters. In addition, in the heating method, electrical energy by thermodynamic processes, using heat exchange equipment, can be converted into mechanical energy. The initial cost for installing the photovoltaic system is high.

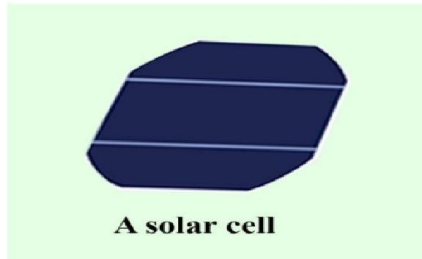


Production of solar electricity

Solar photovoltaic technology (SPV) is used to convert fraction of solar radiation into electrical energy.

A. Solar cell

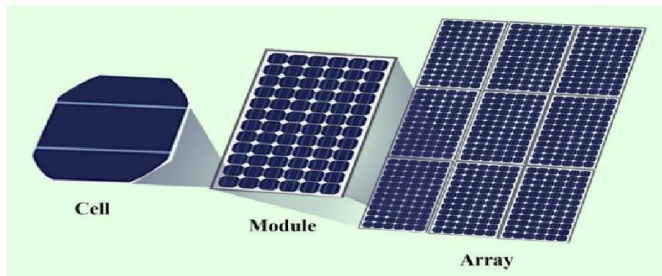
Solar photovoltaic cells were invented bell labs in the United States in 1954, and they have been used in space satellites for electricity generation since the late 1950s. Solar cells are the basic unit of solar panel. Generally solar cells are made of silicon (semiconductor). A single silicon solar cell normally generates 0.6 v DC and about 8A current depending On the area. Therefore, a solar cell of 6 inches can generates power up to 5 watt at a present day technology.



B. Solar photovoltaic module

A solar photovoltaic module is made of specific number of solar cells (36) generally connected in series.

The series and parallel combination of modules hello serve two purposes. The number of modules connected in series generates the required voltage and the number of modules in parallel generates the required current.



C. Solar PV array

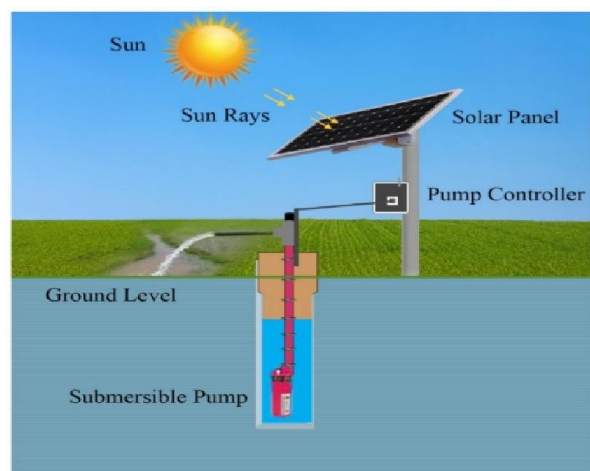
A photovoltaic array is the complete power generating unit. Solar PV array consist of parallel and series Combination of photovoltaic modules

Note: If the appliance needs high voltage we have to combine the modules in series connection.

If the appliance needs high ampere the modules should be in the parallel connection.

Solar water pumps

It is a solar powered water pump with an electric motor run by electricity generated from solar radiations by photovoltaic panels. Photovoltaic panels convert solar energy into direct current DC electricity. Hence, a Dc Motor is required to operate solar PV water pump. The AC motors can also be used to run by converting DC to AC by using inverter which is more complex and costlier. In India up to 80 percentages of farmers using water pumps to irrigate their field which runs by electricity or diesel. By using solar water pump we can reduce the use of conventional electricity and fossil fuel. Solar pumps are very useful where the grid electricity is not available. Use of solar powered water pump decreases the input cost up to 25 percentage which can make agriculture cost effective and eco friendly.



D. Irrigation

Water is the basic necessity for crop production. Irrigation is an important input for agriculture. Irrigation at right time to the crop is important otherwise crop yield will be drastically decreased, Hence Continuous water supplies required for sustainable agriculture production. Solar photovoltaic pumping system is viable solution to provide Regular water supply for irrigation which is more eco friendly.



E. Live stock

Live stock rearing is one of the important activities in rural areas. Regular water supply required for drinking, bathing of live stock etc. Use of PV pumps in live stock farm can be one of the best alternative for regular water supply which is gaining prominence especially in off grid areas.



F. Solar water pumps for aquaculture and fishing

Power aeration pumps are used in commercial fish and shrimp farms it helps in increasing oxygen level, which contributes significantly to productivity. Most of the farms located in the remote, off shore locations use conventional energy sources like diesel generators and grid supply. These energy sources are costly and present an ecological hazard, especially close to vulnerable aquatic ecosystem. For higher energy consuming applications, solar PV Diesel hybrid system can be an option.



solar wild life fencing

Solar PV system it is also used for protecting the farm using electricity generated from solar PV. In the fences use of PV electric is cost effective and convenient solution in pastures management.

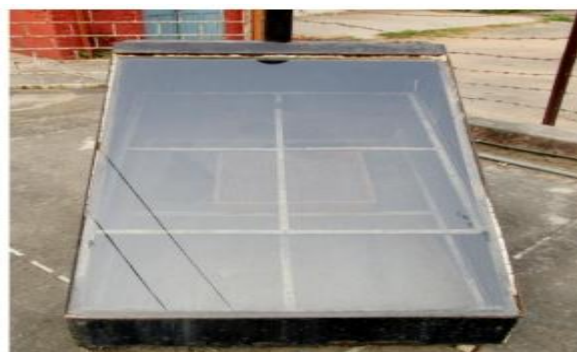


solar dryers

The solar energy is directly used by certain system to collect the solar thermal energy. Solar dryer is one of the applications of solar thermal power. Open sun drying of various

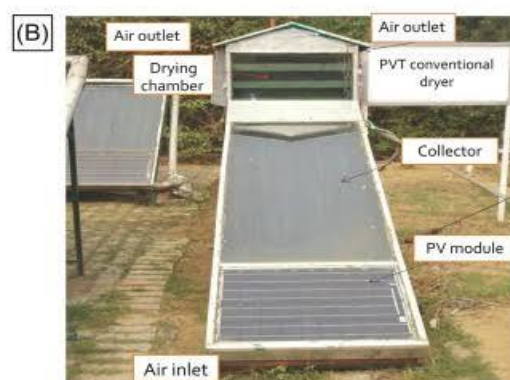
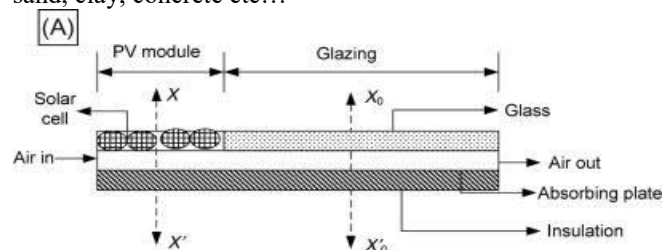
agricultural produce is the most common application of solar energy. With the objective of increasing the drying rate and improving quality of the produce, Natural convection and forced convection type solar dryers have been developed for various commodities.

In natural convection solar dryer, the ambient air passes through the drying chamber using solar chimney. In some cases the ambient air is pre heated in solar air heater to get additional drying capacity of the air. In natural convection dryer the material itself can be used as absorbing surface. The dryer and pre heater can be combined to increase the drying capacity of the air by direct absorption of solar radiation in the material.



Forced convection solar drying system compresses off solar collector array, drying chamber and blower. All these components are designed independently in order to get the desired capacity of the drying system.

Use of forced convection solar dryers seems to be an advantage compared to traditional method and improves the quality of product considerably. Normally thermal storage system or employed to store the heat, which includes sensible and latent heat storage. Common sensible heat storage materials used to store the sensible heat are water, gravel bed, sand, clay, concrete etc...



AGRIVOLTICS (AVS)

Agrivoltics is the emerging technology all over the world. Agrivoltics combines crop planting and electricity generation on the same land, it is considered as an opportunity to

resolve the competition for land use between food and energy production. In addition to growing crops, farmers can gain with the installation of agrivoltaic system on their field. They can use this clean energy for agricultural production or sell it for extra income. To meet the global energy demand agrivoltaics is one of the clean energy source.



G. Cropping option in agrivoltaic system

Photovoltaic modules are installed in AVS at inclination angle to the latitude of the place of installation. To avoid the shade of one PV array on the next array is maintained. The interspaces area between two PV array can be utilized to grow suitable crop or livestock. However, growing crops under shade requires selection of suitable crops which have certain degree of shade tolerance.

Suitable crops E.g.; Leafy greens, root crops, barley and many horticultural crops.

H. Conclusion

Ambit of this paper is to promote to achieve a sustainable development in agriculture by using solar power. Already we had increased the global temperature and changed the climatic pattern by the excessive use of fossil fuels which leads to adverse natural calamities. At least from now we have to adapt renewable energy sources to save us and this is the only way to attain sustainable development in all sectors.

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LITTLE MILLET-BASED INTERCROPPING FOR NUTRIENT SECURITY AMIDST PANDEMICS

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ABSTRACT: Food and nutrient security are ongoing problem, and currently cultivated staple foods are not sufficient to overcome challenges such as the present COVID - 19 pandemic. Global hunger Index ranks India as 64 out of 81 nations. In this situation small millets have the potential to overcome the nutritional security. Millets offer unique advantages for health; they are rich in micro nutrients. Little millet is one of the small millets which is an important food crop for the poor people in the tribal areas of India. Growing of single crop in a year or cereals as sole crop is not beneficial to fulfil the diverse demands of food and soil health. Intercropping little millet with pulses provides more benefits in terms of efficient use of available resources like soil fertility improvement, less use of chemical fertilizers, controlling erosion and run-off of water and enhancing diversity and higher total productivity of crops. A field trial was conducted during *kharif* season of 2016 and 2017, four cropping patterns with two different row proportions for intercropping [*viz.*, (4:1), (6:1)] were used with little millet as a main crop. The cropping systems include - Little millet + pigeonpea [(4:1), (6:1)] followed by a sequential horsegram; little millet + pigeonpea followed by moth bean and little millet + lablab [(4:1), (6:1)] followed by Horsegram and little millet + lablab followed by mothbean. Among them; a higher grain equivalent yield was observed in little millet + pigeonpea (6:1); followed by horsegram. However, higher dry matter, grain weight and higher individual crop yield was obtained in little millet + pigeonpea (6:1) followed by mothbean. Although individual mono cropping yields of these crops were higher; the pattern with little millet – pigeonpea (6:1) followed by horsegram could be recommended as a methodology to aid higher economic returns in shorter period.

Key words: Little millet, Intercropping, Yield, GEY and Economics
INTRODUCTION:

Millets have the tradition and heritage in India as these coarse cereals are cultivated by smallholders and tribal farmers in the subcontinent since early civilization. In India, after green revolution main focus was given on production of fine cereals, namely, rice and wheat and millets became neglected grains. Further, urbanization, increase of income and change of food habit also made millets as poor-man's food. But during recent time, millets have regained their lost pride due to re-evaluation of nutritional qualities (Saha *et al.*, 2016 and Bandyopadhyay *et al.*, 2017).

Little millet (*Panicum sumatrense*) is one of the small millets and the crop is well known in Tamil Nadu and grown quite extensively in many parts of the country. The crop is strongly associated with tribal agriculture and grown as an important catch crop in view of its earliness and resistance to adverse agro climatic conditions. Growing of only cereals is not so much remunerative in present scenario of agriculture to fulfil the diverse demand of consumers and rapid growing population. It is an urgent demand of incorporation the pulses in cereals production system. Intercropping of little millet with different pulses have great scope to utilize the land and other resources to maximum extent besides increasing soil nutrient status. According to Jat *et al.*, (2012) Legumes help in absorbing nutrients from deeper soil layers due to their robust tap root system.

Materials and Methods

A field experiment was conducted at Centre of Excellence in Millets, Athiyandal, Tiruvannamalai district during *Kharif* seasons of 2016 and 2017. The experiment was comprised of 10 treatments, *viz.*, T₁: Little millet sole crop - Horsegram, T₂: Little millet sole crop - Mothbean, T₃: Little millet + Pigeonpea (4:1) - Horsegram, T₄: Little millet + Pigeonpea (4:1) - Mothbean, T₅: Little millet + Pigeonpea (6:1) - Horsegram, T₆: Little millet + Pigeonpea (6:1) - Mothbean, T₇: Little millet + Lablab (4:1) - Horsegram, T₈: Little millet + Lablab (4:1) - Mothbean, T₉: Little millet + Lablab (6:1) - Horsegram, T₁₀: Little millet + Lablab (6:1) - Mothbean. The experimental was laid out in randomized block design with three replications, the

little millet variety Co (*Samai*) 4, was sown with Pigeonpea (Co (Rg) 7), lablab (Co 13) followed by sequential crops of horse gram (Paiyur 2) and moth bean (TMV (Mb) 1) pulses crops. For comparison between treatments, the yields of all intercrops were converted into little millet equivalent yield on price basis.

RESULTS AND DISCUSSION

Growth and yield attributes

Growth attributes like plant height and dry matter production was significantly affected by intercropping. Plant height of little millet was found to be higher at all the stages under the treatment during both the years of study, little millet + pigeonpea - horsegram at 6:1 ratio (T5) (129.5 and 130.0 cm at harvest) (Table 1). Among the various intercrops, little millet + pigeonpea- horsegram at 6:1 ratio (T5) intercropping system produced higher dry matter production (6543 kg / ha during 2016-17 and 6447 kg / ha during 2017-18) followed by little millet + pigeonpea - mothbean at 6:1 ratio (T6). Similar results were also obtained by Kaushik and Sharma (2017) in wheat based intercropping system.

The yielding ability of a crop is reflected through its yield attributing characters. The yield attributes of little millet like number of productive tillers per hill and test weight is found to be increased when intercropped with pigeonpea at 6:1 ratio during both the years of study (Table 1). This might be due to development of better complementary relationship and non-renewable resources like water, nutrients and incoming sunlight. Tripathi and Kushwaha (2013) also reported that plant height and number of leaves per plant of pearl millet under intercropping system were either higher or statistically at par with sole pearl millet, which might be due to better utilization of space and light interception coupled with nutrient contribution of leguminous crop to cereal crop.

Yield and system productivity

The grain yield of little millet was significantly influenced by various intercrops at harvest (Table 2). The highest grain (1602 kg / ha during 2016-17 and 1684 kg / ha during 2017-18) and stover yields (4774 kg / ha during 2016-17 and 4819 kg / ha during 2017-18) were recorded little millet + pigeonpea - horsegram at 6:1 ratio (T6) and it was on par with little millet + pigeonpea - mothbean at 6:1 ratio (T6). Higher grain yield of pigeonpea in 6:1 row ratios could be attributed to higher yield attributes and least competition due to better planting arrangement. These results are in close conformity with the findings of Rathore and Gautam (2003) revealed significant increase in yield components when foxtail millet was intercropped with pigeonpea at 5:1 ratio as compared to 1:1 row ratio.

Horsegram and mothbean yield were significantly higher in little millet -horsegram/ mothbean sequence than horsegram/mothbean relayed in little millet + pigeonpea or lablab in 4:1 or 6:1 row ratios, but it was on par with horsegram/mothbean

relayed in little millet + pigeonpea in 6:1 row ratio. Similar finding was reported by Kumar *et al.*, (2008).

Little millet equivalent yield (GEY) (Table 2) was calculated for comparing different intercropping combinations. The highest little millet grain equivalent yield (2025.7 kg / ha during 2016-17 and 2121.9 kg / ha during 2017-18) was recorded in 6:1 row ratio of little millet + pigeonpea -horsegram sequence which was closely followed by 6:1 row proportion of little millet + pigeonpea -mothbean sequence (1995.5 kg / ha during 2016-17 and 2099.0 kg / ha during 2017-18). Ansari *et al.*, (2011) reported that pearl millet intercropped with pigeonpea recorded significantly higher pearl millet equivalent yield as compared to sole stand of component crops. It was due to almost similar yield of intercropped pearl millet as that of its sole stand and additional yield of pigeonpea as a bonus in intercropping system. Kumar *et al.*, (2008) reported that the higher little millet grain equivalent yield in 6:2 row ratio and horsegram sequence was due to higher yield of little millet and pigeonpea coupled with better utilization of the natural resources by the component crops in intercropping system.

ECONOMICS OF INTERCROPPING:

The net return (Rs. 48,209 / ha during 2016-17 and Rs. 51,985 / ha during 2017-18) and benefit cost ratio (2.26 during 2016-17 and 2.36 during 2017-18) were recorded by little millet intercropped with pigeonpea at 6:1 ratio with horsegram as sequence crop during the crop year. Little millet intercropped with pigeonpea at 6:1 ratio with mothbean as sequence crop was found to be the second best. According to Seran and Brintha (2009) the intercropping system provides higher cash return to smallholder farmers than growing the monocrops. Also, Himasree *et al.* (2017) suggested that more gross and net incomes and benefit-cost ratio were obtained by sowing of foxtail millet + pigeonpea in 5:1 ratio.

CONCLUSION:

Based on these results, it may be summarised that to increase the productivity per unit area in little millet intercropping system under rainfed conditions of Tiruvannamalai district, growing of little millet and pigeonpea in 6:1 row ratio with horsegram or mothbean in sequence have been found superior over other intercropping systems and also growing sole crop of little millet alone. Also, the UN-FAO has announced the year 2023 as 'International Year of Millets', recognizing the potential of this crop. By that time, the intervention of government and non-governmental bodies in initiating or reviving millet farming may be expected to incentivize increased millet production. This could achieve success in combating hunger and malnutrition among the vulnerable population in any future aberrant conditions.

FUTURE LINE OF WORK:

The research evidences and literary sources clearly indicate that enough research has not been carried out on little millet. Considering the present demand and importance of the crop, research work

should be carried out in intensive study on cropping system and intercropping targeting production sustainability of little millet in rainfed condition.

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Table 1: Effect of intercropping on growth and yield attributes of little millet

	Treatments	Plant height (cm) (At harvest)		Dry matter production (kg / ha)		Number of tillers / hill	
		2016- 2017	2017- 2018	2016- 2017	2017- 2018	2016- 2017	2017- 2018
T₁	Little millet sole crop - Horsegram	108.0	103.0	5700	5826	9	8
T₂	Little millet sole crop - Mothbean	110.3	100.7	5689	5721	8	8
T₃	Little millet + Pigeonpea (4:1) Horsegram	113.9	112.6	4714	4491	9	8
T₄	Little millet + Pigeonpea (4:1) - Mothbean	111.6	114.5	4686	4442	9	9
T₅	Little millet + Pigeonpea (6:1) - Horsegram	129.5	130.0	6543	6447	10	11
T₆	Little millet + Pigeonpea (6:1) - Mothbean	127.6	129.8	6352	6331	10	10
T₇	Little millet + Lablab (4:1) - Horsegram	107.8	110.4	4365	4351	9	8
T₈	Little millet + Lablab (4:1) - Mothbean	106.8	108.3	4165	4214	8	9
T₉	Little millet + Lablab (6:1) - Horsegram	119.4	117.8	5421	5549	9	8
T₁₀	Little millet + Lablab (6:1) - Mothbean	120.3	119.0	5162	5251	9	9
	SEd	5.80	5.88	281	261	0.7	0.7
	CD (P=0.05)	12.11	12.30	588	545	NS	1.5

*Significant at P 0.05; NS- Non Significant at P > 0.05

Table 2. Economics of little millet as influenced by intercropping (2016-17)

Treatments	Little millet yield (kg / ha)				Yield of intercrops (kg / ha)		Little millet Grain equivalent yield (GEY)		Yield of sequential crops(kg / ha)		Gross income (Rs / ha)		Net income (Rs/ha)		B:C ratio	
	Grain		Straw													
	2016 - 2017	2017-2018	2016 - 2017	2017-2018	2016-2017	2017-2018	2016 - 2017	2017 - 2018	2016-2017	2017-2018	2016-2017	2017-2018	2016 - 2017	2017-2018	2016-2017	2017-2018
T ₁	1340	1397	4259	4333	-	-	-	-	804	823	66,263	68,561	27,887	30,175	1.73	1.79
T ₂	1365	1463	4148	4267	-	-	-	-	860	873	63,957	67,329	24,808	28,180	1.63	1.72
T ₃	924	975	3637	3492	295	316	1463.5	1553.7	612	632	64,294	66,757	29,168	31,631	1.83	1.90
T ₄	955	1007	3574	3478	308	338	1519.8	1626.6	621	654	63,018	66,747	27,332	31,061	1.77	1.87
T ₅	1602	1684	4774	4819	231	239	2025.7	2121.9	757	790	86,379	90,155	48,209	51,985	2.26	2.36
T ₆	1584	1633	4656	4689	224	254	1995.5	2099.0	658	699	79,540	83,504	40,683	44,647	2.05	2.15
T ₇	811	908	3233	381	1471	1494	1154.3	1209.3	561	594	53,462	57,284	9,610	13,432	1.22	1.31
T ₈	803	861	3096	3215	1395	1412	1128.2	1237.0	609	641	50,365	53,294	5,953	8,882	1.13	1.20
T ₉	1163	1245	4044	4159	682	774	1321.8	1425.9	549	562	59,042	62,645	16,090	19,696	1.37	1.46
T ₁₀	1168	1232	3852	3867	693	752	1329.9	1407.1	573	624	56,749	60,108	15,873	19,232	1.39	1.47
SEd							110.6	102.3								
CD (P=0.05)							237.2	219.4								

ORGANIC CULTIVATION OF CHILLI

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ABSTRACT: Here we are discussed about the subject of protected cultivation of our times, we've many sorts of our country. Okra is predominantly a crop of tropics and sub-tropics it occupies area under the vegetables within the country with the protection of 33.24 lakh metric tons from an 3.47 lakh hectares. The crop is cultivated for its young tender fruits it's used also a superb source of iodine and is beneficial for the treatment of Goiter. It against genitor-urinary disorder. Fruits also are dried are frozen to be used during off season. edible fruit contain 13-22% of edible oil and 22-24% protein and is employed for refined edible oil. Its origin Okra in tropical and sub-tropical Africa. India as a secondary centre of origin and largest producer within the world. Its scientific name is Bhendi. it's a many sorts like IIHR Bangalore, IARI Delhi, IIVR Varanasi. Okra prefers loose, well drained and rich in soil. the perfect pH for growth plant is 6-8. Similarly flower drops when day temperature exceeds 42 C. In black soils, irrigation is completed at 5-6 days interval. it had been developed at department of Olericulture, Horticulture college and research institute TNAU, Coimbatore. Root and stem are used for cleaning Cane juice for preparation of jaggery. During summer Vegetative growth is comparatively less and seeds are sown at closer spacing of 45*20cm are evenless. Seed rate required is 18-20kg/ha. A manuring and fertilizing requirement may be a dose of 150Kg each of N1P2 05 and K2O is suggested for Pusa Sawani within the coordinator trails. it had been mainly researched by Tamil Nadu Agricultural University, Coimbatore.

1.INTRODUCTION

Chilli (*Capsicum annum*) belongs to the genus *Capsicum* under Solanaceae family. The Chilli plant may be a white flowered, dark green or purple leaved plant that grows upto 1.5 m tall . it's also called as hot pepper, cayenne pepper, sweet pepper etc. Five species of *Capsicum* are under cultivation, though variety of untamed species are identified recently. In India, only two species viz. *Capsicum annum* and tabasco pepper are known and most of the cultivated varieties belong to the species *Capsicum annum*. The native home of chilli is taken into account to be Mexico with secondary origin of

Gautemala. Chilli was introduced in India by the Portugese in Goa within the middle of 17th century and since then it had rapidly spread throughout the country.

Chilli besides imparting pungency and red colour to the dishes, may be a rich source of vitamin A , C and E and assists in digestion. Recently, Russian scientists have

identified vitamin P in green chilli which is taken into account to be important because it protects from secondary irradiation injury. The pungency in chilli is thanks to an alkaloid capsaicin has high medicinal value.



Capsaicin has many medicinal properties, especially as an anti-cancerous agent and instant pain reliever. It also prevents heart diseases by dilating blood vessels. Capsicum pigment is incorporated in poultry feed. In Mexico, pigments are concentrated and blended in feed mix for chicken. this provides a reddish tint to the chicken meat, which is more valued. it's believed that yolks of eggs of such chicken also are more coloured and healthy looking. Almost 80 percent of the capsaicin in chilli is in its seeds and membranes.

Chilli is a crucial ingredient in day to day curries, pickles and chutnies. Oleoresin, sauce and essence are prepared from chilli. Chilli is employed in various forms; as raw fresh green chopped chilli ; or ground to a paste, broken split or whole form. To preserve chilli for extended time it's pickled or sun-dried to urge a "red" coat chilli which when powdered is employed in pinch to urge the specified level of pungency.

2. INTERNATIONAL SCENERIO

The planet area and production of chilli is around 15 lakh ha and 70 lakh tonne respectively. Major chilli growing countries are India, China, Pakistan, Indonesia, Korea, Turkey and Sri Lanka in Asia; Nigeria, Ghana, Tunisia and Egypt in Africa; Mexico, us of America in North & Central America; Yugoslavia, Spain, Romania, Bulgaria, Italy and Hungary in Europe and Argentina, Peru and Brazil in South America. India is that the world leader in chilli production followed by China & Pakistan. the majority share of chilli production is held by Asian countries. the main consumers of chilli within the world are India, China, Mexico, Thailand, us of America, uk , Germany and Sweden. the main chilli exporting countries with their percentage share in world total exports are India (25 %), China (24 %), Spain (17 %), Mexico (8 %), Pakistan (7.2 %), Morocco (7 %) and Turkey (4.5 %). the planet trade chilli account for Sixteen Personality Factor Questionnaire of the entire spice trade the planet , occupying second position after black pepper. the main chilli importing countries are United Arab Emirates, European Union , Sri Lanka, Malaysia, Japan and Korea.

Chilli requires a warm and humid climate for its best growth and dry weather during the maturation of fruits. Chilli crop comes up well in tropical and sub-tropical regions, but it's a good range of adaptability and may withstand heat and moderate cold to some extent. The crop are often grown over a good range of altitudes from water level upto nearly 2100 m above MSL. It are often grown throughout the year under irrigation. It are often grown successfully as a rain-fed crop in areas receiving an annual rainfall of 850-1200 mm. Heavy rainfall results in poor fruit set and in association with high humidity results in rotting of fruits.

3. NATIONAL SCENERIO

India may be a major producer, exporter and consumer of chilli. the world and production of chilli within the country is 6.81 lakh ha and 10.09 lakh tonne. the main states growing chilli within the country are Andhra Pradesh , Gujarat, KarnatakaMadhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamilnadu, Uttar Pradesh , West Bengal etc. The productivity is high within the States of Andhra Pradesh , Tamil Nadu etc., where chilli is grown under

irrigation than in Maharashtra and Karnataka, where the crop is raised mainly under rainfed situations. the main chilli growing districts of the country are Dharwad in Karnataka, Nagpur in Maharashtra and Prakasam, Khammam, Guntur and Warangal in Andhra Pradesh . Andhra Pradesh ranks first both in area and production.

The state wise area (ha) and production (t) of chilli during 2005-06 (provisional) and major chilli growing tracts within the country are given in Table 1 and a couple of respectively.

A. SOIL

Chilli are often grown during a range of soils, but black soils which retain moisture for long periods are suitable for rainfed crop whereas well drained soils, deltaic soils and sandy loams are good under irrigated condition. However, in hills of Uttarakhand, chilli are grown during a wide selection of soils starting from sandy to clay loam mixed with gravel and coarse sand.

4. MAINTENANCE OF BUFFER ZONE

For organic cultivation of chilli, a buffer zone of seven .5 - 15 m is to be left all round the conventional farm, depending upon the situation of the farm. The produce from this buffer zone shall not be treated as organic.

A LAND PREPARATION

Chilli are often grown altogether sort of soft but the sandy – loam, clay loam and loam soils are best fitted to it, the soil must be drained and well aerated. Acidic soils aren't suitable for chili cultivation. The land is ready by giving 2-3 ploughings and clod0 crushing after each plowing.



The area and production of chilli in Uttarakhand as on 31 March 2005 is to the tune of 2005 ha and 4262 t. In terms

of area and production, Uttarakhand might not be within the top of the chilli growing states within the country, but chilli of Uttarakhand features a special place due to their colour and pungency. The district wise area and production under chilli is given in Table 3.

Areas in Betalghat block of Nainital district, Sult and Syaldeh blocks of Almora district, Beironkhal block of Pauri Garhwal district and Lohaghat of Champawat district are the main chilli growing pockets of the State. Chilli of Betalghat and Lohaghat command premium price within the marketplace for their very high levels of pungency which is evidenced by high values of Scoville Heat Units, a way to precise the capsaicin content in chilli.

5. ORGANIC CULTIVATION OF CHILLI:

A CLIMATE

untreated seeds from local high yielding varieties could even be used, within the absence of organically produced seeds.

B VARIETIES

Presently, many improved sorts of chilli are available within the market and that they often knew differently counting on the world .

However, learn the list of some famous chilli varieties across the planet .

- ✓ Kashmiri Chilli
- ✓ Guntur Chilli
- ✓ Bird's Eye Chilli – Dhani
- ✓ Naga Chilli
- ✓ Mundu Chilli
- ✓ Jwala Chilli
- ✓ Kanthari Chilli
- ✓ Byadagi Chilli
- ✓ Green Cayenne
- ✓ Red Cayenne

There could also be another sort of chilli which is popular in your region in accordance with the climate conditions and atmosphere.

C SEED TREATMENT

Seeds shouldn't be treated with any chemical fungicides or pesticides. However, it's always beneficial to adopt indigenous practices for seed treatment, wherever possible. The seeds could also be treated with Trichoderma and Psuedomonas sp. @ 10 g per kg of seed to stop incidence of seedling rot within the nursery. the perfect time for raising nursery is February - March within

the hills of Uttarakhand. Transplanting would be done

Name of the State	Area (ha)	Production (t)
Andhra Pradesh	171450	537710
Andaman & Nicobar	388	878
Arunachal Pradesh	2168	2646
Assam	14690	9490
Bihar	3093	3089
Chattisgarh	6510	3600
Gujarat	31650	37840
Himachal Pradesh	740	200
Jammu & Kashmir	996	1006
Karnataka	69880	94500
Kerala	-	1192
Madhya Pradesh	46660	42480

during the months of April - May. 400 g of seeds would be sufficient for raising nursery for transplantation in a neighborhood of acre.

D NURSERY RAISING

Fresh seeds are sown in well prepared nursery beds. Although it are often sown by broadcast method within the main field, transplanting method is preferred for better quality and survival. The nursery bed is typically raised from ground level and is ready by thorough mixing with compost and sand. Seeds treated with Trichoderma are sown and covered thinly using sand. The seeds germinate in 5 to 7 days. About 40 - 45 days old seedlings are transplanted within the main field.

1.4 TRANSPLANTING

40-45 days old seedlings are used for transplantation. Transplanting is usually done during the April-May. The seedlings are transplanted in shallow trenches / pits or on ridges / level lands. In some places, 60 cm x 60 cm or 45 cm x 30 cm or 30 cm x 30 cm spacing is additionally followed. However, a spacing of 60 cm x 30 cm with a plant population of about 22200 seedlings per acre or 45 cm x 45 cm with a plant population of 19750 per acre are considered optimum.

E DIRECT SOWING

Direct sowing is practiced under rainfed conditions. For direct sown crop, the seeds are drilled by the top of March or first week of April. Seed rate is 2.5-3.0 kg per acre. After 30-40 days of sowing, thinning and gap filling is completed on a cloudy day.

F IRRIGATION

Chilli cannot withstand heavy moisture. Hence irrigation should tend only necessary. Frequent and heavy irrigation induces lanky vegetative growth and cause flower shedding. Plant growth, branching and dry matter accumulation are adversely suffering from excess irrigation. The number of irrigation and interval between irrigation depends on soil and climate. If the plants show drooping of leaves at 4 p.m., it's a sign that irrigation is required.

Flowering and fruit development in chilli are the foremost critical stages of water requirement. Normally chilli is grown under rain-fed condition. However, under irrigated condition, care should be taken to avoid using water contaminated with fertilizers, pesticides and fungicides. Irrigation should be done judiciously. Stagnation of water shouldn't be allowed in nursery beds and fields so as to avoid mycosis.

G INTERCULTURE OPERATIONS

Grown up seedlings raised by sowing through broadcasting method or in line in ridges should be thinned out by hand 25 to 30 days after sowing the seeds to take care of a plant population of about 30 to 60 plants/m². The plant density to be maintained finally may depend upon the character and fertility of the soil. On marginal soil, the population is maintained high. Generally two weedings/hoeings are required to stay the sector free from weeds, the primary within 20-25 days of sowing and therefore the other after 20-25 days of the primary weeding/hoeing. Wherever needed, counting on the weed growth one or two more weedings could also be haunted. Weeds which magnetize pests should be allowed to grow within the field to act as trap and removed before flowering. Earthing up is administered as and when necessary. Chilli are often cultivated organically as an inter or mixed crop provided all the opposite crops are grown under organic methods. It's desirable to incorporate a leguminous crop in rotation with chilli.

H MANURING

Organic manures like farmyard manure is applied @ 4 t/acre. However, it's always advisable to use compost/farmyard manure from own farm instead of from outside the farm. Restricted use of permitted mineral fertilizers under organic system are often done counting on requirement, on the idea of soil analysis. Use of bio-fertilizers also can be resorted to together with organic inputs.



10kg of neem seed kernels may be boiled in 15 l of water. 200 ml of this extract may be mixed in 15 l of water and four to five sprays may be given to control sucking pests. Farmers also use seed extracts of Bakaine (*Melia azadirach*) along with Bichoo Grass (*Urtica dioica*) for control of pests. Release of larvae of *Chrysoperla cornea*, a bio control agent, once in 15 days is also helpful in controlling thrips and mites. Fruit (pod) borers are the major pests which cause considerable damage to the crop. They can be managed to a certain extent by adoption of bio control measures. Restricted installation of pheromone traps in the field @ 5 no. per acre helps to monitor the adult moths. Ten days after spotting the moths in the traps, 4-5 spraying with Nuclear Polyhedrosis Virus (NPV) @ 200 LE (larval equivalent)/acre is beneficial to control the early larval stage of the pod borers. The egg masses of *Spodoptera* borer can be mechanically collected and destroyed. *Trichogramma*, an egg parasite, may be released two days after appearance of moths. Spraying of neem products like neem oil, neem seed kernel extract and restricted use of *Bacillus thuringiensis* @ 0.4 kg/acre are beneficial. All the

ed fruits and part of inflorescences should be collected and destroyed at regular intervals.

6 PLANT PROTECTION

A. PESTS

Thrips, mites, aphids, root grubs and pod borers are the main pests in chilli. To avoid infestation of root grub, only well rotten farmyard manure should be applied within the field. Application of organic @ 100 kg/acre is advisable for control of root grubs. Change within the agronomic practices to disturb the life cycle of the grub is additionally found useful. To regulate the infestation of root grub, light traps are often laid out from March. Grass are often heaped at different places within the field and therefore the grubs which accumulate within the se heaps could also be collected in the early morning and destroyed. 400 g/acre of *Beauveria bassiana* could also be broadcast within the field. Transplanting before first fortnight of April also helps in reducing the incidence of root grub. Application of seed kernel extract (NSKE) are often finished control of thrips, aphids and mites.

10 kg of seed kernels could also be boiled in 15 l of water. 200 ml of this extract could also be mixed in 15 l of water and 4 to 5 sprays could also be given to regulate sucking pests. Farmers also use seed extracts of Bakaine (*Melia azadirach*) along side Bichoo Grass (*Urtica dioica*) for control of pests. Release of larvae of *Chrysoperla cornea*, a bio control agent, once in 15 days is additionally helpful in controlling thrips and mites. Fruit (pod) borers are the main pests which cause considerable damage to the crop. they will be managed to a particular extent by adoption of bio control measures. Restricted installation of pheromone traps within the field @ 5 no. per acre helps to watch the adult moths. Ten days after spotting the moths within the traps, 4-5 spraying with Nuclear Polyhedrosis Virus (NPV) @ 200 LE (larval equivalent)/acre is useful to regulate the first larval stage of the pod borers. The egg masses of *Spodoptera* borer are often mechanically collected and destroyed. *Trichogramma*, an egg parasite, could also be released two days after appearance of moths. Spraying of neem products like neem oil, seed kernel extract and restricted use of *Bacillus thuringiensis* @ 0.4 kg/acre are beneficial. All the shed fruits and a part of inflorescence should be collected and destroyed at regular intervals.

B DISEASES

Fruit rot & die down caused by *Colletotrichum capsici* and bacterial wilt are the 2 major diseases of chilli. Bacterial leaf spot, mildew and mosaic disease (caused by virus) are the main diseases of chilli. Careful seed selection and adoption of phytosanitary measures will check the diseases of chilli. Early removal of affected plants will

control the spread of the diseases. Seed treatment with *Trichoderma* takes care of seedling rot in nursery. Varieties tolerant to diseases should be used wherever the disease is severe. Rouging and destruction of affected plants help in checking the mosaic virus. For effective disease control, 10 g of *Trichoderma* or *Pseudomonas* sp. per litre of water should be used for spraying.

C HARVESTING

Chilli is very perishable in nature. It requires more attention during harvest, storage and transportation. Harvesting should be done at the proper stage of maturity. Dark green fruit should be plucked for preparing chilli pickle. For dry chilli and for creating chilli powder, picking should be done when the fruit is red. Ripe fruits are to be harvested at frequent intervals. Retaining fruits for an extended period on the plants causes wrinkles and colour fading. Crop is prepared for harvesting in about 90 days after transplanting. About 5-6 pickings are made for dry chilli and 8- 10 pickings for green chilli.

D GROWTH PHASES IN CHILLI

The crop duration of chilli is about 150-180 days counting on variety, season and climate, fertility and water management. the expansion of chilli comprises of vegetative and reproductive phases. generally, the vegetative introduce chilli extends to 75-85 days followed by 75-95 days of reproductive phase. The vegetative phase is characterised by increase in plant height with profuse branching. Heavy branching is preferred for better aeration and sunlight infiltration into the cover over compact varieties. This also helps in preventing fruit rot. Flowering starts from 80-85 days of the crop or 40-45 days after transplanting. Chilli plant is an often cross pollinated crop with 50% of natural crossing. For fruit development and maturity about 40 days time is required after anthesis and pollination.

7 YIELD

The yield of fresh chilli varies from 30-40 q/acre counting on variety and growing conditions. Out of 100 kg of fresh fruits 25-35 kg of dried fruits could also be obtained. The yield of dry chilli is predicted to be within the range of seven .5 to 10 q/acre. However, within the present model, yield of 8 q/acre has been assumed.

8. POST HARVESTING MANAGEMENT:

DRYING

Chilli on harvesting have a moisture content of 65-80% counting on whether partially dried on the plant or

harvested while still succulent. This must be reduced to 8-10% to avoid microbial activity and aflatoxin production. Traditionally, this has been achieved by sun - drying of fruits immediately after harvesting, the foremost common practice in India, with none special sort of treatment. Soon after harvest, the produce is to be heaped or kept in clean gunnies for at some point for uniform colour development of the pods. the simplest temperature for ripening is 22-25°C and direct sun light is to be avoided since this will end in the event of white patches. The preparation of drying floor differs from tract to tract. Heaped fruits are opened up in thin layers within the sun on hard dry ground or on concrete floors or maybe on the flat roofs of homes, frequent stirrings are given during day time so as to urge uniform drying and thereby avoid discolouration or mould growth. Levelled and compacted floor is to be made for drying. From the fifth day onwards, the produce is inverted on alternate days in order that the pods within the lower layers are mentioned to make sure quick and uniform drying. While drying, the produce are often covered with polythene sheets during already dark to avoid dew deposition and resultant colour fading.

Since the produce is exposed to sun for 10-15 days within the open yards, it's likely to be contaminated with foreign matter like dust and dirt, damaged by rainfall, animals, birds and insects. Traditional method of harvesting and sun drying involves poor handling of fruits leading to bruising and splitting. Bruises show up as discoloured spots on pods, splitting results in an excessive amount of loose seeds during a consignment and there's a substantial loss in weight then in price. If the harvested fruits aren't properly dried and guarded from rain and pests, it'll lose the color, glossiness and pungency. The losses thanks to this method may range from 30-40% you look after the entire quantity.

The produce are often dried within a period of 18 hours using air blown drier keeping the temperature at 44° - 46° C.

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PROTECTED CULTIVATION OF ONION

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ABSTRACT: The Onion (*Allium cepa* L., from Latin *cepa*"onion"), also known as the bulb onion or common onion, is a vegetable that's the most extensively cultivated species of the allium. The shallot is a botanical variety of the onion. Until 2010, the shallot was classified as a separate species. Genus also contains several other species similarly appertained to as onions and cultivated for food, similar as the Japanese bunching onion (*allium fistulosum*), the tree onion, and the Canada onion (*allium caonadense*). The name "wide onion" is applied to a number of *Allium* species, but *A. cepa* is simply known from civilization. Its ancestral wild original form isn't known, although escapes from civilization have come established in some regions. The onion is most constantly a biennial or a imperishable shops, but is generally treated as an anperidic and gathered in its first growing season.

The onion factory has a addict of concave, bluish-green leaves and its bulb at the base of the factory begins to swell when a certain day-length is reached. The bulbs are composed of docked, compressed, underground stems girdled by fleshy modified scale (leaves) that envelop a central cub at the tip of the stem. In the afterlife (or in spring, in the case of overwintering onions), the leafage dies down and the external layers of the bulb come more dry and brittle. The crop is gathered and dried and the onions are ready for use or storehouse. The crop is prone to attack by a number of pests and conditions, particularly the onion cover, the onion eelworm, and colorful fungi which can beget rotting. Some kinds of *A. cepa*, similar as shallots and potato onion, produce multiple.

INTRODUCTION

Onion (*Allium cepa* L) is one of the important seasonings extensively used in all homes all the time round. The green leaves and immature and mature bulbs are eaten raw or used in medication of vegetables. Onions are used in mists, gravies and for seasoning foods. The small bulbs one pickled in ginger. Recent exploration has suggested that onions in the diet may play a part in precluding heat complaint and other affections. Onion bulb is rich in phosphorus, calcium and carbohydrates. The pungency in onion is due to a unpredictable canvas known as allyl-propyl disulphide.

A SOIL

Onion can be grown in all types of soils similar as flaxen gault, complexion gault, ground gault and heavy soils. Still, the stylish soil for successful onion civilization is deep, brickle gault and alluvial soils with good drainage, humidity holding capacity and sufficient organic matter. In heavy soils, the bulbs produced may be misshaped. Onion crop can be grown successfully on heavy soil with operation of organic ordure previous to planting and medication of the field for onion civilization should be veritably good. The optimum pH range, anyhow of soil type, is 6.0-7.5, but onion can also be grown in mild alkaline soils. Onion crop is more sensitive to largely acidic, alkali and saline soils and water logging condition. Onions don't thrive in soils having pH below 6.0 because of trace element scarcities, or sometimes, Al or Mn toxin. The threshold electrical conductivity of a achromatism excerpt (ECe) for onion crop is 4.0 dS/m. When the ECe position exceeds this, crop yield starts declining.

B CLIMATE

Onion is a temperate crop but can be grown under a wide range of climatic conditions similar as temperate, tropical and subtropical climate. The stylish performance can be attained in a mild rainfall without the axes of cold and heat and inordinate downfall. Still, onion factory is hardy and in the youthful stage can repel indurating temperature also. In India, short-day onion is overgrown in the plains and requires 10-12 hours day length. The long-day onion is grown in hills taking 13-14 hours day length. For vegetative growth, lower temperature combined with short photoperiod is needed whereas fairly advanced temperature along with longer photoperiod is needed for bulb development and maturity. The optimum temperature for vegetative phase and bulb development is 13-24 °C and 16-25 °C, independently. It requires about 70 relative moisture for good growth. It can grow well in places where the average periodic downfall is 650-750 mm with good distribution during the thunderstorm period. Areas with low (< 650 mm) or heavy downfall (> 750 mm) aren't particularly suitable for rain-fed crop.

C PLANTING

1. LAND MEDICATION

Previous to broadcasting, field should be ploughed and disked duly to exclude debris and soil clods. Organic manures original to 75 kg N/ ha (roughly FYM 15 t/ ha or flesh ordure 7.5 t/ ha or vermicompost 7.5 t/ ha) should be incorporated at the time of last ploughing and beds with applicable size should be prepared after leveling. Substantially, flat beds of the size 1.5-2.0 m range and 4-6 m length is formed. Still, flat bed should be avoided to help water logging during Kharif or stormy season. Water logging favours Anthracnose complaint which is most ruinous during Kharif season. Broad bed furrows (BBF) of 15 cm height and 120 cm top range with 45 cm crinkle are formed to achieve proper distance and population viscosity. It's suitable for drip and sprinkler irrigation as well. BBF is the stylish system for Kharif

MANURING AND FERTILIZATION

Fertilizer schedule for onion (per ha)

onion product because the redundant water can be drained out through the crinkle. This improves the aeration and helps in reducing the prevalence of Anthracnose complaint.

D TRANSPLANTING

Proper care should be taken while opting seedlings for broadcasting. Over and under aged seedlings should be avoided for better establishment. At the time of broadcasting, one third of the seedling top should be cut to get good establishment. The onion seedling should be scattered after dipping roots in carbendazim result (0.1) for two hours to reduce the prevalence of fungal conditions during the establishment. The optimum distance is 15 cm between the rows and 10 cm between shops

Well-rotten ranch yard ordure @ 25-35 tonnes/ ha should be ploughed under during land medication at least one month before bed medication. Before broadcasting, 70-80 kg of phosphorus, 50 kg of Nitrogen and 50 kg of Potash per hectare should be completely mixed in the soil. This should be followed with a supplementary cure of 50 kg of nitrogen per hectare at the time of bulb conformation.

E IRRIGATION

The first watering is given incontinently after sowing and broadcasting. Latterly posterior irrigations should be given at 7-10 days interval. The watering should be discontinued before neckfall.

F FERTIGATION

Fertigation is an effective and effective system of applying diseases through drip irrigation which is used as the carrier and distributor of irrigation water and crop nutrients. Operation of diseases @ NPK 40-40-60 kg/ ha as rudimentary and the remaining 70 kg N in seven splits through drip irrigation is recommended for achieving advanced marketable bulb yield and cost benefit rate. The drip irrigation system not only helps in water saving but also reduces nitrogen losses by filtering into ground water, as in fertigation, toxin nutrients are applied in root zone only.

Schedule	N	P ₂ O ₅	K ₂ O	Organic manures
Kharif onion (Yield potential – 25-30 t/ha)				
Basal	25 kg	40 kg	40 kg	Organic manures equivalent to 75 kg N (FYM – Approx. 15 t/ha or Poultry manure- Approx. 7.5 t/ha or Vermicompost – Approx. 7.5 t/ha)
30 DAT	25 kg	-	-	-
45 DAT	25 kg	-	-	-
Total	75 kg	40 kg	40 kg	-
Late Kharif and Rabi onion (Yield potential- 40-50 t/ha)				
Basal	40 kg	40 kg	60 kg	Organic manures equivalent to 75 kg N (FYM – Approx. 15 t/ha or Poultry manure- Approx. 7.5 t/ha or Vermicompost – Approx. 7.5 t/ha)
30 DAT	35 kg	-	-	-
45 DAT	35 kg	-	-	-
Total	110 kg	40 kg	60 kg	-
Long day onion (Yield potential-100 t/ha)				
Basal	60 kg	60 kg	70 kg	Organic manures equivalent to 75 kg N (FYM – Approx. 15 t/ha or Poultry manure- Approx. 7.5 t/ha or Vermicompost – Approx. 7.5 t/ha)
30 DAT	60 kg	-	-	-
60 DAT	60 kg	-	-	-
Total	180 kg	60 kg	70 kg	-

One third of recommended N and full dose of P₂O₅ and K₂O are applied at the time of planting while remaining two third N is applied in two equal splits at 30 and 45 days planting.

VARIETIES

Multiplier Onion - Co 1, Co 2, MDU 1, Agrifound Red



Small Common Onion - Agrifound Rose, Arka Bindu



Red onion - Bhima Super, Bhima Red, Bhima Raj, Bhima Dark Red, Bhima Shakti, Punjab Selection, Pusa Red, N2-4-1, Pusa Madhavi, Arka Kalyan, Arka Lalima



White Onion - Bhima Shubra, Bhima Shweta, Bhima Safed, Pusa White Round, Arka Yojith, Pusa White Flat, Udaipur 102, Phule Safed, N25791, Agrifound White.



Spanish Brown - Bhima Light Red, Bhima Kiran, Phule Suvarna, Arka Niketan, Arka Kirthiman



CULTIVATING AND WEEDING

As soon as the youthful shops have come established in the field, they should be furrowed for the control of

STOREHOUSE

Onions are stored in a well-voiced place with lot of aeration and sun. Onion bulbs are packed in perforated

weeds. Three to four hoeing are necessary for controlling weeds.

HARVESTING

Onion is gathered depending upon the purpose for which the crop is planted. Onion crop is ready for harvesting in five months for dry onion. Still, for marketing as green onion, the crop becomes ready in three months after broadcasting.

When the bulbs developing from the splint bases of onions are completely formed, the lush green covers begin to unheroic and ultimately collapse at a point a little above the top of the bulb, leaving an upright short neck. When the covers" go down" in this way, the bulbs are ready for harvesting. Because all the onions in a crop don't develop at the same time, large-scale marketable farmers gather them when about half the covers have gone down.

In kharif season, since covers don't fall, bulbs are gathered soon after the colour of leaves changes to slightly unheroic and red saturation on bulbs develop. Stylish time to gather rabi onion is one week after 50 covers have fallen over. Onions for trade as dried bulbs or for storehouse should be gathered precipitously after covers have started falling over.

Since onion bulbs are typically formed at the soil face, it's occasionally possible in flaxen soils to pull the mature bulbs by hand. Where conditions make hand pulling insolvable, crop is gathered by loosening the bulbs with a chopstick or hoe before lifting them. The gathered crop is left in windrows in the field for a many days until the covers are dry. The windrows should be made so that the green covers cover the bulbs to cover them from sunburn. The leaves are cut leaving about 2-2.5 cm covers above the bulb after complete drying. This practice helps to increase the dry matter content. However, the neck doesn't near well and provides entry for decay organisms, If covers are cut too close.

Early crop results in sprouting of the bulbs and late crop results in conformation of secondary roots during storehouse. In kharif season, late harvesting results in doubles and bolting.

YIELD

Irrigated onion crop in rabi season gives an yield of 25-30 t/ ha while under rainfed conditions it yields only about 0.7-1.0 t/ ha. Onion raised as an intercrop in sugarcane and turmeric, in alleys of youthful fruit theater and banana theater, gives a yield of 5-9 t/ ha. The small sized, pungent, original cluster type onion yields half as compared to the large sized kinds.

gunny bags and stalked in perpendicular column, one above the other. Still, height of similar perpendicular column shouldn't exceed further than 5 bases and should have sufficient space each around and bottom.

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RESEARCH ON SURFACE DEFECT DETECTION ON CARROT

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ABSTRACT: Fruits and Vegetable have a large part of the agriculture sector. To ensure the freshness of fruits and vegetables modern technology can help a lot. Experts can detect the defected fruits and vegetables by watching them with their eyes but the process is too long and not suitable for all. Grading is important things in all the vegetables and fruits production farmers. Carrot grading is a labour-intensive and time consuming task. In order to improve the efficiency of Carrot we must detect the defects that affect the carrot grading like fibrous root, cracking, breaking, green shoulder, bending etc.,. In this paper an automated approach is developed to detect the defects of carrot and recognize diseases by using machine vision based on image processing technique which is implemented in MATLAB including a machine learning algorithm. Hence we separate the defected parts of the carrot using K-means clustering. Here a supervised machine learning concept is implemented to recognize various carrot diseases. As the domain of this research model, Carrot disease are classified and 96% of accuracy is achieved which can certain help in agriculture science along with proper maintenance.

Keyword: carrot, machine vision, system vector machine, neural network, extreme learning machine, surface defect on carrot, grading, appearance shape.

1. INTRODUCTION

Carrot is consumed by millions of people all over the world. It belonging to the family Umbelliferae. Carrot is one of the most important and useful vegetables for the human body since it content nutrients and individual's resistance to infectious disease (Abbas, 2011; zhu et al., 2019). The Grading sale of carrots can help improve the competitiveness in the market and the profits of carrot planting and processing companies. But at present, the grading of carrots mainly depends on manual work, which has the inherent shortcomings of manual grading, such as labour intensive, inefficient, and unstable grading quality (Deng L. et al. (2017); Z. Han et al. (2013); Hahn F. and Sanchez S (2000)).

Nowadays, machine vision is widely used in agricultural production as a fast, non-destructive and simple method (R. M. et al. (2012)). Many studies have been conducted in the field of sorting using machine vision technology. First the fruits were classified into seven categories according to feature such as color and the shape of external defects. In fruits, Mohammadi et al. (2015) sorted persimmon fruit based on ripeness level through image processing technique. The results of the study showed that image analysis indicated a significant difference among different ripeness levels for image features such as R, G, B channels and the gray level. The accuracy rate of fruits is 90.24%. In vegetables, BPNN combined with machine vision was proposed for identifying the spherical shape of cabbage leaves. Nine characteristics of cabbage leaves were obtained as input parameters of BPNN, and the recognition rate was 100% (H. Li et al. (2015)). A method of chicken ketone mass classification based on machine vision was put forward. The six features of chicken carcass were extracted as inputs of linear regression model and the multiple linear regression model. And the average correct rate was 89% (K. Chen et al. (2017)).

Eight characteristics of chestnuts were extracted as inputs of Back Propagation Neural Network (BPNN) for grading recognition, and the recognition accuracy rate reached 91.67% (H. Zhan et al. (2010)). To detect the freshness of duck egg, the area ratio of egg core to whole egg, the mean grey value of R, G and I components were extracted by machine vision. These features were put in a discriminant model with least squares support vector machine, and the detection accuracy reached 93.85% (Q. Wang et al. (2017)). The neural network model for detecting pepper type was built, whose inputs were the color, shape and texture of pepper extracted by machine vision, and the recognition rate reached 84.94% (Kurtulmus F. et al. (2016)). The shape of beets and weeds were extracted as inputs of artificial neural network and SVM recognition models, SVM model had a higher recognition rate, the recognition rate of weed and beet reached 93.33 % and 96.67% respectively (Bakhshipour A., and Jafari A. (2018)). It showed that the application of advanced technology such as machine vision in agricultural production can improve the efficiency and reduce the cost (Hameed K. et al. (2018)).

There are few research reports on carrot grading by machine vision. So some feature parameters of color and shape of carrot were studied and extracted by machine vision, and recognition models based on machine learning methods are constructed to grade carrot. Thus, the aim of the present study was to distinguish defect of carrot using machine vision which is useful for carrot sorting in order to increase its marketing and wasting control of products.

2. MATERIALS AND METHODS

2.1 Materials

The carrots were purchased from a farm in Salem, Tamilnadu. 300 carrots were averagely divided into four, 60 carrots for training and 15 carrots for verification in each grade. All carrots were stored at 4°C until the experiment began.

2.2 Image Acquisition System

In order to avoid the influence of natural light, the whole image acquisition process is carried out in a light box that is sealed with black opaque acrylic board and with two LED lights. The inner wall of the light box is wrapped with black absorbent cloth, and the bottom board is white. The schematic of image acquisition system is shown in Fig.1. The image of carrot is captured by a camera and transmitted to a laptop via cable for subsequent processing. The camera used in the experiment is MinTe U2-YW500 (2592*1944). Z50, configured as Intel Pentium 3558U @1.70GHz, 4G memory, 500G hard disk and Windows 8.1 operating system.

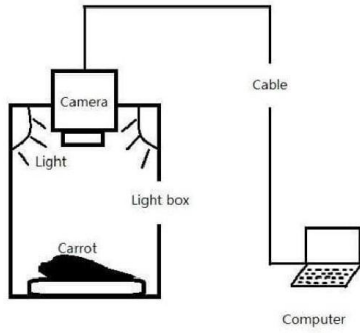


Fig.1. Schematic of Image Acquisition System setup

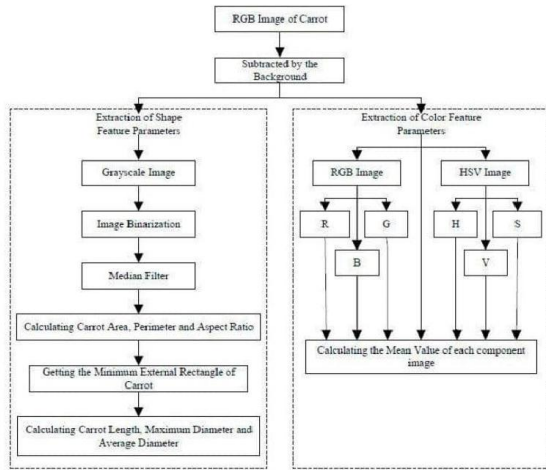


Fig.2. Flow chart of feature extraction algorithm

2.3 Image Pre-processing

In order to extract the feature parameters of shape and color of carrot from an image, image pre-processing is necessary, including grey level transform, filtering, binarization, background segmentation and edge detection (M. Hu et al. (2013); F. Wang et al. (2018)). All image processing are implemented by Matlab 2016 a software (The Math Work Co., Ltd., USA).

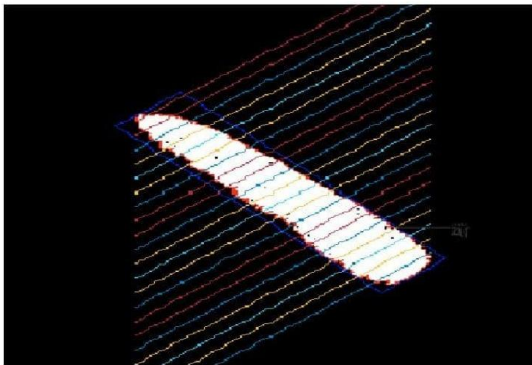


Fig. 3. Schematic diagram for calculating average diameter

2.4 Feature Parameter Extraction

The shape features includes length (L), maximum diameter (D), average diameter (d), area (A), perimeter (P), and aspect ratio (I). Color features includes the mean greyvalue of R, G, B, H, S, and V components.

The algorithm flow of carrot feature extraction is shown in Fig.2. The area of carrot (A) is the sum of the number of pixels in the carrot area, the perimeter (P) is the sum of the edge pixels. And the aspect ratio (I) is the ratio of the short axis to the long axis of the equivalent ellipse (Y. Kong et al. (2012)). Carrot length (L) is the length of the minimum enclosing rectangle of carrot, while the maximum diameter (D) is the width of the minimum enclosing rectangle (Y. Song et al. (2018)). The steps for obtaining the minimum enclosing rectangle are as follows:

- 1) Binarizing grey-scale image to obtain carrot binary area by Matlab command `im2bw`.
- 2) Constructing the outer rectangle of the carrot area and record the length, width and area of the outer rectangle.
- 3) Rotating the enclosed area counterclockwise by 1 degree, repeat step 2, and go to step 4 until traversal 90 degree.
- 4) Comparing the area of outer rectangle after each rotation to get the minimum area of outer rectangles.

The steps for calculating the average diameter (Batchelor M. M., and Searcy S. W. (1989)) are as follows:

- 1) Rotating carrot counterclockwise by 45 degrees to avoid the infinite slope, and then obtain the minimum enclosing rectangle by the methods above.
- 2) Calculating the slope k of the short edge of the rectangular.
- 3) Taking k as the slope, make a straight line every 50 pixel distances as shown in Fig.3, and make $L/50$ in total.
- 4) Find out the two intersections of each straight line and carrot edge, and calculate the distance (d_i) between the two intersections.

- 5) Calculating the average Diameter $d = \frac{\sum_{i=1}^{L/50} d_i}{50}$

Extracting image on R, G, B, H, S and V components, respectively. And then calculate grey mean values by the following equation. The x is the width and y is the height of image.

$$Mean_value = \frac{\sum x \sum y f(x,y)}{A}$$

2.5 Data Normalization

Before data analysis, we usually need to normalize the data first (Kamilaris A., and Prenafeta-Boldú F. X. (2018)). Data normalization can improve the convergence rate and accuracy of the model. The z-score normalization method was adopted in this study (Q. Zhang (2017)), which normalizes data based on the mean and the standard deviation of original data. The processed data conform to the standard normal distribution. It means the mean value is 0, the standard deviation is 1. The transformation function is listed as equation (2)

$$x^* = \frac{x - \mu}{\delta}$$

Where μ and δ are the mean value and the standard deviation of data.

2.6 Features Interval Partition

The feature interval was divided after extracting the shape and color features of carrots, and then frequency of each interval could be calculated. As shown in Table 1, the feature histogram is further generated as the sample feature.

Table 1. Features Interval Partition

Features	Interval partition	The frequency of each interval p
Area	$[n_{11} \ n_{12}), [n_{12} \ n_{13}), \dots, [n_{1j} \ n_{1(j+1)})$	$P_{11}, P_{12}, \dots, P_{1j}$
Perimeter	$[n_{21} \ n_{22}), [n_{22} \ n_{23}), \dots, [n_{2j} \ n_{2(j+1)})$	$P_{21}, P_{22}, \dots, P_{2j}$
Length	$[n_{31} \ n_{32}), [n_{32} \ n_{33}), \dots, [n_{3j} \ n_{3(j+1)})$	$P_{31}, P_{32}, \dots, P_{3j}$
Maximum diameter	$[n_{41} \ n_{42}), [n_{42} \ n_{43}), \dots, [n_{4j} \ n_{4(j+1)})$	$P_{41}, P_{42}, \dots, P_{4j}$
Average diameter	$[n_{51} \ n_{52}), [n_{52} \ n_{53}), \dots, [n_{5j} \ n_{5(j+1)})$	$P_{51}, P_{52}, \dots, P_{5j}$
Aspect ratio	$[n_{61} \ n_{62}), [n_{62} \ n_{63}), \dots, [n_{6j} \ n_{6(j+1)})$	$P_{61}, P_{62}, \dots, P_{6j}$
R mean value	$[n_{71} \ n_{72}), [n_{72} \ n_{73}), \dots, [n_{7j} \ n_{7(j+1)})$	$P_{71}, P_{72}, \dots, P_{7j}$
G mean value	$[n_{81} \ n_{82}), [n_{82} \ n_{83}), \dots, [n_{8j} \ n_{8(j+1)})$	$P_{81}, P_{82}, \dots, P_{8j}$
B mean value	$[n_{91} \ n_{92}), [n_{92} \ n_{93}), \dots, [n_{9j} \ n_{9(j+1)})$	$P_{91}, P_{92}, \dots, P_{9j}$
H mean value	$[n_{101} \ n_{102}), [n_{102} \ n_{103}), \dots, [n_{10j} \ n_{10(j+1)})$	$P_{101}, P_{102}, \dots, P_{10j}$
S mean value	$[n_{111} \ n_{112}), [n_{112} \ n_{113}), \dots, [n_{11j} \ n_{11(j+1)})$	$P_{111}, P_{112}, \dots, P_{11j}$
V mean value	$[n_{121} \ n_{122}), [n_{122} \ n_{123}), \dots, [n_{12j} \ n_{12(j+1)})$	$P_{121}, P_{122}, \dots, P_{12j}$

In the table, the variable subscript i denotes the ordinal number

In the table, the variable subscript i denotes the original number of features, j denotes the ordinary number of the interval where the current feature is valued, n_{ij} and $n_{i(j+1)}$ denote the lower bound value and upper bound value of the features in the j interval respectively, and P_{ij} Denotes the frequency of the i_{th} features in the j_{th} interval.

2.7) Recognition Model

In this paper, the recognition model based on back propagation neural network (BPNN) (Xinhua J. et al. (2018)), support vector machine (SVM) (Geng J. et al. (2019); Sidehabi S. W. et al. (2018)) and extreme learning machine (ELM) (feng L. et al. (2018)) were built.

1) Back Propagation Neural Network (BPNN)

The BPNN structure is shown in Fig.4, including the input layer, the hidden layer, and the output layer. Data pass through the middle hidden layer processing, and the error can transmit backward. Adjacent layer neurons is constantly corrected forward, and constantly approach the expected output (Rumelhart D.E., and Hinton G.E. (1986)).

2) Support Vector Machine (SVM)

The purpose of the SVM is to find a superplane to divide the sample, the principle of segmentation is to maximize distance, and finally transform into a convex secondary planning problem to solve. SVM can not only carry out twoclassification, but also solve the problem of multi-class classification. For multi-class classification issues, sample data can be mapped from the original space to a higher space, where the sample can be divided (Xiong J. et al. (2017)). The $\phi(x)$ represents the characteristic vector after x mapping, so in the feature space, the model corresponding to the superplane can be represented as:

$$f(x) = \omega^T \phi(x) + b \quad (3)$$

Minimize function :

$$\begin{cases} \text{Min} \frac{1}{2} \|\omega\|^2 \\ \omega, b \\ \text{s. t. } y_i(\omega^T \phi(x) + b) \geq 1 (i = 1, 2, \dots, m) \end{cases} \quad (4)$$

It's dual problem as:

$$\begin{cases} \max_a \sum_{i=1}^m \alpha_i - \frac{1}{2} \sum_{i=1}^m \sum_{j=1}^m \alpha_i \alpha_j y_i y_j \phi(x_i^T) \phi(x_j) \\ \text{s. t. } \sum_{i=1}^m \alpha_i y_i = 0, \alpha_i \geq 0, i = 1, 2, \dots, m \end{cases} \quad (5)$$

Let, $k(x_i, x_j) = \phi(x_i^T) \phi(x_j)$:

$$\begin{cases} \max_a \sum_{i=1}^m \alpha_i - \frac{1}{2} \sum_{i=1}^m \sum_{j=1}^m \alpha_i \alpha_j y_i y_j k(x_i, x_j) \\ \text{s. t. } \sum_{i=1}^m \alpha_i y_i = 0, \alpha_i \geq 0, i = 1, 2, \dots, m \end{cases} \quad (6)$$

$$f(x) = \omega^T \phi(x) + b = \sum_{i=1}^m \alpha_i y_i k(x_i, x_j) \quad (7)$$

$K(x_i, x_j)$ is the nuclear function, such as linear core, Polynomial core, Gaussian core and Laplace nucleus. This paper selects the Gaussian nuclear function.

3) Extreme Learning Machine

The extreme learning machine (ELM) is a new type of fast learning algorithm. For a single hidden layer neural network, ELM can initialize the input weight and bias randomly, and get the corresponding output weight (Huang G. et al. (2011)). Suppose it has N arbitrary samples as (X_i, t_i) , $X_i = [x_{i1}, x_{i2}, \dots, x_{in}]^T \in R^n$, $t_i = [t_{i1}, t_{i2}, \dots, t_{in}]^T \in R^n$. For a neural layer L hidden layer nodes, it can be expressed as:

$$\sum_{i=1}^L \beta_i g(W_i X_j + b_i) = 0_j, j = 1, 2, \dots, N \quad (8)$$

Where $g(x)$ is activation function, $W_i = [w_{i1}, w_{i2}, \dots, w_{in}]^T$ is the input weight, β_i is output weight, b_i is i_{th} hidden bias.

To minimize the output error, it can be expressed as:

$$\sum_{j=1}^N |0_j - t_j| = 0 \quad (9)$$

$$\sum_{i=1}^L \beta_i (W_i X_j + b_i) = t_j, j=1, 2, \dots, N \quad (10)$$

The matrix expressed as:

$$H\beta = T \quad (11)$$

Where H is output of hidden nodes, β is output weight and T is expected output.

Equation (11) is solved to get $\hat{\beta} = H^+ T$, H^+ is generalized inverse of matrix H .

Recognition model is evaluated by accuracy, as in (12)

$$\text{Accuracy} = \frac{N_C}{N_A} \quad (12)$$

Where N_C is the number of correct recognition samples, N_A is the total number of samples.

3. RESULTS AND DISCUSSION

3.1 Image Pre- Processing and Features Extraction

After image pre-processing, RGB image was transformed into grey image firstly by average method, and binarized by global threshold 40. After filtering, carrot shape and color features were extracted.

From that the area, perimeter, length, average diameter, aspect ratio and grey mean value of R components of carrot distributed from 50,000 to 1,50,000 pixels, 2600 to 3600 pixels, 500 to 1100 pixels, 120 to 240 pixels, 0.14 to 0.26 and 0.7 to 0.85 respectively. And they were divided with interval of 20,000 pixels, 200 pixels, 100 pixels, 300 pixels, 0.03 and 0.03 correspondingly. It showed that the distribution of each grade is obvious in the same interval. It is solely on a certain features of each features on the grade needs to be considered comprehensively.

3.2) Result of Different Recognition Models

1) Result of BPNN Recognition Models

The recognition effect of BPNN is related to the number of layers and the number of nodes in each layer. ReLU function is the activation function in the middle layer of BPNN and Softmax function is the activation function in the output layer. With the increase of the layer, the iteration decreased. However, the nodes and the layers cannot increase indefinitely, which will lead to complicate network, increase training time, and over-fitting. The recognition effect of bilevel neural network is not very good that was caused by the middle hidden layers is too small and the high error, which made the network training insufficiently.

2) Results of SVM Recognition Models

The effect of penalty coefficient C and the radial basis function parameter gamma on the accuracy of model recognition showed that the penalty coefficient C has little effect on the recognition accuracy of the model. But the penalty coefficient C can complete with the simplicity of the decision surface, and it can be used to transform the misclassification of training samples. Smaller c makes the decision plane smoother, while higher C aims to classify all training samples correctly. Gamma defines how much impact a single training samples can have, and large gamma is equal to 1. The recognition confusion matrix of SVM model has the highest recognition accuracy for second – grade carrot whose features are quite different from that of other grades. However, SVM will misclassify carrots of the two adjacent grades as of the little different of features.

ELM recognition model has the advantages of fast running speed and good generalized performance. The results of Sigmoid, Sine and Hardlim activation functions with different nodes number are shown. It showed that accuracy rate of model increased with the increase of nodes number. The accuracy rate of ELM model reached the highest of 96.67% with Sine activation function and 100 nodes number. The confusion matrix of ELM model at this time is shown, the accuracy rate of ELM model was 100% for carrots of grade 3 and grade 4 because there are great difference between them and other grades. The misrecognition mainly occurred for carrot of grade 1 and grade 2 as of the small difference of features.

4. CONCLUSION

As per the earlier experiment recognition accuracy rate of the three models under the optimal condition were more than 90%. It showed that machine learning technique such as BPNN, SVM and ELM can be used for carrot grade recognition. These machine learning models map problems to a higher dimensional plane and then classify them. Both SVM and ELM are searching for mapping modes passively, but when the kernel function of SVM is determined, the mapping mode is determined. And ELM can map to high-dimensional space in infinite ways, so the accuracy rate of ELM is higher than that of BPNN and SVM. The highest accuracy rate of ELM model is 96.67%, which can meet the

need of actual production. Moreover, the ELM model is simple, has fast speed, so it has the value of research and practical application.

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TRANSPORT TECHNOLOGY IN AGRICULTURE

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ABSTRACT: This Paper addresses “The improvement of transport technology in agriculture” the slow adaptation of new technologies by farmers in many Developing countries. The transport technology shows the link between the Producers and consumers. In many countries, large quantities of goods are transported by rails, ships, airways etc., this has the advantage of generally being cheaper than road transport. In many parts of the world, farmers and peasants live Far away from any road on which grain can be transported to places of collections, Storage, or marketing. The transport system must be economical. This paper Shows different modes of transportation which should be widely used in Agricultural activities. We have to explain the merits and demerits of the modes of transportation

INDRODUCTION:

Transport is regarded as crucial factor in improving agricultural Productivity. It enhances quality of life of the people create market for agricultural Production. It facilitates interaction among geographical and economical region this paper also tells about different modes of transportation and also how the People faces the transportation problem in agriculture. The purpose of this paper is to provide detailed advice about a transportation technology in agriculture. Farmer easily to transport products (vegetables, fruits, crops, etc...) for consumer. We will try to explain different modes of transport technology in agriculture. Improved transport technology in agriculture now a days in the world. Now a Days transport technology is important for agriculture transportation service division (TSD) experts support domestic and international agribusinesses by providing market reports, economic analysis, transportation disruption reports.

ROADWAYS:

Road transport is the most regular and multifaceted network that includes wide range, physically judicious, largely bendable and generally the most operationally suitable and readily available means of movement of goods.

There are several problems and limitations linked with transportation of husbandry products. In case transport services are not common, cheap quality or precious also tillers will be at a vexation when they try to sell their crops. An precious service will naturally lead to low estate gate prices (the net price the farmer receives from dealing his yield).

The seasonally blocked routes or sluggish and irregular transport services, together with wrong storage, can actually lead to high losses as specific particulars analogous as milk, fresh vegetables, tea, get worse snappily after a while. In case the agricultural products are moved through bumpy road network, also several other crops analogous as mangoes & bananas might also suffer losses from staining.

Roads are the means that connect one place to another on the face of the land. You must have seen roads in your village, in cosmopolites and cosmopolites. Not all of them look likewise. Some of them are made of sand and some may be of chips and cement or coal-tar. You find different Vehicles plying on roads like bullock carts, cycles, motorcycles, motorcars, truck, buses, etc.

You might have seen individualities carrying goods on their head or back, in bikes or on Theas, move from one place to other. People also ride a bike or use jitney to travel Short distances. We also find beast driven vehicles like carts (drawn by bullocks, camels, Horses, donkeys, etc....) used in pastoral areas to carry crops, straw, fodder and sometimes indeed People. Sometimes indeed brutes are directly used to carry goods from one place to another. In areas, which are generally covered with snow throughout the time, we find sledges pulled by hounds used to carry both passengers and goods.

Compared with man driven and beast- driven means of road transport, motor driven mean Of transport have come more important over the times. This is due to their speedy Movement and larger carrying capacity. Extension of roads to every corner of the country have also enhanced the use of motor driven transport. The types of motor vehicles used to carry goods and passengers include machine- taxicabs, scooters, vans, buses, tempos and Exchanges, etc. In Kolkata, term way also forms part of road transport for carrying passengers.

Advantages of Road transport:

It's a flexible mode of transport as loading and unloading is possible at any Destination. It provides door-to- door service. It helps for people to travel and carry goods from one place to another, in places which are not connected by other means of transport like hilly areas.

LIMITATIONS OF ROAD TRANSPORT:

It has the following limitations. Due to limited carrying capacity road transport is not provident for long distance Transportation of goods.



RAILWAYS:

Rail transport has surfaced as one of the most reliable modes of transport in terms of safety. Trains are fast and the least affected by usual rainfall turbulence like rain or fog, compared to other transport mechanisms.. It has fixed routes and schedules. Its services are more certain, invariant and regular compared to other modes of transport. Rail transport began from mortal hauled contrivances in ancient Greece. Now it has evolved into a ultramodern, complex and sophisticated system used both in civic and cross-country (and mainland) networks over long distances.

Rail transport is an enabler of profitable progress, used to rally goods as well as people. Acclimations include passenger railroads, underground (or over ground) civic metro railroads and goods carriages. Trains need high capital to make and maintain and the

cost is magnified when a whole rail network is to be erected. The cost of construction, conservation and outflow charges are veritably high compared to other modes of transport. Also, rail transport can not give door-to-door service as it's tied to a particular track. Intermediate lading or discharge hinge involves lesser cost, further wear and gash and destruction of time. Railways help to increased agrarian

Affair, import of food- grains, widening of request, commercialization of Agriculture cropping pattern. It conducting conditioning like business, Sight seeing, passage along with Transportation of goods. Road ways are important ways of transportation. Road transportation plays great part in transportation.

EFFECT AND CAUSES OF THE FISCAL DIFFICULTIES OF THE RAILROADS:

Since numerous of the most serious current transportation issues of Public consequence have grown out of the changing part of the roads

In the transport system and attempts by the roads and affected Groups to guard their traditional profitable position, a brief analysis of the sources of the fiscal difficulties of roads will be profitable. It'll lay the base for a discussion of the probable cures and of the primary cause of the profitable reverses sustained by the roads has been the (! Fairly low average volume of business and earnings during the once 8 or 9 times. Back of the decline in business and earnings have been two's factors of outstanding significance (1) The general Industrial depression; (2) the adding competition of other forms of transportation, which has accentuated the reduction in rail traffic. There's little, of course, that the roads can do directly about a general recession in profitable exertion which reduces the volume of their traffics. Laterally, they can help by acclimate carriage their rates to take into account the lessened capability of shippers and passengers to pay. But lowers rates alone well not restore general substance for the reason that numerous other rudiments of cost enter hits the profitable Picture



WATERWAYS:

Aqueducts of the nation give other indispensable means of transport. Unfortunately, in India, aqueducts aren't completely developed though she has a great potentiality. Though India has kilo measures of passable swash aqueducts, only kilometres are used. Again, we've kilo measures of conduits of only 600 kilo measures are passable but hardly 400 kilo measures are actually used.

Graces

It's cheaper means of transport Inland aqueducts tariffs are much lower and, thus it works cheaper for both short and long distances. The particulars which are big and heavy and which are fragile can be moved withiest sender of weight has the installations of lading and unloading from boats and docks on and from steamers and barges. Indeed the receiver has the analogous installations. Aqueducts give an independent movement unlike road system where road is meant for all kinds of vehicles creating the problem of traffic.

Faults

The speed of the boats and steamers is poorly limited in case of conduits and gutters. Goods demanding quick movement as perishable can be hardly transported Changing seasons produce problems. Winter may indurate the gutters and conduits and summer eats the depth of gutters and conduits. Again, the gutters are known for changing their course of flow. The inland aqueducts are connecting the given places. Again, the weight capacity is relatively limited.

Water transportation described as the movement of people and freight by boat, boat, barge or windjammer across ocean, ocean, lake, conduit, or swash, or through other modes of water transportation. It's a vital system of transportation.

Water transportation is the most cost-effective system of moving large, perishable, and heavy products across long distances. This system of trip is substantially used to carry people, as well as perishable and non-perishable particulars together appertained to as weight.

Water transport is the most provident and historically significant system of transport. It runs on a nature track and, with the exception of conduits, doesn't need significant fiscal expenditure in the structure and conservation of its route.

Water transport also has a veritably low operating cost. It has the topmost cargo capacity and is therefore stylish suited to transporting huge amounts of heavy

particulars across long distances. It has been necessary in bringing the world's numerous regions closer together and is essential to transnational commerce.

ADVANTAGES AND DISADVANTAGES OF WATER TRANSPORTATION:

Advantages of Water Transportation

Provident Rivers are a tone- contained thruway that requires no structure or conservation. Indeed yet, the cost of structure and maintaining conduits is much cheaper if they're employed for purposes other than transportation, similar as irrigation. Also, the cost of operating water transport seems to be veritably cheap.

It's the least precious system of conveyance for transporting products between locales.

It has a minimum operating cost, making it the cheapest mode of trip across large distances.

Large boats operate more cheaply, since energy expenditures may be distributed across a larger volume. Distance has a negligible effect on overall conveyance costs. While road and rail transport have veritably high conservation costs, water transport has fairly low conservation costs. Large Storage Capacity.

Vessels are the modes of transport that have a advanced capacity for transporting a larger quantum of goods. This is particularly true when compared to other modes of trip similar as rail, truck, or aircraft.



Water transport enables the transportation of large and heavy particulars at a low cost.

Safe Mode of Transport

Weather detainments the departure or appearance of an airplane on a larger number of times, while vessels can operate more readily in more complex or changeable situations due to their continuity, resistance, and responsibility.

Increased Product Diversity and Transmittable Accoutrements Considered one of the most notable

features, we can observe how, in discrepancy to air transport (where, in several cases, dangerous or liquid weight isn't permitted), the capability to transport all types of accoutrements is the only option when it comes to canvas, liquids, and dangerous particulars that aeroplane can not transport. However, it can not convey them through multinational transport, if land transport is able of lading similar particulars.

Environmentally friendly although it produces veritably little environmental damage, canvas leakage from tanks seems to be the primary issue with this system of transportation attimes. However, water transport will win since it generally has a lower carbon footmark, If we want a green world with the smallest CO2 emigrations. There's an exception if a canvas slip is included in the comparison.

AIRWAYS:



We can not boast of airways in India as we do in case of railroads and highways because, it's underdeveloped and underutilized. It acts as a confluent or supporting transport means. Domestic capacity available is 115 lakh ton kilo measures but use only to the extent of 12 lakh ton kilometres in 1990.

Transnational capacity corresponds to 218 lakh ton-kilo measures of which 175 lakh ton-kilo measures are used. India has 4 transnational airfields, 92 airdromes with 50 intermediate and 40 minor airdromes.

Graces

Fastest means of transport

Air transport provides the speediest movement of weight over the distant places by barring virtually spatial barriers. It's known for its reliable service during the times of cataracts, wars, earth- shakes. It's all rainfall means, of transport though breakouts are cancelled due to bad rainfall conditions.

The position of consumer service and, hence satisfaction is of high order as it's known for proximity, speed and least damage to weight.

As it provides fastest and continued service, capital investments in the form of stocks of goods is less. This

is of particular significance in case of largely perishable particulars.

Faults

It's premium means of transport

The cost of air transport is veritably high and there's limit of weight of weight. Hence, it's suitable for light weight, high grade and expensive particulars only.

The aeroplanes can not land at all the places of our choice. It connects megalopolis and some important metropolises only.

The weight capacity of a aeroplane is much lower because of its size as it works against the force of graveness.

Pipe-Lines:

Pipe-lines are the technical means of transportation designed to move the particulars like crude- canvas, petroleum, chemicals, coal, lime- gravestone, iron-ore, bobby concentrates and gas. India has made a late morning in this regard unlike U.S.A., U.S.S.R. and Middle-East, and the development is accepted only in case of canvas refineries to move petrol and gas from sources to requests.

The total pipe length in India, at present is of the order of kilo cadence possessed by private and public undertakings similar as Canvas India Limited, Indian Oil Corporation and Oil and Natural Gas Commission. Biggest Pipeline is planned between Iran and India.

Graces

Crude canvas or coal and gas transported through the pipe \rightarrow lines works out nearly $1/4$ of railroads and thruway.

Pipe- line transportation presents all rainfall system to move the products. Absolutely there's no any destruction of time as it works round the timepiece.

As there are no occasions of lading and unloading, there's no compass for discovering, evaporation, pilferage and so on.

The pipe- line generally underground and, hence, takes no fresh space. What's more important is that it traverses through delicate terrain.

Faults

Though functional and conservation costs are minimum, the capital cost of pipe- line is rather much advanced and that's why a county like India has minimum length. In the ages of war and political ascendance, pipe- lines are more prone to adversary attacks therefore risking the modes of force to the entire nation. The product conditioning are grind to halt. Transport takes a veritably important place in every assiduity, including husbandry. In order to produce food, growers need certain coffers, similar as seed, diseases, fungicides, packaging accoutrements,

and numerous others. Furthermore, transport is a burning element of post-harvest crop operation..

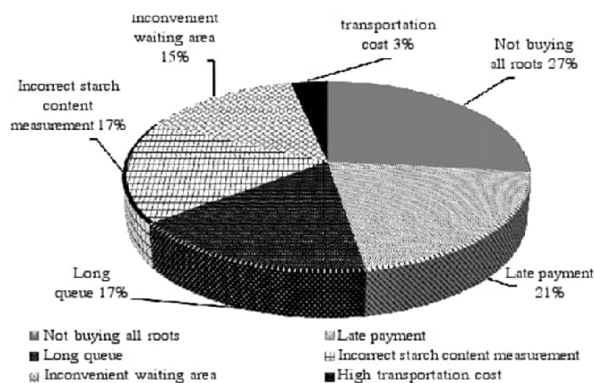


HOW GROWERS ARE AFFECTED IN TRANSPORTATION

Since transportation, whether of persons or goods, inescapably involves the expenditure of time and trouble, growers and consumers are interested not only in having available a transportation system of the necessary geographical extent but also in having it serve so that the minimal quantum of time and cost will be involved (id at colourful service Situations. The functioning of the transport system affects growers in a variety of ways. The focal points of concern to growers as both directors and consumers are their capability to reach requests at which to vend and buy goods; the timing of shipments of ranch products and purchases of ranch inventories in agreement with their requirements relative to request conditions; the preservation of the quality commodities during payload; and the rates, charges, and other direct and circular costs of transportation.

The relative emphasis accorded to these colourful aspects of transportation in relation to husbandry operations and pastoral life varies with circumstances peculiar to particular ages in the development of husbandry, transportation, and assiduity. Of significance also are the period of time over which the effectiveness of the transport system is observed and measured, the distance from requests of particular Husbandry and product areas, the nature of the product in relation to request requirements, the phase of the business cycle, the actuality of a war frugality, and multitudinous other factors. Accordingly, it's delicate to draw valid conceptions in brief compass regarding the shifts in emphasis on colourful aspects of the transportation system. The trouble at one time is to promote the development of the physical installations of transport; at other ages it may be to secure bettered

services from being installations by concession with the carriers or by regulation, to secure reductions in operating costs, to gain rate Adaptations by concession, or to promote fresh transport services. The ages of special emphasis also lap. The history of agrarian movements through which favourable transportationadaptations have been sought is substantial as well as complex in its interrelations with other ranch objects.



EFFORT BY FARMERS TO IMPROVE THE TRANSPORTATION FACTOR:

A brief review of the role of agriculture in promoting transportation development in the past, though incomplete, may serve a useful purpose as background for an analysis of present problems and a discussion of phony. During the early history of this country, the development of agriculture in frontier areas was limited by the lack of adequate transportation facilities. Availability of transportation tended to determine the direction of settlement. As population increased along the eastern and southern coasts, the farmers settled on navigable streams which furnished a means of transporting their products to market. As the seaports grew in population and wealth, with an attendant increase in their requirements for food products, the fertility of the interior portions of the country proved attractive to many pioneers, who steadily pushed the agricultural frontier westward and established industrious rural committees hard upon the heels of the departing Indian and the American huntsman. However, the meagreness of transportation facilities and the difficulties, dangers, and excessive cost of marketing seriously hampered this movement and early directed public attention toward the urgent necessity of establishing better means of transportation and communication. In successive overlapping phases, this public concern led in Until more than a century to the promotion and development of the early trails and

land routes across the Appalachian barrier, canals to supplement the natural water routes, toll roads, the (early Government-aid roads, such as the Cumberland Road, trails across the West to the Pacific coast, railroads, pipe lines, modern motor highways, and finally airways. While it would be inaccurate to attribute the promotion of the Prescott elaborate transportation network in the United States solely to the efforts of farmers to exploit the undeveloped lands of the

West, it cannot be giiinsaid that agriculture played an important role in the marvelous development in this field. Many other forces contributed, of course, such as concern over national unity and defense, the needs of industry, the availability of foreign capital, and the profitable adventure of the railroad barons in spanning the continent. The wxistward movement and all it implies in terms of location of specialized regions of agricultural production and farm population depleted significantly upon the rapid development of rail transportation in the last half of the nineteenth century. Moreover, rural life and farming operations would be back in the horse-and-buggy days of isolation from neighbour's and urban culture, restricted educational opportunities, self-sufficient farms, and inaccessible markets were it not for the modern highway and motor-vehicle facilities, in the promotion of which agriculture has been vitally interested in recent decades. Farmers are today less concerned with promoting the development of additional transport facilities than they have been in times past. This is because the domestic system of transport has apparently reached a state of maturity, except perhaps in the fields of highway and air transport and in restricted areas where special agricultural or industrial development may yet take place.

CONCLUSION:

In recent years trends in the level and structure of freight rates have been of great concern to agriculture. Many efforts have been made to induce the railroads to reduce freight rates on agricultural products more or less in sympathy with the depressed farm prices and the low levels of farm income during recent years. Vigorous efforts have been exerted through the regulatory process to prevent the railroads from using the "greater revenues" approach—which generally means increased rates on farm products—to solve their admitted

Financial difficulties. Not all of these representations either to the railroads or to the Interstate Commerce Commission have been successful, but that they have been of real value is shown by the general rate increase on agricultural products granted by the Commission to the railroads effective March 28, 1938, of 5 percent, as

compared with a 10-percent increase on industrial products.

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ECG SIGNAL PROCESSING USING 1D CONVOLUTIONAL NEURAL NETWORKS AND APPLICATIONS: REVIEW

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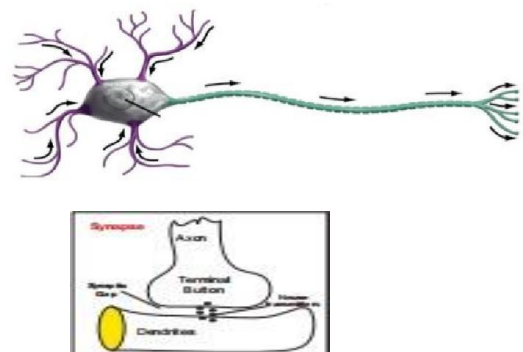
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ABSTRACT

During the last decade, convolutional neural networks (cnns) have become the defacto standard for various computer vision and machine learning operations. Cnns are feedforward artificial neural networks (anns) with alternating convolutional and subsampling layers. Deep 2d cnns with many hidden layers and millions of parameters have the ability to learn complex objects and patterns providing that they can be trained on a massive size visual database with ground- truth labels. With a proper training, this unique ability makes them the primary tool for various engineering applications for 2d signals such as images and video frames. Yet, this may not be a viable option in numerous applications over 1d signals especially when the training data is scarce or application specific. To address this issue, 1d cnns have recently been proposed and immediately achieved the state-of-the-art performance levels in several applications such as personalized biomedical data classification and early diagnosis, structural health monitoring, anomaly detection and identification in power electronics and electrical motor fault detection. Another major advantage is that a real-time and low- cost hardware implementation is feasible due to the simple and compact configuration of 1d cnns that perform only 1d convolutions (scalar multiplications and additions). This paper presents a comprehensive review of the general architecture and principals of 1d cnns along with their major engineering applications, especially focused on the recent progress in this ifield. Their state-of-the-art

performance is highlighted concluding with their unique properties. Introduction

Artificial neurons used in conventional anns are the fifirst-order models of biological neurons. In the mammalian nervous system, the biological learning is mainly performed at the cellular level. As shown in [fig. 1](#), each neuron is capable of



processing the electrical signal based on the three individual operations [\[1,2\]](#): 1) reception of the other neurons outputs through the synaptic connections in dendrites, 2) the integration (or pooling) of the processed output signals in the soma at the nucleus of the cell, and, 3) the activation of the ffinal signal at the fifirst part of the axon or the so-called axon hillock:

If the pooled potentials exceed a certain limit, it “activates” A series of pulses (action potentials). As shown in [fig. 1\(b\)](#), each terminal button is connected to other neurons across a small gap called a synapse. During the 1940s the

first “artificial neuron” Model was proposed by mcculloch- pitts [3], which has thereafter been used in various feed-forward anns such as multi- layer perceptrons (mlps). As expressed in eq. (1), in this popular model the artificial neuron performs a linear transformation through a weighted summation by the scalar weights. So, the basic operations performed in a biological neuron, that operate the individual synaptic connections with specific neurochemical operations and the integration in the cell’s soma are modeled as the linear transformation (linear weighted sum) followed by a possibly nonlinear thresholding function, which is called activation function.

Starting from the 1959, hubel and wiesel have established the foundations of the visual neuroscience through the study of the visual cortical system of cats. Their collaboration has lasted more than 25 years during which they have described the major responsive properties of the visual cortical neurons, the concept of receptive field, the functional properties of the visual cortex and the role of the visual experience in shaping the cortical architecture, in a series of articles published in the journal of physiology [16–20]. They are the pioneers who found the hierarchical processing mechanism of information in the visual cortical pathway, which eventually led to the nobel prize in physiology or medicine in 1981. With these advances in neurocognitive science, fukushima and miyake [21] in 1982 proposed the predecessor of convolutional neural networks (cnns), at the time called as “neocognitron” Which is a self-organized, hierarchical network and has the capability to recognize stimulus patterns based on the differences in their appearances (e.g., shapes). This was the first network, which has the unique ability of a biological mammalian visual system, that is, the assessment of similar objects to be assigned to the same object category independent from their position and certain morphological variations. However, in an attempt to maximize the learning performance, the crucial need of a supervised method to train (or adapt) the network or the learning task in hand became imminent. The ground-breaking invention of the back-propagation (bp) by rumelhart and hinton in 1986 [22] became a major cornerstone of the machine learning (ml) era. Bp incrementally optimizes the network parameters, i.e., weights and biases, in an iterative manner using the gradient descent optimization technique.

These two accomplishments have started a new wave of approaches that eventually created the first naïve cnn models but it was the seminal work of yann lecun in 1990 who formulated the bp to train the first cnn [23], the so-called “lenet”. This cnn ancestor became mature in 1998 and its superior classification

power was demonstrated in [24] over the benchmark mnist handwritten number database [25]. This success has begun the era of cnns and brought a new hope to otherwise “idle” World of ml during the 1980s and early 90s. Cnns have been used in many applications during the 90s and the first decade of the 21st century but soon they fell out of fashion especially with the emergence of new generation ml paradigms such as support vector machines (svms) and bayesian networks (bns). There are two main reasons for this. First, small or medium size databases were insufficient to train a deep cnn with a superior generalization capability. Then of course, training a deep cnn is computationally very demanding and feasible only with the modern graphical processors present today. This is why during these two decades the application of cnns has been limited only to low-resolution (e.g. The thumbnail size) and gray-scale images in small-size datasets. On the contrary, both svms and bns in comparison have fewer parameters that can be well optimized especially over such small to medium size datasets and independent from the image resolution. The annual imagenet large scale visual recognition challenge (ilsvrc) in the image classification competition in 2012 became the turning point for the application of deep cnns in the area of large-scale image classification.

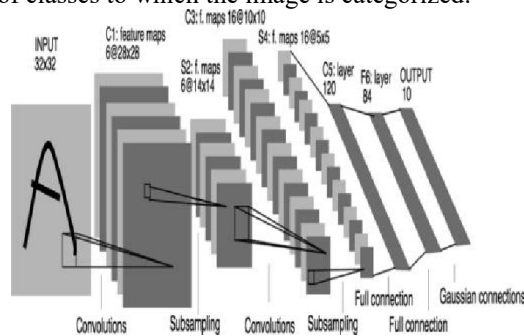
2D convolutional neural networks

Although it has been almost 30 years after the first cnn was proposed, modern cnn architectures still share the common properties with the very first one such as convolutional and pooling layers. Also, besides few variations, the popular training method, the back-propagation technique is another commonality since 90s. This section will provide a brief overview of the conventional deep cnns while introducing the most fundamental ideas and cornerstone architectures of the past.

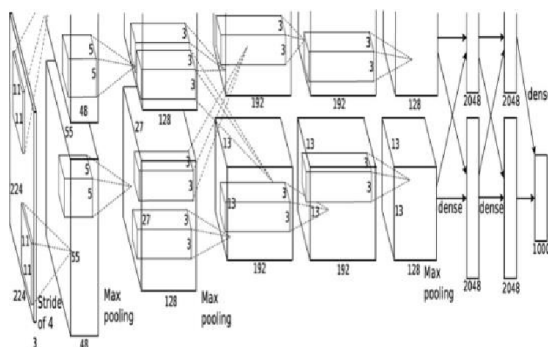
To start with, the popularity and the widerange of application domains of deep cnns can be attributed to the following **Advantages:**

1. Cnns fuse the feature extraction and feature classification processes into a single learning body. They can learn to optimize the features during the training phase directly from the raw input.
2. Since cnn neurons are sparsely-connected with tied weights, cnns can process large inputs with a great computational efficiency compared to the conventional fully- connected multi-layer perceptrons (mlp) networks.
3. Cnns are immune to small transformations in the input data including translation, scaling, skewing and distortion.
4. Cnns can adapt to different input sizes.

This sample network consists of two convolution and two pooling layers with 4 and 6 neurons, respectively. The output of the last pooling layer is processed by a single fully connected layer and followed by the output layer that produces the classification output. The interconnections feeding the convolutional layers are assigned by weighting filters δw_P having a kernel size of δK_x ; $K_y P$. The convolution takes place within the image boundaries; therefore, the feature map dimension is reduced by the $\delta K_x - 1$; $K_y - 1$ pixels from the width and height, respectively. The subsampling factors δS_x ; $S_y P$ are set in advance in the pooling layers. In the sample illustration in the figure, the kernel sizes corresponding to the two convolution layers were set to $K_x = 4$; $K_y = 4$, while the subsampling factors are set as $S_x = 3$; $S_y = 3$ for the first pooling layer and $S_x = 4$; $S_y = 4$ for the second one. Note that these values were deliberately selected so that the outputs of the last pooling layer (i.e. the input to the fully-connected layer) are scalars. (1x1). The output layer consists of two fully-connected neurons corresponding to the number of classes to which the image is categorized.



1D convolutional neural networks



The conventional deep CNNs presented in the previous section are designed to operate exclusively on 2D data such as images and videos. This is why they are often referred to as, “2D CNNs”. As an alternative, a modified version of 2D CNNs called 1D Convolutional Neural Networks (1D CNNs) have recently been developed [45–54]. These studies have shown that for certain applications 1D CNNs

are advantageous and thus preferable to their 2D counterparts in dealing with 1D signals due to the following reasons:

- There is a significant difference in terms of computational complexities of 1D and 2D convolutions, i.e., an image with $N \times N$ dimensions convolve with $K \times K$ kernel will have a computational complexity $\sim O(N^2 K^2)$ while in the corresponding 1D convolution (with the same dimensions, N and K) this is $\sim O(NK)$. This means that under equivalent conditions (same configuration, network and hyper parameters) the computational complexity of a 1D CNN is significantly lower than the 2D CNN.
- As a general observation especially over the recent studies most of the 1D CNN applications have used compact (with 1–2 hidden CNN layers) configurations with networks having $< 10^6$ parameters whereas almost all 2D CNN applications have used “deep” architectures with more than 1 M (usually above 10 M) parameters. Obviously, networks with shallow architectures are much easier to train and implement.
- Usually, training deep 2D CNNs requires special hardware setup (e.g. Cloud computing or GPU farms). On the other hand, any CPU implementation over a standard computer is feasible and relatively fast for training compact 1D CNNs with few hidden layers (e.g. 2 or less) and neurons (e.g. < 50).
- Due to their low computational requirements, compact 1D CNNs are well-suited for real-time and low-cost applications especially on mobile or hand-held devices [45–57].

As illustrated in Fig. 5, two distinct layer types are proposed in 1D CNNs: 1) the so-called “CNN-layers” where both 1D convolutions, activation function and subsampling (pooling) occur, and 2) Fully-connected (dense) layers that are identical to the layers of a typical Multi-layer Perceptron (MLP) and therefore called as “MLP-layers”. The configuration of a 1D-CNN is formed by the following hyper parameters:

- 1) Number of hidden CNN and MLP layers/neurons (in the sample 1D CNN shown in Fig. 5, there are 3 and 2 hidden CNN and MLP layers, respectively).
- 2) Filter (kernel) size in each CNN layer (in the sample 1D CNN shown in Fig. 5, the filter size is 41 in all hidden CNN layers).

- 3) Subsampling factor in each CNN layer (in the sample 1D CNN shown in Fig. 5, subsampling factor is 4).
- 4) The choice of pooling and activation functions.

Conclusions:

Since the introduction of the first “artificial neuron” model by McCulloch- Pitts [3] in 1943, the era of ML has experienced many ups and downs in different stages of the history. Nevertheless, CNNs as its final product are attracting the utmost attention worldwide and influencing almost all aspects of the modern life. On the other hand, deep CNNs alone can have an equal or even better learning ability than humans for the complex patterns or objects in massive size data repositories. Empowered by these, more and more Artificial Intelligence (AI) products are emerging every day, which will soon replace for many basic tasks such as driving, assisting, transportation, handling or load carrying, etc. It has already become apparent that AI will further assist or perhaps even replace humans on those complex tasks that require a high level of expertise and training, such as medical operations, health monitoring and diagnosis, taxonomy and even higher education.

1D CNNs are the recent variants of conventional (2D) CNNs. Although they were introduced only a few years ago, recent studies have revealed that with a proper systematic approach, compact 1D CNNs can surpass all the traditional and conventional approaches. In this article, we draw the focus especially on those compact 1D CNNs and present a comprehensive survey on their engineering applications. Compact 1D CNNs can promise a sole advantage of being applicable to those applications where the labeled data for training is scarce and a low-cost, real-time implementation is desired. In such applications, it is obvious that a deep 2D CNN may not be feasible at all due to the scarcity of the training data and the high complexity that eventually violates the real-time constraint. On top of this, the conventional 2D CNNs can only process 2D signals; hence this enforces an extra 1D to 2D transformation following with a windowing (framing) operation, both of which cost additional time and resources. In many applications covered in this article, it has been shown that 1D CNNs are relatively easier to train and offer the minimal computational complexity while achieving state-of-the-art performance levels. They are especially suitable for mobile or hand-held devices with limited computation power and battery life. This is why they are attracting attention with an increasing pace; for instance, the 1D CNN publications, [46] and

[50] have immediately become the most-popular and most-cited articles in their journals. The 1D CNN software used in these studies is now publicly shared in [63].

The main limitation or the drawback of 1D CNNs is actually common for conventional CNNs and ANNs in general: They are homogenous (same neuron type in the entire network) and based solely on linear-neuron model from 1950s.

Generalized Operational Perceptrons (GOPs) can use any neuron model, linear or non-linear while having a heterogeneous network structure just like the human nervous system. Further in, [98–100] GOPs were further improved to obtain other desired features such as neuron-level heterogeneity and “memory” capability.

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MEDICAL INDUSTRY TRENDS THAT PROMOTE THE USE OF OPTICAL MEDICINE FIBER

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Abstract:Internet Of Things (IOT) is one of the modern innovations in Information

Technology, which intends to interconnect the physical and digital worlds. It introduces a vision of smartness by disabling communication between objects and humans through the Internet. IOT has different applications in almost all sectors like Smart Health, Smart Transportation, and Smart Cities, etc. In healthcare applications, IOT communication between doctors and patients as the latter can be diagnosed remotely in emergency scenarios through body sensor networks and wearable sensors. However, using IOT in healthcare systems can lead to violation of the privacy of patients us, security should be taken into consideration. Blockchain is one of the tendency research topics nowadays and can be applied to the majority of IOT scenarios. Few major reasons for using the Blockchain in healthcare systems are its prominent features, i.e., Decentralization, Immutability, Security and Privacy, and Transparency.

KEYWORDS: IOT(Internet Of Things),wearable sensors, Blockchain

1.INTRODUCTION

The healthcare sector is an primary concern for all the developing as well as developed countries because this sector is directly concerned with the social welfare and lives of people. Research and development in the healthcare sector should be an current process , as it will help to improve the quality of living by fighting various health issues and diseases. With the promotion and recent developments in technology, the improvement in the healthcare sector can be seen easily. The existing capabilities of the healthcare and medical sector can be further improved by the introduction of the latest and innovative computer technologies in the health sector.

Various emerging and revolutionary computer technologies are already being used in other sectors with miraculous result. These technologies include the IOT , block chain, machine learning, Data mining, Natural Language Processing(NLP),Image processing, cloud

computing ,and many more . IOT means connecting everything with the internet.

Everything hear include vehicles ,home appliances,and other items embedded with electronics,and software,sensors,actuators,and connectivity that enable these things to connect a,collect ,and exchange data.

Such as desktop laptop smartphones and tablets to any range of traditionally dumb or non internet, enabled physical devices an everyday objects. The major technologies used in the internet of things are sensors cloud, wireless technology,and security. The main applications of IOT are Smart Homes, Smart City, Agriculture, Smart Retail, Driver less Cars, and Healthcare. Security remains a critical aspect of every technology and plays a

vital role in the smooth functioning of IOT networks.

In IOT architecture, proper format of IOT is done at the physical level so that any unauthorized receiver cannot access the system. IOT architecture correspond to five layers: the Perception layer, Network layer, Middleware Layer, Application layer, and Business layer . Each layer has its objective and issues. The main security goals critical in IOT are Confidentiality, Integrity, and Availability (CIA). Based on weakness, there are four categories of attacks in IOT:

“Physical attack,” “Software attack,” Network attack,” and “Encryption attack.”

2.PROBLEM DOMAIN

This section enlarge on the motivating factors as well as the review strategy used for conducting this study on Blockchain and IOT in the Healthcare sector.

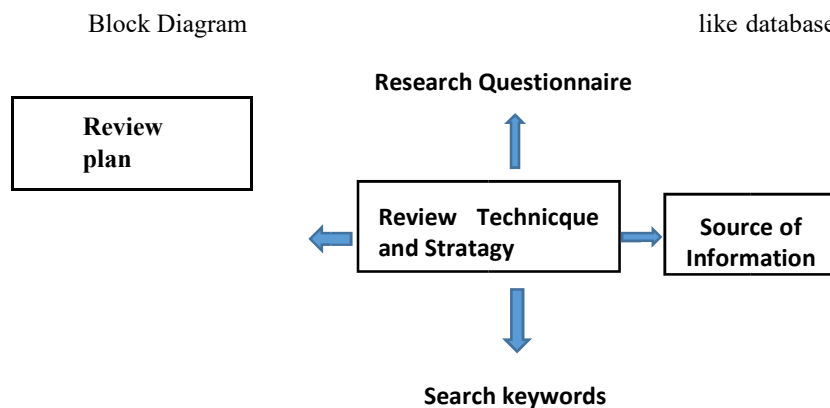


Figure2: Block Diagram

2.1. Review Plan. Time period that were involved in this literature review on the use of Blockchain and IOT technologies in the Healthcare and Medical sector includes building a review strategy, downloading research articles from different online sources, analyzing the quality of articles, interpreting and enumerating observed results of the review, recording the results of the review, and finally presenting various research challenges and future research directions.

2.2. Research Questionnaire. The first step involved in conducting this resume was to frame the different research questionnaires and the motivating factors, and searching for different online research databases for relevant articles.

2.3. Source of Information. For conducting this review, various possible related resources have been consulted for finding the required and related research resources required for this study.

2.4. Search Keywords. Complete search on understanding the possibility of using Blockchain and IOT technologies in the Medical and Healthcare sector includes qualitative.

3. IOT AND RELATED DOMAIN

The fundamental architecture of IOT is the same as the TCP /IP architecture. There are many factors in IOT architecture that need to be focused like Measurability, Interoperability, Reliability and QOS. The basic architecture of IOT consists of many layers, and the general architecture of IOT is described in figure 2.

3.1 Perception layer: First is the representation (Perception layer) layer, also known as the device layer. In this layer, sensors sense and collecting information about the environment.

3.2 Transport layer: It transfers the sensor's data between different layers through networks such as wireless, 3G, LAN, and RFID.

3.2 Processing layer: This layer stores, analyses, and processes huge amounts of data. Ability and concepts

like databases, cloud computing, and big data are used in this layer. **3.3 Application layer:** This layer is responsible for delivering application specific services to the user.

3.4 Business layer: It manages the whole IOT system, including applications, business and profit models, and user privacy. This layer also helps in future actions and business strategies.

Three domains of IOT architecture

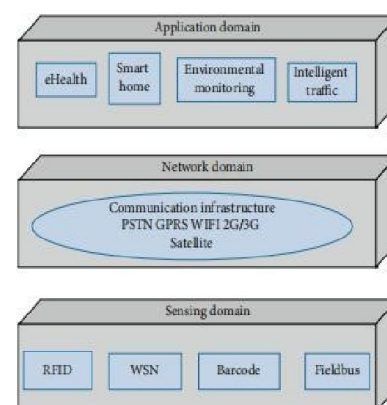


Figure 3: Domains of IOT architecture.

3.5 Communication Technologies in IOT. Collection of heterogeneous networks and devices is done in IOT. To make Centralization decisions concerning IOT, reliable communication between the gateway and things is essential. The IOT gateway works as a communication between the sensing domain and the network domains like Zigbee,

Bluetooth, WiFi are the technologies that are used to connect Smart things to IOT gateway. IOT gateways are required in two situations: when the connection occurs between different sensing domains like Zigbee, Bluetooth, and the connection between sensing and network domain, e.g., Zigbee and 3G

4. INTEGRATION OF BLOCKCHAIN AND IOT TECHNOLOGIES IN HEALTH -CARE

The number of patients crossways the country is increasing day by day and with the increase in the number of patients, it has become difficult to provide full medical care. In the last few years, the superior of medical care has improved with the help of IOT and wearable devices. Remote patient monitoring is the main sensation to address healthcare issues. Wearable devices used for collecting and transferring data to hospitals, and IOT devices play an important role in remote patient monitoring. The main aims of these devices are to provide important information such as breathing patterns of a person, blood glucose level, and blood pressure to health

providers .

Healthcare devices that are used for data collection data can be classified into four parts: **(a) Stationary Medical Devices:** These devices are used for specific physical locations,

(b) Medical Embedded Devices: These devices are placed inside the human body, **(c) Medical Wearable Devices:** These

devices prescribed by doctors, **(d) Wearable Health Monitoring Devices:** These devices are worn on the body.

5. BLOCKCHAIN TECHNOLOGY AND RELATED CONCEPTS

Blockchain is an rising technology used in numerous different networks to ensure security and reliability in those networks. Blockchain technology is also given option in various transaction management systems, and it is replacing the current existing transaction management system. The issues with the current banking system are as follows: (i) High transactional fees

(ii) Double spending

(iii) Banks have become synonymous with crises.

Blockchain consists of a chain of blocks, and each block is a collection of all modern transactions that have taken place and are verified. Blockchain is a guiding technology, only second to the best-selling bitcoin. Working of bitcoins using the Blockchain can help to read Blockchain technology better. Another important concept connected with the Blockchain is the value or proof of work of that block. This is the mathematical solution that is connected to the block to ensure that this is the valid block.

6. VARIOUS APPLICATIONS OF BLOCKCHAIN AND IOT IN HEALTHCARE

Blockchain helps to maintain and share the patient's medical record with hospitals and health providers. there are many applications of healthcare:

Patient Monitoring/Electronic Health Record (ERH). According to the International Organization of Standardization, electronic health records store the patient data in a digital format, and the data are exchanged securely and only accessible by authorized authority. It contains private information attention a person's health issues, and its main objective is to maintain and provide efficient service to the patient.

6.1. Managing Medical Records and Other Data. The long-standing method of monitoring medical records needs to be changed. Now, the use of the Computer network in the healthcare system makes it more

efficient. Computer network smart objects make it easy to store and process the data in any format like audio, images, or text.

7. CHALLENGES OF USING BLOCKCHAIN IN HEALTHCARE DERIVED INDUSTRIAL IOT

The main challenges in the use of Blockchain Technology, along with IOT in the Healthcare and Medical Sector, are as follows: **7.1. Interoperability:** Healthcare

Interoperability means exchanging information with each other in the Blockchain network. It is the main challenge due to the large and varied providers and due to its large open nature

7.2. Security: As the concept of decentralization is more secure, there are also some disadvantages associated with it. As in decentralized Blockchain, the data are distributed in a public ledger, which can cause privacy leakage

7.3. Lack of Standardization: Blockchain is a trending technology and is adopted in many countries. In domains and networks where the concept of security, trust, and track ability is involved, the Blockchain is used. Proper standardization of protocols, technologies, etc., is very important.

8. RESULT AND DISCUSSION

In this article, an attempt was made to identify different possible ways with which the IoT technology along with the Blockchain can be integrated into the Healthcare sector to improve the overall performance and to strengthen the current Healthcare sector. Three major application areas Table 8: Summarizes the list of abbreviations used in this survey.

(a) remote monitoring of patient's health,

(b) drug's traceability, and

(c) medical records management, where IOT and Blockchain profession have their applicability were explored in detail. Also, various possible challenges and issues in the deployment of these two revolutionary technologies, i.e., IOT and Blockchain, in the Healthcare sector were explored and unregenerated.

9. CONCLUSION In Today's world, IOT technology is implemented in every field like agriculture, healthcare, smart cities, etc. In the field of healthcare, IOT is brought into use for applications like observation of the patient's health regularly, drug traceability, etc. However, there exist various security issues in IOT, which can be solved by integrating IoT ensure that patients' sensitive health related records remain safe from any type of tampering and leakage

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ARTIFICIAL ORGAN AND 3D PRINTING PACEMAKER

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Abstract-*The purpose is to develop a temporary machine or pump for a person who has a complaint of the Heart and their survival without transplant is impossible. These temporary bias can give enough time for the case until a patron heart is available. The purpose of this review is to give an overview and history of how man has developed an artificial heart for survival. Cardiovascular- related artificial Organs are implanted in cases where the heart, its gates, or another part of the circulatory system is in Complaint. Lab- grown hearts and 3D bio published hearts are also being disquisition. Cases who bear a heart transplant. The cases, who do admit a heart transplant, bear life-long vulnerable suppression remedy, which significantly hinders the quality of life. There are presently further than significantly lower than the number of 6.2 million cases in the US with heart failure, and heart failure reckoned for 356 mortalities in 2016. There is a truly large profitable cost associated with heart failure, reported to be \$30.7 billion in 2012. For the cases who do admit a heart transplant, the median survival rate of heart transplant cases between 2002 and 2009 has been reported to be 12.5 times.*

Keywords-*tissue engineering, 3D bio printing, pacemaker.*

I. INTRODUCTION

Heart failure is a major medical problem encyclopedically and utmost times requires heart. Still, the number of patron organs available for transplant is always abstract. Recently, regenerative medicine exercising kerchief tissue manufacturing has been a creative content of Study, offering pledge for resolving the gap between shy organ force and transplantation conditions. An artificial organ is a mortal made organ

device or kerchief that is implanted or integrated into a Mortal — interfacing with living kerchief — to replace a natural organ, to duplicate or compound a specific function or functions so the case may return to a normal life as soon as possible. The replaced function does not have to be related to life support, but it constantly is. For illustration, relief bones and joints, analogous as those factory in hip reserves, could also be considered artificial organs. The heart is a muscular organ which pumps blood through blood vessels to different organs of the body. It's the most significant and vital organ in the mortal body.

II. HISTORICAL PERSPECTIVE OF 3D BIO PRINTING

Physicians treating cases suffering from cardiac failure have a myriad of medical bias available to stabilize the case and, at best detention, the progression of cardiac dysfunction. The ultimate birth result to cardiac failure is the relief of the failing heart with a feasible heart through allograft transplantation. The status of 3D bio printing technology is beyond its immaturity, and an update on progress toward an implantable Total Bio fabricated Heart is handed. The first illustration of cumulative manufacturing was by Francoise who, in 1856, transferred photographic images to a three-dimensional physical construct that replicated the original form. With the development of the computer and plastics, cumulative manufacturing has fleetly surfaced as means to construct a variety of objects. The process involves computer supported design (CAD) to give instructions to computer supported manufacturing (CAM) outfit that produces the object most frequently using a subcaste-by-subcaste cumulative process.

The cumulative manufacturing of plastic corridor was first described by Charles Hull in the early 1980s and has now come a major invention in part manufacturing in the aerospace, automotive, construction, and appliance fields. The emergence of cumulative manufacturing in the medical field can be traced to 3D printing of surgical attendants to prop croakers in the planning of complex interventions. Cumulative manufacturing of implantable medical bias has been used in a growing number of clinical cases. These 3D published implants are created using case specific data (e.g., MRI, reckoned reviews), and the published bias have dimensionality that matches the tissue being replaced.

III. DEFINITION OF TISSUE ENGINEERING

The definition of tissue engineering has been very elegantly presented during a recent publication: "Tissue engineering is a multidisciplinary field bringing together experts from engineering, life sciences and medicine, utilizing the building blocks of cells, biomaterials and bioreactors for the development of 3-dimensional artificial tissue and organs which may be wont to augment, repair and/or replace damaged and/or diseased tissue." This definition truly embodies the key elements of the sector and is split into three main components. First and foremost, tissue engineering may be a multidisciplinary field that brings together experts from many various fields working together to unravel complex problems in medicine. It is common and almost expected to witness this multidisciplinary nature in most major tissue engineering research labs and centers. Engineers, surgeons, and cell biologists are nearly always seen working together in major research centers to unravel complex tissue engineering problems. The second important component of the definition defines the building blocks of tissue engineering as cells, biomaterials, and bioreactors (Fig. 1). While cells provide the functional component of any tissue and/or organ, biomaterials simulate the extracellular matrix (ECM) and supply structural support during tissue fabrication and maturation. Recent advances in biomaterial design have resulted in biomaterials with tissue specific properties, mechanical properties, biocompatibility, and biomimetic activity. The third building block of tissue

They're used in complex jaw, tracheal cranial, and sternum reserves. printers able of rapid-fire, high resolution plastic printing where bias can be produced cheaply, fleetly, and at the point of care. The transition from 3D printing to 3D "bio" printing represents the recognition that tissue exists and functions as a three-dimensional structure with a complex arrangement of cells and extracellular matrix (ECM). Wilson and Boland are credited with the foremost work describing a system to 3D memoir print living matter into complex structures. The original 3-axis robotic memoir printer was called the Biological Architecture Tool or Club.

engineering is bioreactors, custom devices built to duplicate the complex physiological cues within functioning tissue and organs. These cues contains electrical impulses, mechanical stimuli, continuous fluid stresses from blood flow, and compression stresses, all of which function to support development and maturation. The third and final component of the definition outlines the potential applications of tissue engineered constructs, either for repair or replacement of damaged or diseased tissue.

A. *The field of cardiac tissue engineering*

The field of tissue engineering is broad and encompasses all tissue and organ systems within the physical body. The field of cardiac tissue engineering as a whole is targeted to bio engineering 3D heart muscle or cardiac patches, biological pumps, ventricles, valves, blood vessels, and entire bio artificial hearts, with tremendous progress being made on all fronts. Cardiac patches or 3D heart muscle are planar tissue constructs that replicate the anatomical and functional characteristics of mammalian heart muscle tissue. The potential application of 3D cardiac patches is in cases of acute myocardial infarct, where bioengineered cardiac muscle tissue are often wont to augment contractile function. Biological pumps are tubular grafts surrounded by contractile cardio myocytes, resulting in a hollow chambered pulsating construct, with potential applications as biological left ventricular assist devices. Tissue engineered vascular grafts and valves are geared as replacement grafts in cases of coronary bypass surgery or valve replacement surgeries. Overview of cardiac tissue engineering - the field of cardiac tissue engineering

includes methods to bioengineer contractile 3D heart muscle, biological pulsating pumps, bioengineered left ventricles, bio artificial valves and vascular grafts, and bio fabricated ventricles, valves, blood vessels, and entire bio artificial hearts, with tremendous progress being made on all fronts. Cardiac patches or 3D heart muscle are planar tissue constructs that replicate the anatomical and functional characteristics of mammalian heart muscle tissue. The potential application of 3D cardiac patches is in cases of acute myocardial infarction, where bioengineered heart muscle tissue can be used to augment contractile function. Biological pumps are tubular grafts surrounded by contractile cardiomyocytes, resulting in a hollow chambered pulsating construct, with potential applications as biological left ventricular assist devices.

B. The complexity of the mammalian heart

The mammalian heart may be a marvelous organ, one that beats a mean of 70 times every minute or 2–3 billion times during the lifespan of an individual, assuming a mean lifespan of 75 years. From an anatomical standpoint, the mammalian heart consists of four chambers, the left and right ventricles and atrium (Fig. 3).

The electrical system of the guts consists of the pacemaker (SAN), the cardiac muscle (AVN), the left and right bundle branch, and a huge network of Purkinje cells. Spontaneous depolarization waves are initiated at the SAN node, travel through the AVN, and are distributed throughout the heart via a complex network of Purkinje fibers. Depolarization of cardiomyocytes leads to a rise in intracellular calcium transients, which successively deploy a posh cascade of molecular events resulting

in contraction. This

Fig 1: Pre bio printing process

is referred to as E-C coupling or coupling of electrical depolarization waves with cardiac muscle contraction. Spatial variations within the extracellular matrix ensure proper functioning of every component of the guts. This is where 3D bio printing provides a strong tool that permits us to accurately position different cell types during a very specific pattern, thereby allowing tight control over the heart bioengineering process. Major components of the human heart—the human heart consists of 4 chambers, four valves, the cardiac conduction system, contractile cardio myocytes, and a posh vasculature. The four chambers are the right and left auricle, left and right ventricle.

C. Tissue engineering for the heart

There have been numerous publications describing the fabrication of a total bio artificial heart, nearly all of which reckoned upon acellular pulps peopled with either neonatal ventricular rat myocytes (NVRMs) or convinced pluripotent stem (iPS) deduced cardiomyocytes^{21, – 30} (Table I). This collaborative body of work serves

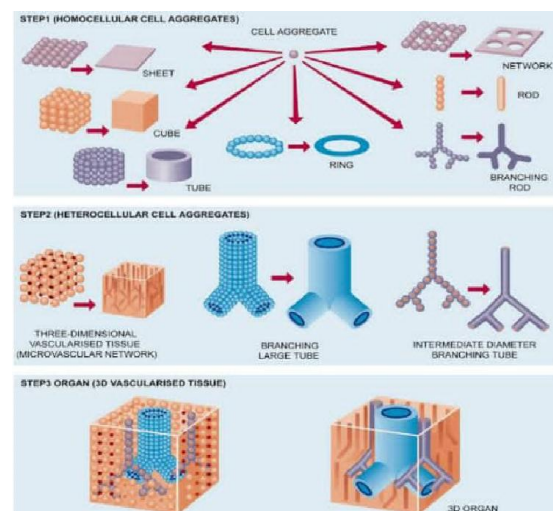


Fig 2: Tissue engineering

to demonstrate the feasibility of bio printing mortal hearts and the vacuity of core technologies

to achieve this fate.

IV. THE 3D BIO PRINTING PROCESS

Extrusion grounded bio printing is the most common system used in ultramodern day bioprinters, and utmost commercially available bioprinters are extrusion- grounded systems. The process for bio printing is remarkably simple and in close resemblance to the operations of an affordable inkjet printer; still, the major difference is that inkjet printers deposit accoutrements in a drop fashion, while bioprinters deposit accoutrements as beaches. In its most simple personification, extrusion grounded bio printing is grounded on insulated cells that are mixed with a memoir essay and loaded onto a hype, and also, curvaceous pressure is used to move the cell loaded bio essay through the hype tip (Fig. 4).

Soft hydrogels generally used in bio printing are fibrin, collagen, alginate, pluronic acid, agarose, and gelatin.

Analogous to other tissue engineering operations, the viability, chastity, and attention of the original cell suspense being used are important. Important printing parameters include density of

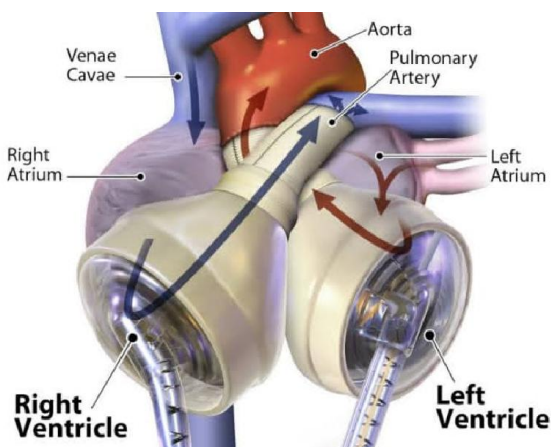


Fig 3: Artificial heart

the cell laden memoir essay, curvaceous pressure, publishing speed, and tip periphery. High density memoir inks and lower tip compasses bear a advanced printing pressure. The printing speed affects the periphery of the filaments, with advanced pets identified with thinner filaments. Exemplifications of cells needed to

bio print hearts include contractile cardiomyocytes, conducting trendsetter and Purkinje cells, structural fibroblast.

V. 3D BIO PRINTING HUMAN HEARTS—SCIENCE OR SCIENCE FICTION

Bio printing an organ as complex as the mortal heart was viewed as wisdom fabrication until lately. Still, there have been numerous advancements in the field of tissue and organ fabrication, which give a clear pathway for the bioprinting of mortal hearts, a field that has been converted from wisdom fabrication to reality. This was demonstrated by a recent publication in April 2019, which showcases the capability to bioprint hearts. The process to 3D bioprint mortal hearts is now well-established and described in detail in Roadmap for 3D Bio printing of Mortal Hearts. Adult physical cells have been viewed as terminally discerned cells for decades; still, in this corner publication, it was shown that four recap factors were sufficient to reprogram terminally discerned skin fibroblasts to an early embryonic state, appertained to as convinced pluripotent stem (iPS) cells. Posterior work in the field of stem cell engineering demonstrated the capability to convert iPS cells to virtually all cell types in the mortal body including functional cardiomyocytes, first reported in 2009 and latterly meliorated in 2013.

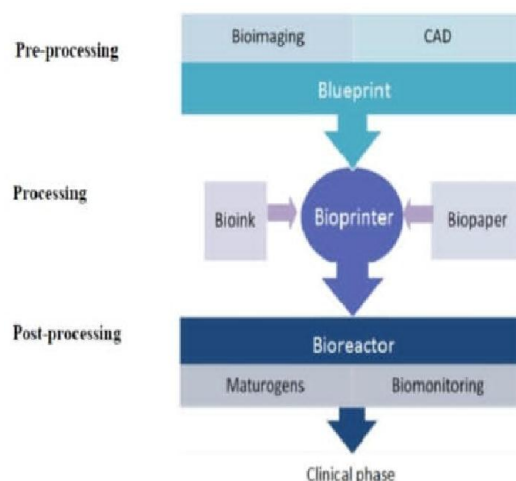


Fig 4: Steps of 3D bio printing process.

VI. ROADMAP FOR 3D BIO PRINTING

OF HUMAN HEARTS

The roadmap to bioprint mortal hearts is presented in Fig.

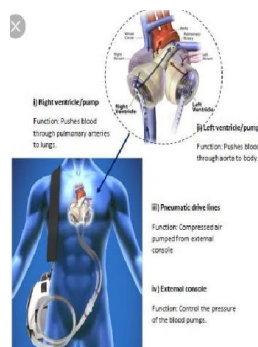
6. Case MRIs

are used to induce a complete 3D chart of the mortal heart, one that's specific for the case. A skin vivisection is attained from the case and dermal fibroblasts isolated and converted to induced pluripotent stem (iPS) cells, stem cells that have the eventuality to be converted to all cell types in the mortal body. These iPS cells are also reprogrammed to form constricting cardiomyocytes. In an ideal case, the iPS cells are also reprogrammed to form conducting trendsetter and Purkinje cells and cells of the vascular system, including smooth muscle cells, endothelial cells, and cardiac fibroblasts. The bioinks correspond of custom phrasings of biomaterials, complements, growth factors, and hormones. Dermal fibroblasts are isolated from patient skin necropsies and converted to iPS cells and also to cardiomyocytes.

A. 3d bio printing of the microcirculation

Ischemic heart complaint (IHD) as a result of cardiac microvascular dysfunction is getting decreasingly honored as a element of congestive heart failure. Regenerative drug approaches to IHD and especially cell- grounded curatives have targeted metabolic blights that uphold the coronary inflow reserve deficiency. These approaches include 3D tissue constructs placed directly on the epicardial face to address ischemic myocardium.

A well- honored handicap toward the creation of a thick (i.e., lesser than 500



micrometer) tissue construct and especially a

biofabricated ventricular wall or the total biofabricated heart has been the incapability

Fig 5 : Artificial heart in bioengineering.

to produce a functional microcirculation to give acceptable perfusion throughout the tissue. Using fat deduced vascular cells including complete microvascular fractions, investigators have successfully overcome this handicap creating functional microvascular constructs. These pre-formed blood vessels parade the capability to connect to (inosculate) the philanthropist microcirculation, furnishing perfusion to thick tissue constructs. The use of adipose deduced cells provides a implicit autologous, point of care cell source for making these prevascularized constructs to meet the immediate requirements of cases with ischemic heart complaint. 3D bio printing provides several advancements toward vascularized tissue finagled constructs. Bioprinters give a completely automated system to produce the construct. This reduces driver variability and permits the assembly of the construct to be performed in a sterile terrain. These cylinders generally have compasses not lower than 100 micrometers, far larger than the confines of factors of the microcirculation, videlicet, arterioles (20 to 80 micrometers), venules (30 to 100 micrometers), and capillaries (4 to 12 micrometers). Following 3D bio printing of microvessel competent cells in bioinks, the cells must suffer a vasculogenic and angiogenic process to form a competent and functional microcirculation in the construct.

B. Construction of coronary macrovascular structures

Atherosclerosis of the coronary rotation remains the major cause of cardiac failure.

These tubes can be of controlled periphery and length; still, the time needed for development of these vessels presently doesn't permit immediate implantation following printing.

For illustration, the coronary vascular system in the mortal heart has no redundancy features, and without collateral rotation, occlusions of

coronary highways affect in acute myocardial

infarction and its sequelae.

C. 3d bio printing for the cardiac conduction system

Another critical aspect will be the capability to reengineer the cardiac conduction system, which is a veritably delicate and intricate system designed to distribute accompanied depolarization swells throughout the heart. The SAN consists of a cluster of technical trendsetter cells located at the junction of the superior vena cava with the right patio and is responsible for generating robotic trendsetter exertion of the heart. Electrical impulses generated at the SAN knot trip through the AVN, through the pack of this, and the throughout ventricular tissue via specialized Purkinje filaments. While the cardiac conduction system is complex, the SAN can be viewed as the point of inauguration of electrical exertion, while the Purkinje filaments are largely responsible for transmitting the electrical exertion through ventricular tissue leading to heart muscle contraction. The use of 3D bio printing technology will most probably have little impact on the direct treatment of arrhythmias with the possible exception of being suitable to implant new spontaneously depolarizing cells. The unborn bio printing of the Total Bio fabricated Heart will really profit from arising 3D charts of the mortal heart conductive system. The programmed cells can also be used to make artificial AVNs, SANs, and Purkinje filaments, critical factors of the cardiac conduction system and Biofabricated Hearts. There are current cardiac meter conditions that may profit from rejuvenescence of mortal Purkinje and trendsetter cells. In SSS, the heart rate can alternate between slow (bradycardia) and fast (tachycardia). Long QT Pattern (LQTS) is a complaint of the electrical system that can be inherited and at threat for ventricular fibrillation (VF), the most dangerous heart meter that causes unforeseen death.

C. 3d bio printing for heart valves

A number of stopcock pathologies affect in cardiac failure. With the arrival of percutaneous stopcock relief,

the occasion to treat a wider range of cases including cases who aren't good surgical campaigners is changing the treatment timing and stopcock form/ relief strategies. With the development of rapid-fire, largely validated CAD/CAM processes and new polymers for 3D printing, we're on course to potentially see 3D published faucets enter the clinical arena. The future will really see the use of 3D published compound faucets with percutaneous delivery systems.

For the final assembly of the total biofabricated heart, it seems likely that the faucets will be bioprinted independently from the specific chambers of the heart, and robotic placement of the faucets into their anatomic positions will do near the completion of the heart. Again, we're considering the stylish design for a 3D bioprinted stopcock using the mortal heart stopcock de construction as a starting point.



Fig 6 : Artificial heart

D. 3d bio printing for cardiac muscle

The fifth element of the total biofabricated heart is the cardiac muscle with its central part to produce compression and stuffing of the chambers of the heart. The hunt for an autologous source of cardiomyocytes remains under violent disquisition and will clearly profit from new understanding of cell isolation. Induced pluripotent stem cell technology

holds great pledge to give autologous cardiomyocytes deduced from a case's own ancestor cells. 3D microphysiologic systems are under development exercising stem cell deduced cardiomyocytes deduced from cases with a variety of cardiomyopathies. 3D bio printing of cardiomyocyte tissue constructs or mixed populations of cells including cardiomyocytes and vascular cells holds great pledge for medicine discovery. This will form the base for a surgically implantable vascular system that will eventually be assembled using 3D bio printing to include cardiomyocytes. The clinical targets for this coming generation of 3D Bioprinted cardiac tissue will include pediatric cases and especially those cases with natural blights performing in inadequate tissue to permit reconstruction of the heart. A significant advantage of 3D Bioprinted tissue constructs will be the capability of these constructs to grow with the child. Any new technology must be completely validated previous to acceptance, and 3D printing and 3D bio printing for medical operations will be no exception. The conception of publishing a model of the heart to help in evaluation of complaint and to help direct proper intervention has come reality, still; this new capability brings new questions regarding how snappily this should enter clinical practice

VII. CHALLENGES IN 3D BIO PRINTING OF HUMAN HEARTS

We've presented a clear and logical pathway to bioprint mortal hearts as well as the crucial scientific and technological challenges that have moved the field to this point. Important progress has been made during the once several times, and it's now clear that 3D bioprinted hearts for clinical transplantation are a near term reality. Still, as with any scientific bid, the field of 3D bio printing mortal heart isn't without its challenges. The single most important challenge that needs to be overcome in the field, and one that in general staggers the field of cardiac stem cell remedy, is the childhood of reprogrammed cardiomyocytes. A recent publication addressed this challenge and showcased that coupled electromechanical stimulation of cardiomyocytes reprogrammed from

iPS cells showed labels of adult phenotype, including the presence of well-organized endoplasmic reticulum and sarcoplasmic reticulum. While this work addresses a clear need in the field of cardiac stem cell remedy and 3D bio printing of mortal hearts, it's yet to be reproduced in other labs, substantially due to the use of technical bioreactors for electromechanical stimulation used in the published study. Maintaining iPS cells in a pluripotent stage remains grueling. There's a high cost associated with the product of iPS deduced cardiomyocytes, due to the cost of associated reagents and also due to the required training position of exploration staff. Likewise, there are presently challenges in producing a veritably large number of iPS deduced cardiomyocytes needed to bioprint mortal hearts.

VIII. CONCLUSION

Recent advances in the field of 3D bio printing have handed a clear pathway for the future, demonstrating the tremendous implicit bio printing has in developing functional organs for clinical transplantation. While there remain challenges in the field from a scientific and technological standpoint, there are also challenges related to nonsupervisory factors. Numerous of the challenges associated with nonsupervisory issues in 3D bio printing are the same as the field of tissue engineering in general and are kindly vague in their compass. This has been attributed to the lack of large-scale marketable success in the field of tissue engineering astronomically and 3D bio printing more specifically. As the field matures to deliver marketable successes, there will be resemblant advances in the nonsupervisory process with further clarity in compass.

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ARTIFICIAL ORGANS AND 3D PRINTINGS

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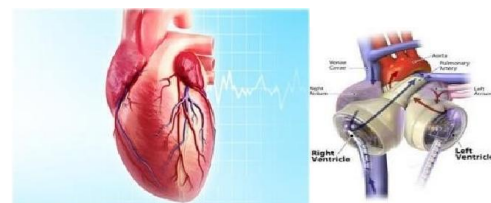
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Abstract : Organ publishing utilizes ways analogous to conventional 3D printing where a computer model is fed into a printer that lays down consecutive layers of plastics or wax until a 3D object is produced. In the case of organ printing, the material being used by the printer is a biocompatible plastic. The biocompatible plastic forms a deck that acts as the shell for the organ that's being published. As the plastic is being laid down, it's also planted with mortal cells from the case's organ that's being published for. After printing, the organ is transferred to an incubation chamber to give the cells time to grow. After a sufficient quantum of time, the organ is implanted into the case.

ARTIFICIAL ORGANS

An artificial organ is a mortal made organ device or kerchief that's implanted or integrated into a mortal — interfacing with living kerchief — to replace a natural organ, to duplicate or compound a specific function or functions so the case may return to a normal life as soon as possible. The replaced function doesn't have to be related to life support, but it constantly is. For illustration, relief bones and joints, similar as that plant in hipsters' reserves, could also be considered artificial organs.

Inferred by description, is that the device mustn't be continuously tethered to a stationary power force or other stationary coffers similar as pollutants or chemical processing units. (Periodic rapid-fire- fire- fire recharging of batteries, refilling of chemicals, and cleaning/ replacing of pollutants would count a device from being called an artificial organ.) Thus, a dialysis machine, while a very successful and critically important life support device that almost completely replaces the duties of a kidney, is not an artificial organ



PURPOSE TO USE

Constructing and installing artificial organs, an extremely exploration-ferocious and precious process originally, may number numerous times of ongoing conservation services not demanded by a natural organ. Furnishing life support to help imminent death while awaiting a transplant (e.g. artificial heart); Dramatically perfecting the case's capability for tone- care (e.g. artificial branch); Perfecting the case's capability to interact socially (e.g. cochlear implant); or Perfecting a case's quality of life through ornamental restoration after cancer surgery or an accident.

3D PRINTINGS

3D printers are used to manufacture a variety of medical bias, including those with complex figure or features that match a case's unique deconstruction. Some bias are published from a standard design to make multiple identical clones of the same device. Other bias, called case- matched or case-specific bias, are created from a specific case's imaging data. Commercially available 3D published medical bias include Instrumentation (e.g., attendants to help with proper surgical placement of a device), Implants (e.g., cranial plates or hipsterism joints), and External prostheses (e.g., hands). Scientists are probing how to use the 3D printing process to manufacture living organs similar as a heart or liver, but this exploration is in early stages of development.

Technology can depend on numerous factors including how the final product will be used and how easy the printer is to use. The most common technology used for 3D printing medical bias is called greasepaint bed emulsion. Greasepaint bed emulsion is generally used because it works with a variety of accoutrements used in medical bias, similar as titanium and nylon. The greasepaint bed emulsion process builds a three-dimensional product from veritably fine essence or plastic greasepaint, which is poured onto a platform and leveled precisely. A ray or electron ray also moves across the greasepaintsubcaste and melts the material it touches. Melted material fuses to the subcaste below it and to the greasepaint around it to produce a solid. Once a subcaste is completed, the platform moves down and one further subcaste of precisely leveled greasepaint is placed on top.

The FDA has several 3D printers that help us more understand the capabilities of 3D printing of medical bias and the public health benefit of this technology. For illustration, the FDA has printers that use different printing technologies, including greasepaint bed emulsion, to estimate what corridor of the printing processes and workflows are critical to insure quality of the finished medical device.



PATIENT-MATCHED DEVICES

While 3D printers are frequently used to produce identical clones of the same device, they can also be used to produce bias unique to a specific case. Case-matched (or case-specific) bias are created specifically for the case grounded on individual features, similar as deconstruction. They can be grounded on a template model that's matched to a case using medical imaging. Case-matching can be fulfilled by ways similar as scaling of the device using one or further anatomic features from patient data.

The FDA regulates 3D published medical bias through the same pathways as traditional medical bias; thus they're estimated according to the safety and effectiveness information submitted to us by the manufacturer. While traditionally manufactured medical bias come in separate sizes, case-matched bias can be made in a nonstop range of shapes with pre-defined minimum and maximum specifications that we can use to review the bias in the same way as standard sized bias. For case, the

specification may define a minimum and maximum wall consistence or how sharp a wind can be to maintain device performance for its intended use.

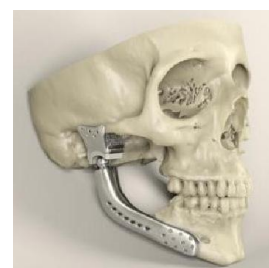
There's a provision in civil law that exempts — customl medical bias from FDA review, but case-matched bias don't automatically meet all the conditions. For farther information on custom device immunity, please relate to the Custom Device Immunity guidance.



3D-PRINTED ORGANS COULD SAVE LIVES BY ADDRESSING THE TRANSPLANT SHORTAGE

Due to the global organ deficit and limited organ benefactors, thousands of cases are left wanting organs and apkins in cases of severe injuries, illness or inheritable conditions. Numerous of these cases die before transplants are available. Towel engineering is an arising field that works on producing artificial towel and organ backups as endless results to replace or repair damage.

As biomedical engineering experimenters, we're developing 3D temporary organ structures — called pulpits — that may help regenerate damaged apkins and potentially lead to creating artificial organs. These apkins can also be used in colorful towel engineering operations, including whim-whams form in structures constructed from biomaterials.



PRINTING TISSUE

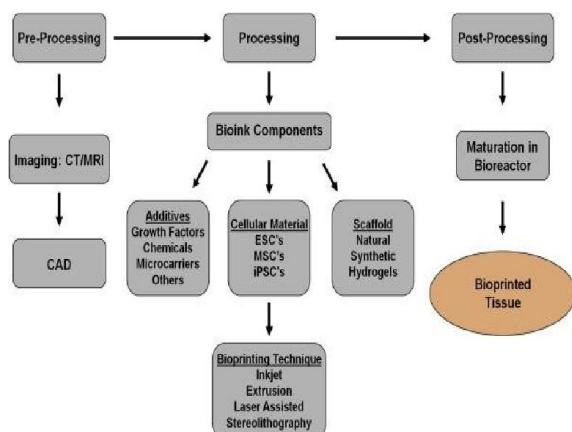
Roughly 22.6 million cases bear neurosurgical interventions annually around the world to treat damage to the supplemental nervous system. This damage is primarily caused by traumatic events similar as motor vehicle accidents, violence, plant injuries or delicate births. It's anticipated that the cost

of global whim-whams form and re-juvenescence will reach further than\$ 400 million by 2025. Current surgical ways allow surgeons to realign whim-whams ends and encourage whim-whams growth. Still, the prevalence of recovery in the injured nervous system isn't guaranteed, and the return of function is nearly noway complete.

Beast studies on rats have shown that if an injury destroys further than two centimeters of jitters, the gap can not be bridged duly and may affect in the loss of muscle function or feeling.

3D bio printing prints 3D structures subcaste by subcaste, analogous to 3D printers. Using this fashion, our exploration platoon created a pervious structure made of the case's neural cells and a biomaterial to ground an injured whim-whams. We used alginate — deduced from algae — because the mortal body doesn't reject it.

While this fashion has not yet been tested in people, formerly meliorated, it has the implicit to help cases staying for apkins and organs.



MATERIAL CHALLENGES

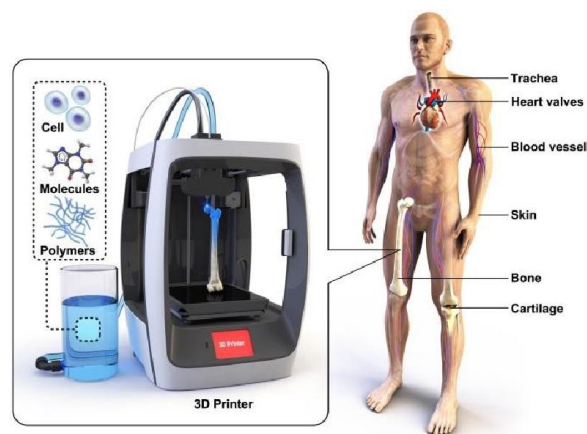
Alginate is a grueling material to work with because it collapses fluently during 3D printing. Our exploration focuses on the development of new ways to ameliorate its printability.

For whim-whams form, alginate has favorable parcels for living cells growth and functions, but its poor 3D printability vastly limits its fabrication. It means that alginate flows fluently during the printing process, and results in a revived structure. We developed a fabrication system where cells are contained within a pervious alginate structure that's created with a 3D printer. Former exploration used molding ways to produce a bulk alginate without a pervious structure to ameliorate whim-whams rejuvenescence; the cells don't like such a solid terrain. Still, 3D- publishing a pervious alginate

structure is grueling and frequently insolvable.

Our exploration addresses this issue by publishing a pervious structure made of alginate subcaste-by-subcaste rather than a moldered bulk alginate; similar structure has connected pores and provides a cell-friendly terrain. Cells can fluently communicate with each other and start the re-juvenescence while the 3D- published alginate provides a temporary support for them.

Experimenters are going towards the perpetration of 3D- published structures for cases who suffer from whim-whams injuries as well as other injuries. After the fabricated alginate structure is implanted in a case, the big question is if it have enough mechanical stability. Our studies will help to understand cell response, which is the main factor to take into account when assessing the success of the alginate structures.



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INTERNET OF THINGS IN HEALTHCARE AND MEDICAL SECTOR: APPLICATIONS OF BLOCKCHAINS, CHALLENGES AND FUTURE PERSPECTIVES

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Abstract: Internet Of Things (IOT) is one of the modern innovations in Information Technology, which intends to interconnect the physical and digital worlds. It introduces a vision of smartness by disabling communication between objects and humans through the Internet. IOT has different applications in almost all sectors like Smart Health, Smart Transportation, and Smart Cities, etc. In healthcare applications, IOT communication between doctors and patients as the latter can be diagnosed remotely in emergency scenarios through body sensor networks and wearable sensors. However, using IOT in healthcare systems can lead to violation of the privacy of patients us, security should be taken into consideration. Blockchain is one of the tendency research topics nowadays and can be applied to the majority of IOT scenarios. Few major reasons for using the Blockchain in healthcare systems are its prominent features, i.e., Decentralization, Immutability, Security and Privacy, and Transparency.

KEYWORDS: IOT(Internet Of Things), wearable sensors, Blockchain

1.INTRODUCTION
The healthcare sector is an primary concern for all the developing as well as developed countries because this sector is directly concerned with the social welfare and lives of people. Research and development in the healthcare sector should be an current process , as it will help to improve the quality of living by fighting various health issues and diseases. With the promotion and recent developments in technology, the improvement in the healthcare sector can be seen easily. The existing capabilities of the healthcare and medical sector can be further improved by the introduction of the latest and innovative computer technologies in the health sector.

Various emerging and revolutionary computer technologies are already being used in other sectors with miraculous result. These technologies include the IOT , block chain, machine learning, Data mining, Natural Language Processing(NLP), Image processing, cloud computing ,and many more . IOT means connecting everything with the internet.

Everything hear include vehicles ,home appliances, and other items embedded with electronics, and software, sensors, actuators, and connectivity that enable these things to connect a, collect ,and exchange data.

Such as desktop laptop smartphones and tablets to any range of traditionally dumb or non internet, enabled physical devices an everyday objects. The major technologies used in the internet of things are sensors cloud, wireless technology, and security. The main applications of IOT are Smart Homes, Smart City, Agriculture, Smart Retail, Driver less Cars, and Healthcare. Security remains a critical aspect of every technology and plays a vital role in the smooth functioning of IOT networks.

In IOT architecture, proper format of IOT is done at the physical level so that any unauthorized receiver cannot access the system. IOT architecture correspond to five layers: the Perception layer, Network layer, Middleware Layer, Application layer, and Business layer . Each layer has its objective and issues. The main security goals critical in IOT are Confidentiality, Integrity, and Availability (CIA). Based on weakness, there are four categories of attacks in IOT:

“Physical attack,” “Software attack,” Network attack,” and “Encryption attack.”

2.PROBLEM DOMAIN

This section enlarge on the motivating factors as well as the review strategy used for conducting this study on Blockchain and IOT in the Healthcare sector.

Block Diagram

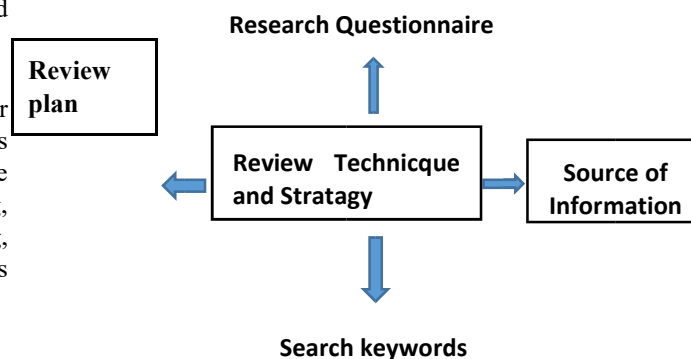


Figure2: Block Diagram

2.1. Review Plan. Time period that were involved in this literature review on the use of Blockchain and IOT technologies in the Healthcare and Medical sector includes building a review strategy, downloading research articles from different online sources, analyzing the quality of articles, interpreting and enumerating observed results of the review, recording the results of the review, and finally presenting various research challenges and future research directions.

2.2. Research Questionnaire. The first step involved in conducting this resume was to frame the different research questionnaires and the motivating factors, and searching for different online research databases for relevant articles.

2.3. Source of Information. For conducting this review, various possible related resources have been consulted for finding the required and related research resources required for this study.

2.4. Search Keywords. Complete search on understanding the possibility of using Blockchain and IOT technologies in the Medical and Healthcare sector includes qualitative.

3. IOT AND RELATED DOMAIN

The fundamental architecture of IOT is the same as the TCP /IP architecture. There are many factors in IOT architecture that need to be focused like Measurability ,Interoperability, Reliability and QOS. The basic architecture of IOT consists of many layers, and the general architecture of IOT is described in figure 2.

3.1 Perception layer:First is the representation(Perception layer) layer, also known as the device layer. In this layer, sensors sense and collecting information about the environment.

3.2 Transport layer: It transfers the sensor’s data between different layers through networks such as wireless, 3G, LAN, and RFID.

3.2 Processing layer: This layer stores, analyses, and processes huge amounts of data. Ability and concepts like databases, cloud computing, and big data are used in this layer. **3.3 Application layer:** This layer is responsible for delivering application specific services to the user.

3.4 Business layer: It manages the whole IOT system, including applications, business and profit models, and user privacy.is layer also helps in future actions and business strategies.

Three domains of IOT architecture

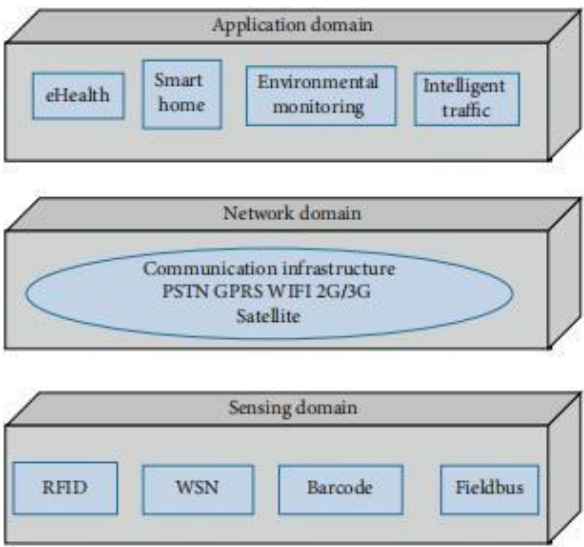


Figure 3: Domains of IOT architecture.

3.5 Communication Technologies in IOT. Collection of heterogeneous networks and devices is done in IOT. To make Centralization decisions concerning IOT, reliable communication between the gateway and things is essential . The IOT gateway works as a communication between the sensing domain and the network domains like Zigbee, Bluetooth, WiFi are the technologies that are used to connect Smart things to IOT gateway IOT gateways are required in two situations: when the connection occurs between different sensing domains like Zigbee, Bluetooth, and the connection between sensing and network domain, e.g., Zigbee and 3G

4.INTEGRATION OF BLOCKCHAIN AND IOT TECHNOLOGIES IN HEALTH -CARE

The number of patients crossways the country is increasing day by day and with the increase in the number of patients, it has become difficult to provide full medical care. In the last few years, the superior of medical care has improved with the help of IOT and wearable devices . Remote patient monitoring is the main sensation to address healthcare issues. Wearable devices used for collecting and transferring data to hospitals, and IOT devices play an important role in remote patient monitoring The main aims of these devices are to provide important information such as breathing patterns of a person, blood glucose level, and blood pressure to health providers .

Healthcare devices that are used for data collection data can be classified into four parts: **(a) Stationary Medical Devices:** These devices are used for specific physical locations,

(b) Medical Embedded Devices: These devices are placed inside the human body, **(c) Medical Wearable Devices:** These

devices prescribed by doctors, **(d) Wearable Health Monitoring Devices:** These devices are worn on the body.

5. BLOCKCHAIN TECHNOLOGY AND RELATED CONCEPTS

Blockchain is an rising technology used in numerous different networks to ensure security and reliability in those networks. Blockchain technology is also given option in various transaction management systems, and it is replacing the current existing transaction management system. The issues with the current banking system are as follows: (i) High transactional fees

(ii) Double spending

(iii) Banks have become synonymous with crises.

Blockchain consists of a chain of blocks, and each block is a collection of all modern transactions that have taken place and are verified. Blockchain is a guiding technology, only second to the best-selling bitcoin. Working of bitcoins using the Blockchain can help to read Blockchain technology better. Another important concept connected with the Blockchain is the value or proof of work of that block. This is the mathematical solution that is connected to the block to ensure that this is the valid block.

6. VARIOUS APPLICATIONS OF BLOCKCHAIN AND IOT IN HEALTHCARE

Blockchain helps to maintain and share the patient's medical record with hospitals and health providers. there are many applications of healthcare:

Patient Monitoring/Electronic Health Record (ERH). According to the International Organization of Standardization, electronic health records store the patient data in a digital format, and the data are exchanged securely and only accessible by authorized authority. It contains private information attention a person's health issues, and its main objective is to maintain and provide efficient service to the patient.

6.1. Managing Medical Records and Other Data. The long-standing method of monitoring medical records needs to be changed. Now, the use of the Computer network in the healthcare system makes it more efficient. Computer network smart objects make it easy to store and process the data in any format like audio, images, or text.

7. CHALLENGES OF USING BLOCKCHAIN IN HEALTHCARE DERIVED INDUSTRIAL IOT

The main challenges in the use of Blockchain Technology, along with IOT in the Healthcare and Medical Sector, are as follows: **7.1. Interoperability:** Healthcare

Interoperability means exchanging information with each other in the Blockchain network. It is the main challenge due to the large and varied providers and due to its large open nature

7. 2. Security: As the concept of decentralization is more secure, there are also some disadvantages associated with it. As in decentralized Blockchain, the data are distributed in a public ledger, which can cause privacy leakage

7.3. Lack of Standardization: Blockchain is a trending technology and is adopted in many countries. In domains and networks where the concept of security, trust, and track ability is involved, the Blockchain is used. Proper standardization of protocols, technologies, etc., is very important.

8. RESULT AND DISCUSSION

In this article, an attempt was made to identify different possible ways with which the IoT technology along with the Blockchain can be integrated into the Healthcare sector to improve the overall performance and to strengthen the current Healthcare sector. Three major application areas Table 8: Summarizes the list of abbreviations used in this survey.

(a) remote monitoring of patient's health,

(b) drug's traceability, and

(c) medical records management, where IOT and Blockchain profession have their applicability were explored in detail. Also, various possible challenges and issues in the deployment of these two revolutionary technologies, i.e., IOT and Blockchain, in the Healthcare sector were explored and unregenerated.

9. CONCLUSION In Today's world, IOT technology is implemented in every field like agriculture, healthcare, smart cities, etc. In the field of healthcare, IOT is brought into use for applications like observation of the patient's health regularly, drug traceability, etc. However, there exist various security issues in IOT, which can be solved by integrating IoT ensure that patients' sensitive health related records remain safe from any type of tampering and leakage

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MAXIMO CAMPO VISUAL INSIGHT

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ABSTRACT:

There are lots of misconceptions about a vision loss and how a person can see. Insight which enhancing medical device is commonly referred as electronic glasses, for visually impaired or low vision. People born with inherited retinal disease, macular degeneration, retinitis pigmentosa, stargardt's disease, cataract, nystagmus, seamlessly and many more. We identify a person who is visually impaired or low vision also self- identify as a technology geek, so imagine how exciting it is to be checking out visual insight that focuses augmented reality technology on solving problems, people who are legally impaired deals with every day. Main components in this insight are OLED Screen, battery, controller, high-resolution camera, and light weight processing unit. It moves seamlessly with wearers through their daily life by offering best visual accuracy whether in commuting to work or exploring new places our users are able to retain 100% of their mobility in addition to experiencing the dramatically enhanced vision. Life changing device for the people who have severe vision loss.

KEYWORDS: *Macular degeneration, Retinitis pigmentosa, Stargardt's disease, cataract, nystagmu,. Inherited retinal disease, seamlessly.*

INTRODUCTION

Visual Insight is an eccentric wearable medical device that strengthens the functional vision of an individual person who has the constitutionally blind. It doesn't

require any type of surgery and allows individuals with vision loss to truly see. What they are doing with their fresh reconditioned sight is up to them. Other than in operation an automobile, this extends to just about all freelance Activities Daily Living (ADLs). It sports a sleek new type issue, is considerably lighter and smaller. Campo Visual helped innumerable individuals see again. The importance and worth of this device can truly be understood by those who have lost or never had the sense

of sight. eSight Corp provides a 15-days risk-free trial at home for this miracle device before purchase. Interested individuals simply fill out a form on their website and can avail the trial period before purchase. Newer models and improved technology will surely improve the device but even in its present form, it is a ray of hope for the blind and therefore nothing less than a modern scientific miracle.

OBJECTIVES

- ✓ Patented bioptic tilt allows full mobility
- ✓ 21.5 megapixel camera
- ✓ 24x zoom
- ✓ Real time imaging
- ✓ eSight app connectivity for enhanced functionality
- ✓ Lightweight
- ✓ Quick and quiet autofocus
- ✓ Coaching and live technical support

RELATED WORKS

Text detection and recognition have been a challenging issue in different computer vision fields. There are many research papers that have discussed different methods and algorithms for extracting the text from the images. the main purpose of this literature review is to view some of these methods and their effectiveness regarding their accuracy rates. In end-to-end text recognition with the power of neural network combined with the new unsupervised feature, learning growth took advantage of the known framework for the train to achieve high accuracy of the text and character detection and recognition modules. These two models have been combined using simple methods to build end to end text recognition system. The datasets that been used

are ICDAR 2003 and SVT. The method of 62-way character classifier obtained 83.9% of accuracy for a cropped character from the first dataset [1].

In novel scene text recognition, this is an algorithm that mainly depended on machine learning methods. Two types of classifiers have been designed to achieve more accuracy, the first one was developed to generate candidates, but the second one was for filtering of candidates that are not text. a novel technique has been developed to take advantage of multi-channel information. two datasets have been used in this study, ICDAR 2005, ICDAR 2011. This method has achieved significant results in different evaluation protocols [2].

In photo OCR which is a system designed to detect and extract any text from any image using machine learning techniques, it also used different distributed language modelling. The goal of this system was to recognize any text from any challenging image such as poor quality or blurred images. This system has been used in different application such as Google Translate. The datasets that are been used for this system are ICDAR and SVT. the results showed that the processing time for text detection and recognition is around 600ms for one image [3].

For text recognition in natural scene images method, this method has proposed an accurate and robust method for detecting texts in natural scene images. This method has used an algorithm to detect almost all characters 8 from any image. the datasets used for this system are ICDAR 2011 and Multilingual datasets. The results showed that the has achieved 88.52% in character level recall [4].

End-to-end real-time text recognition and localization system have used ER (External Regions) detector that covered about 94.8% of the characters, and the processing time of an image with 800×600 resolution was 0.3s on a regular personal computer. The system used two datasets ICDAR 2011 and SVT. The average run time of the method on an 800×600 image was 0.3s on a standard PC. On the ICDAR 2011 dataset, the method achieved 64.7% of image-recall. For SVT, it achieved 32.9% of image-recall [5].

Text detection and localization using Oriented Stroke Detection is a method that took advantage of two important methods that are connected to a component with a sliding window. The character or the letter has been recognized as a region in the image that has some strokes in a particular direction and particular position. The dataset that has been used is ICDAR 2011, the experiment results showed 66% recall better than the previous methods [6].

EAST is an abbreviation of an Efficient and Accurate Scene Text Detector.

This method is a simple and powerful pipeline that allows detecting a text in natural scenes, and it achieves high accuracy and efficiency. Three datasets have been used in this study, ICDAR 2015, COCO-Text and MSRA-TD500. The experiment has shown that this method has better results than previous methods regarding accuracy and efficiency [7].

An indoor navigation wearable system based on visual markers recognition and ultrasonic obstacles perception used as an audio assistance for blind people. In this prototype, visual markers identify the points of interest in the environment; additionally this location status is enriched with information obtained in real time by other sensors. A map lists these points and indicates the distance and direction between closer points, building a virtual path. The blind users wear also glasses built with sensors like RGB camera, ultrasonic, magnetometer, gyroscope, and accelerometer to the environment, avoiding possible obstacles, it is used a couple of ultrasonic sensors. The audio assistance provided to the user makes use of an audio bank, with simple known instructions to indicate precisely the desired route and obstacles [8].

The method comprises receiving, by one or more computer processors, at least one digital image of a physical environment of a user that is captured by one or more digital video devices and converting the at least one digital image into a three-dimensional image. Furthermore, the method includes analysing the three-dimensional image using object analysis to generate output data where the output data corresponds to the physical environment. Additionally, the method includes determining a device associated with the user and formatting the output data for use with the device [9].

This project is mainly focusing on people with visual impairments and more specifically their education life. It is presenting a concept of smart glasses to provide assistance in multiple tasks represented as modes to be chosen by the user. To prove the concept, this project implements only one mode which is reading using text detection techniques. Taking into consideration the cost, this project is using the single board computer raspberry pi 2 as the heart of the processing and the raspberry pi camera for image capturing and video recording [10].

METHODOLOGY

When a person unpacks Insight, make sure they have received the items below:

Once the person has checked the contents of that package, charge Insight.

- ✓ Insight 3 (Headset controller)
- ✓ Printed Product Documentation
- ✓ Lensless Frame with Nose pad
- ✓ Microfiber Bag
- ✓ Insight 3 USB Cable
- ✓ Wrist and Neck Lanyards
- ✓ USB AC Wall Adapter
- ✓ Belt Clip
- ✓ Digital Video Cable
- ✓ Carry Case
- ✓ SD Card includes Electronic Product Documentation.

PROPOSED SYSTEM

The proposed system is a wearable device based on the cloud server for image recognition. Its sensors include a micro camera, ultrasonic sensor, and infrared sensor. The system uses the Raspberry Pi as the local processor, connecting to the cloud server via Wi-Fi or 4G network. It takes advantage of the cloud server's powerful parallel computing power and huge storage capacity. All visual and voice processing algorithms that consume more CPU (Central Processing Unit) computing resources run in the cloud. Like the remote human brain, the cloud platform can efficiently process target information and feed the results back to the user.

Specifically, after wearing the smart glasses, the users have access to scan the points of interest. Considering the safety of visually impaired people, this program will be running until it shuts down. Scanning points of interest adopts the fusion recognition scheme of ultrasonic sensor and infrared sensor. When the infrared sensor detects someone in front of the user, there will be a ringtone prompt. The user can touch the button to start the recognition process, and the camera will capture the front image.

The server will extract and identify the faces, objects and text information that may be contained in the images uploaded by the client. The server's recognition result will be transmitted to the client and then converted to voice feedback to the user through TTS (Text To Speech) technology.

The Camera takes those images, processes them using artificial intelligence image processing

algorithms and generates a matching response which is sent to text to speech module. Open CV framework is used to develop the AI model which gives Caffee model, Python program is used to get the input through camera and handle the interaction between the model and the input. Then, it shows the output on the screen as a text. Text to speech module takes the text as an input and converts it to an audio output which goes directly into the user's ears. Infrared sensors are placed in a way to match the angle of vision in a human. They are used to calculate the distance between the user and an object located at a far distance. Sonar sensors are placed at an angle of 30 degrees from the vertical plane facing downwards.

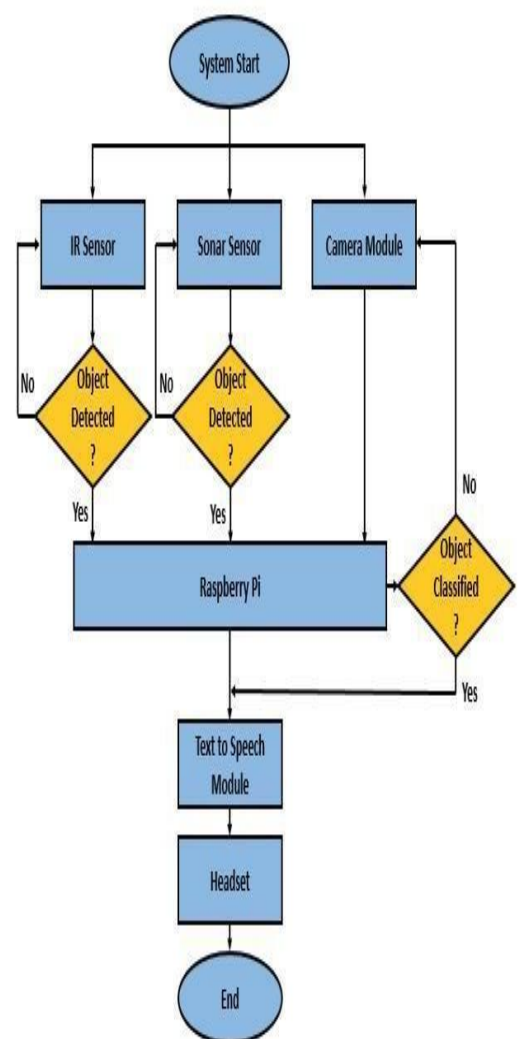


Figure 1 Flowchart of object detection System

The flowchart shows the sequence of steps and decisions required to perform the

Vision impaired process. The camera is considered the eye of this system.

This inclination of 30 degrees helps sonar sensors to scan for the objects placed onground near the user. Hence, they can be used to calculate the distance from an object lying on the ground adjacent to the legs of the user. Both of these sensors send the data to raspberry pi which in turn processes the data and sends the desired output to the text to speech module. This again takes text as an input and converts it to an audio response which reaches the user through headset. This full process keeps going simultaneously and continuously until the user decides to switchoff the device.

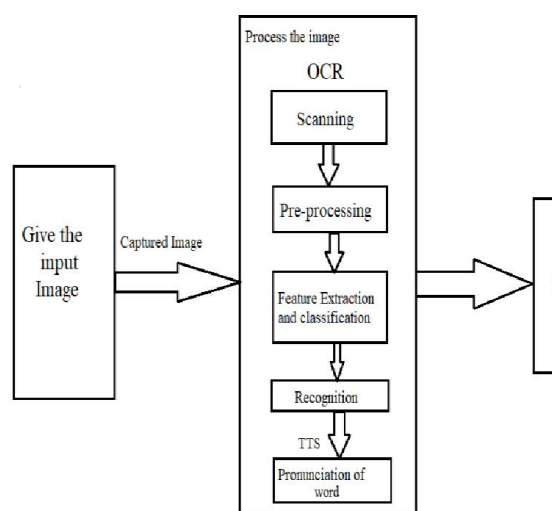


Figure 2 Flow of Process

RESULT

1. Face Recognition: Face landmark detection is the process of finding points of interest in an image of a human face. It has recently seen rapid growth in the computer vision community because it has many compelling applications. For example, we have shown the ability to detect emotion through facial gestures, estimating gaze direction, changing facial appearance (face swap), augmenting faces with graphics, and puppeteer ring of virtual characters.



Figure 3 Face Recognition

2. Object Detection: Object detection is a technology that falls under the broader domain of Computer Vision. It deals with identifying and tracking objects present in images and videos. Object detection has multiple applications such as face detection, vehicle detection, pedestrian counting, self-driving cars, security systems, etc.



Figure 4 Object Detection

The two major objectives of object detection include: To identify all objects present in an image filter out the object of attention. In this project, we will use object detection in Python with the help of the Image I i.e. deep learning techniques.

3. For OCR: OCR (optical character recognition) is the use of technology to distinguish printed or handwritten text characters inside digital images of physical documents, such as a scanned paper document. The basic process of OCR involves examining the text of a document and translating the characters into code that can be used for data processing. OCR is sometimes also referred to as text recognition. OCR systems are made up of a combination of hardware and software that is used to convert physical documents into machine-readable text in order to avoid overlapping of features we use push buttons to specify different modes or to activate each piece of code.

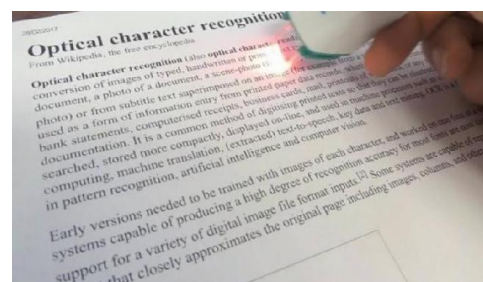


Figure 5 OCR**CONCLUSION**

In today's world, disability of any kind for any person can be hard and it is the same case with blindness. Blind people are generally left underprivileged. It is very difficult to give a vision to a blind person. In this paper, a new AI based system called —Navigation System for Blind - Third Eye to control the navigation of a blind person has been proposed and developed. This AI based system offers a simple electronic guidance embedded vision system which is configurable and efficient. The system helps blind and visually impaired people to be highly self-dependent by assisting their mobility regardless of where they are; outdoor or indoor. Results show that all the sensors work properly and give accurate readings, though the range of the prototype Sensors are not high. Technology plays a very important role in our life. The distinct and quick development that we discover each day proof for us that there is no point to give up and struggle with our obstacle in life. A technology offers us a lot of significant solution to our problem and dis applies. Our role is to use it properly to reach the success level that benefits individual, society and whole country as well.

FUTURE WORKS

While the team members were working on the implementation, they thought of many ideas and improvements for the "Insight Glasses". However, they wished they have more time and knowledge to do them. "Insight Glasses" can be improved in the future for blind people and people who have vision difficulties by adding new techniques. For instance, direction and warning messages to prevent expected accidents, messages to tell the user about the battery level, video detection to provide a full healthy life for people with vision difficulties, develop mobile application to control "Insight Glasses", use 270 camera to have more wider view angle., provide the glasses with GPS notification and develop the glasses' design to have little, small and light components so the user can wear it easily.

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A Review Optics Coherence Tomography Based Medical Instrument

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ABSTRACT: Optic has, since ancient times, optics has been utilized to aid in the assessment of human patients as well as in some therapeutic therapies. Many of the optical medical instruments in use today were developed in the nineteenth century, and with the introduction of optical fibres and laser light sources in the mid-twentieth century, a new generation of medical devices, instruments, and techniques were developed, helping to modernize medicine and perform tasks that were unimaginable only a few decades ago. This chapter demonstrates the uses, benefits, and future prospects of optics as an enabling technology to medicine and general health care through many optical instrument and application. The uses, benefits, future prospects that optics brings as an enabling technology to the medicine and the overall healthcare industry.

KEYWORDS:

Optical Coherence Tomography, Medical Instrument Otitis. External Direct Illumination Indirect Ophthalmoscope.

INTRODUCTION:

Medical practitioners in the ancient era did not have access to advanced instruments and diagnostic tools like X-rays, ultrasound machines, or CT scanners, as we do today. The tools of the day were visual and manual auscultations. As a result, optics has been a valuable and powerful technology to assist doctors and other healthcare practitioners in performing examinations and diagnoses on their patients from the dawn of medicine. This is because one of the most basic components of medicine is observing and

physically examining the patient's overall appearance. As a result, anything that might help "see" a patient's situation better will be beneficial. It is light and its interaction with living tissues that is at the heart of what allows optics to be used in medicine. Light is a form of energy that can interact with biological cells, tissues, and organs. Their main advantage is that they are thin and flexible, allowing them to be inserted into the body for remote sensing, imaging, and treatment. The discipline of endoscopic imaging was their first and most successful biological/biomedical application. Fundoscopy exam visualization of information about a medical diagnosis. Include high blood pressure, diabetes, increased pressure in the brain and infection like endocarditis. From outside, the retina is the only part of the central nervous system that can be seen. Similarly, the fundus is the only place where vasculature can be seen. Because we see so much vascular disease in internal medicine, looking at the fundus is a fantastic approach to gain a sense of the patient's total vasculature. The fundoscopic exam, on the other hand, can detect pathological processes that are otherwise undetectable. Examples include detecting endocarditis, disseminated candidemia, CMV in an HIV positive patient, and staging diabetes and hypertension.



iEXAMINAR

OBJECTIVES:

- *Recognize and assess the signs and symptoms of a retinal detachment
- * Indications or symptoms of high blood pressure, diabetes, or other disorders that damage the blood vessels, may need an ophthalmoscope.
- *It is used to detect and evaluate symptoms of various retinal vascular diseases or diseases such as glaucoma.
- *ophthalmoscope ,instrument for the interior of the eye.
- *ophthalmoscope became a later part of endoscopy.
- *The device consists of a strong light that can be directed into the by a small mirror or prism.

RELATED WORKS:

Detection and dialysis have been and challenging issues in optics in medicine. A test that allows your ophthalmologist , or eye doctor, to look at the back of your eye. This fundus is the components of your eye that consists of:

- retina
- optic disc
- blood vessels

This test is frequently performed as part of a normal eye checkup to detect eye disorders. At the beginning of the procedure , may use eye drops to dilate your pupils. For a few seconds ,the drops may irritate your eyes. They can also cause an unusual taste in mouth .After your pupils have been dilated, the rear of your eye will be examined. There are three different types of examinations that could be done:

- direct examination
- indirect examination
- slit-lamp examination

The direct ophthalmoscope is a compact flashlight (torch)-sized tool with many lenses that can magnify up to 15 times. During a typical physical examination, this type of ophthalmoscope is most usually utilized . You will take a seat in a chair. The lights in the room will be turned off. Your eye

doctor will examine your eye with an ophthalmoscope while sitting across from you .An ophthalmoscope is a device with a light and a number of tiny lenses. Your eye doctor can inspect your eye through the lenses. During the inspection, they may ask you to look in specific directions.

You'll be asked to lie down or sit in a reclining position for this test. A bright light will be placed on your eye doctor's forehead. They will light it in your eye while examining it with a lens in front of your eye While your doctor examines the back of your eye, you may be asked to stare in specific directions. They may also use a small, blunt probe to apply pressure to your eye. Indirect ophthalmoscope, also known as a binocular indirect ophthalmoscope, is an optical instrument used to investigate the fundus or back of the eye. It is worn on the examiner's head and occasionally attached to spectacles. It creates a stereoscopic image with a magnification of 2 to 5 times. It's useful for determining the cause of retinal tears, holes, and detachments, as well as diagnosing and treating them. For it to work properly, the pupils must be fully dilated examination helps your eye doctor to have a better look at the structures in the back of your eye.

This method allows your eye doctor to see your eye in the same way as an indirect examination does, but with more magnification .You will be seated with a slit-lamp gadget in front of you. You'll be able to lay your chin and forehead on it. This will assist you in maintaining a steady head during your exam.

At surgical holding, we provide a range of ophthalmic instrument for ophthalmic for ophthalmologists providing visual and eye care .Our ophthalmic instruments are design to prevent and potential eye damage disease or injuries.

METHODOLOGY:

This discover through attempt to understand why the pupil was black under certain condition ,yet emitted a bright red light under other conditions.

*Diagnosis and monitoring of moderate to severe eye condition.

*Cataract surgery.

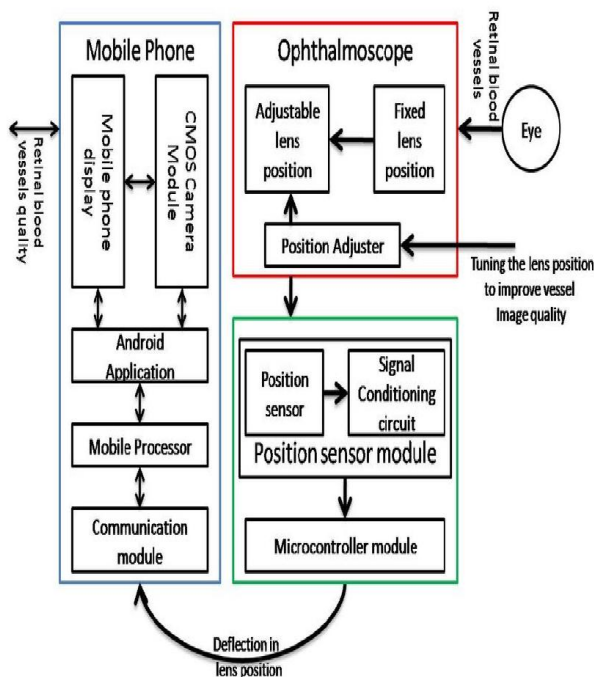
*glaucoma surgery

*Refractive surgery to correct vision.

*Cancer treatment.

*Reconstructive surgery to repair trauma or birth abnormality, such as crossed eye. Chronic or severe tear duct intection or blockages.

BLOCK DIAGRAM:



Patient side of the ophthalmoscope



PATIENT SIDE OF THE OPHTHALMOSCOPE:

This inflow map shows the ophthalmoscope. In this we use two lens there are fixed lens position malleable position. position adjuster is used to turning lens position to ameliorate vessel image quality. Position detector a position detector is used for measuring the distance traveled by a body starting from its reference position. It measures direct or angular position in reference to a fixed point or arbitrary reference. The detector can also be used to descry the presence or absence of an object. A singlewire transmission line (or

single line system) is a system of transmitting electrical power or signals using only a single electrical captian. we used in the position detector module. A microcontroller is comprises factors like memory, peripherals and most importantly a processor. Microcontrollers are

bedded inside bias to control

the conduct and features of a

product. Hence, they can also be appertained to as Bedded regulators.. Microcontrollers can take inputs from the device they controlling and retain control by transferring the device signals to different corridor of the device This all shows the deviation in lens position.In Communication Module

(cmm) handles the exchange of Dispatches between modules on different robots. As similar it nearly interacts with the Communication System. It is used to identify objects, zones, shapes and labels or lists of these particulars. In this mobile processor element that converts all your conduct into visual changes on the screen. Visual perceptivity(VA) and visual field screening Apps available in the App request are able of detecting visual declination indeed before they present to a healthcare professional (HCP). Apps could also make the case feel more engaged and ameliorate their compliance with treatment. so we android operation in ophthalmoscopy. Its is veritably useful for case satification and convinient In android operation we use two Bias to imaged the image There are mobile phone display and CMOS camera mobile its is used to view the retinal blood vessles Volume in the eye. And also test that lets see inside the reverse of the eye, which is called the fundus. Also see other structures in the eye. Its is magnifying tool and a source to see inside the eye.

Diagnostic and monitoring ophthalmoscope

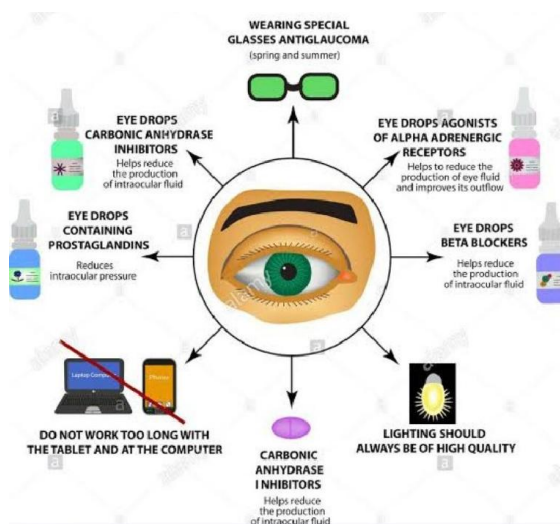
Monitoring and diagnostics By measuring affix lenses and refractive errors, ophthalmic devices and equipment are used to diagnose and monitor illnesses of the retina and cornea.This devices help to identify the power of intra ocular lens (IOLs)and analyze the visual field .ophthalmic diagnostic and monitoring devices include ultrasound imaging system ,optical coherence tomography scanners ,ophthalmoscope, corneal topographers ,specular microscope ,slip lamp fundus cameras, anomaloscope ,haploscope, ophthalmic lens gauge, stereopsis measuring instrument ,retinoscopes, stereoscope and others. Advanced eye care medical devices equipped with artificial intellingence (AI)and machine learning (ML)are the new trends in the ophthalmic diagnostic and monitoring equipment market.AI and MI equipped medical devices can not only quickly interpret the eyes of the patient with better accuracy but also recommend a stiutable treatment for the patient.

Diagnostic And Monitoring Ophthalmic Devices And Equipment Global Market Report



Glaucoma surgery:

To lower intraocular pressure, surgery involves either laser treatment or cutting a cut in the eye. Your doctor's recommendation for surgery will be based on the kind and severity of your glaucoma as well as the overall health of your eye. When medicine alone isn't enough to decrease blood pressure, surgery can help. It cannot, however, reverse visual loss. "The sort of surgery your doctor advises will be determined by the type and degree of your glaucoma as well as the overall health of your eye."



Glaucoma

Cataract surgery:

Cataract surgery is performed to treat cataracts. Cataracts can beget vague vision and increase the

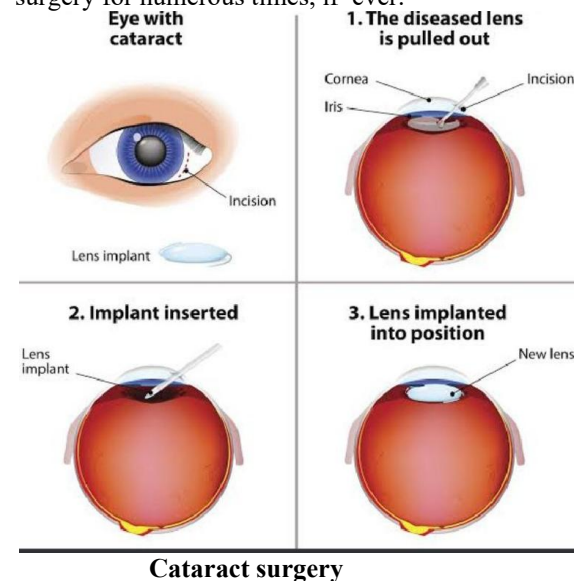
light from lights. If a cataract makes it Delicate for you to carry out your normal conditioning, your croaker may

. suggest cataract surgery. When a cataract interferes with the treatment of another eye problem,

. cataract surgery may be recommended. For illustration, croakers may recommend cataract surgery if a cataract makes it delicate for your eye croaker to examine the reverse of your eye to cover or treat other eye problems, similar as age-related.macular

degeneration or diabetic retinopathy. In utmost cases, staying . to have cataract surgery will not harm your eye, so you have time to consider your options. If your vision

is still relatively good, you may not need . cataract surgery for numerous times, if ever.



CONCLUSION:

Optics, as discussed in this section, is a useful, practical, versatile, and powerful technology that has helped humans throughout history perform visual examinations, diagnostics, and therapeutics on both the sick and healthy. Modern optical devices and instruments, such as endoscopes, patient monitoring probes, and sensors, as well as advanced robotic assisted surgery systems, rely on optics technology and optical components. New advances in optics and photonics are propelling the development of a new generation of imaging tools, such as optical coherence and photo-acoustic tomography, that can quickly provide two and three-dimensional images of various human body tissues and organs .Optics has been and will continue to be an enabling technology for the advancement of medicine, allowing for the development of previously unimaginable new devices, techniques, and applications in the not-too-distant future.

FUTURE TRENDS:

As preliminarily stated, optics and photonics are important, protean, and enabling technologies for developing current and unborn generations of medical bias, instruments, and ways for individual, remedy, and surgical operations. Advances in the development of ever lower and thinner medical examinations and catheters, as well as wide use of OCT bias, should be anticipated in the future, with OCT bias getting as common as ultrasound scanning bias are moment. There will also be an increase in the number of ray- grounded treatments and curatives. Optic imaging ways, like digitalX-rays, will continue to advance, makingnon-invasive examination and opinion safer, briskly, and with lesser resolution and point delicacy. Some unborn inventions are formerly visible moment, similar as optic bias used in confluence with smart movable cell phones (11, 12). Several new companies, for illustration, have developed smart phone attachments that transfigure them into electronic videotape coequals of traditional medical examination instruments similar as otoscopes (to view the inside of cognizance), ophthalmoscopes (to view the inside of eyes), or indeed simple microscopes. These bias are unresistant optic rudiments that couple images from the case to the videotape lens on the smart phone's digital camera, transubstantiating it into a completely functional, and ulcers in resource-poor settings. JAMA Ophthalmol 132:8945-51

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network- connected medical instrument able of transferring images and videotape. Ever to a consulting croaker. Depicts a cell phone otoscope in use, while depicts a smart phone interpretation of an ophthalmoscope and a dermal loupe.

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FETAL ODDITY USING ULTRASOUND IMAGE ACQUISITION

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Abstract

Ultrasound image segmentation methods, focal point is on techniques developed for fetal biometric parameters and nuchal translucency, are briefly explained. Ultrasound medical pictures can easily points the fetus using segmentation techniques and calculate fetal parameters. It can opportune find the abnormality of fetal that necessary action that can be taken by pregnant women. First of all, a detailed explanation has been offered on fetal biometric parameters and nuchal translucency to peak the investigation approaches with degree of validation in diverse clinical domains. Next, a grading of bibliographic assessment of recent research effort in segmentation field of ultrasound 2D fetal images had been presented. High risk pregnant women's fetal images have been taken into routine and fetal parameters are continuously monitored. Its parameters are used fetal weight, fetal growth, gestational age, and any possible abnormality detection.

KEYWORDS: fetal biometric parameters, nuchal translucency, bibliographic assessment.

OBJECTIVES:

- Weakly supervised estimation of shadow confidence maps in fetal ultrasound imaging.
- Texture based clustering technique for fetal ultrasound image segmentation.
- Weakly supervised localization for fetal ultrasound images.
- Dilated squeeze-and-excitation U-Net for Fetal Ultrasound Image Segmentation.

1. INTRODUCTION:

There are a variety of imaging modalities accessible, including ultrasound, CT, MRI, NMR, and X-rays. There are other display modes available, but brightness mode ultrasound is the most commonly used investigative tool because to its noninvasive nature, lower cost, and less risk to the patient when compared to other picture modalities. In general, injections such as radio-opaque dyes are

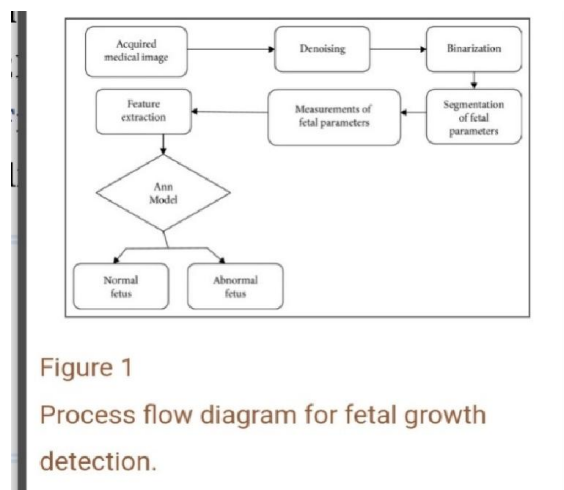
required in radiology, however in the United States, no external imaging source is required. For obstetricians and gynaecologists, pictures of the organ are the most powerful approach for diagnosis. When a sufficient beam of sound waves is transmitted through a transducer in the human body, the image of the United States is moulded. Gotten reverberation by the replication from inner organs makes fitting ultrasound pictures. Additionally, because of properties of picture arrangement, they could be affected by the dot, weakening, missing limits, and antiquities, making the division task more convoluted.

The National Consensus for Medical Abortion in India report determined because of difficulties identified with early termination every year a normal of around 11 million fetus removals happen every year and around 20,000 passings because of complexities identified with fetus removal. Exact fetal boundary measurements of US pictures are central points of interest for the pregnant lady's better medical care. In obstetrics, fetal biometric boundaries and thickness of nuchal clarity are fundamental boundaries for the location of fetal irregularity. The fetal biometric boundaries incorporate gestational sac (G.Sac), biparietal breadth (BPD), head perimeter (HC), stomach circuit (AC), and femur length (FL). These biometric boundaries are utilized to quantify the gestational age of the hatchling and identify the development examples and anomalies.

The nuchal clarity (NT) thickness of the hatchling at 11–14 weeks of development was utilized to analyze chromosomal anomaly. NT thickness is the liquid collection in the nuchal locale in the main trimester. Broad examination has checked that Down condition is a particular problem set off by the presence of an extra chromosome on chromosome 21. By and large, every human cell includes 23 sets of assorted chromosomes. Each chromosome communicates qualities which are attractive for suitable

development of human bodies. For the length of origination, a particular gets 23 chromosomes each from the mother and the dad. Youngsters might get the extra chromosome from any of the guardians. The most recent review shows that such fetal chromosomal peculiarities can be detected by estimating the NT thickness in the primary trimester. The ordinary and strange development is distinguished through estimations with the populace based development diagram. Manual estimations of fetal boundaries are exposed to between and intraobserver inconstancy. Programmed strategies for fetal boundary estimation decrease the irregularity and make more exact and reproducible estimations. Computerized fetal checking further develops the work process proficiency; it serves to effectively quantify the fetal boundary. These exact estimated boundaries will assist the radiologist with diagnosing the situation with the baby. and fetal medical image

2.Process flow diagram for fetal growth detection:



Three-dimensional clinical ultrasonography was portrayed in the mid-1990s for fetal screening, however its spread was insufficient because of helpless picture class and slow procurement conventions, incapable to forestall fetal movement antiques. These constraints are continuously evaporating with state of the art advancements, expanding the clinical interest in 3D ultrasound (3DUS). During the main trimester and beginning phase of the second trimester of development, the field of perspective on the ultrasound tests can incorporate the entire gestational sac. Thus, 3DUS-based volumetric investigations of uterine constructions have been distributed, just as measurement of the entire embryo or fractional body segments (e.g., head and trunk), giving helpful data to clinical daily schedule. These volumetric

investigations actually depend on manual following, and computerized division techniques are, consequently, alluring. Semi-mechanized strategies were utilized in ongoing examinations, particularly with the product instrument VOCAL, marketed by General Electric and referred to in a few works. It empowers to recreate smooth organ surfaces from a bunch of 2D shapes obtained on turned perspectives along a solitary pivot. This product stays restricted to the extraction of single organs and isn't yet fit for sectioning complex articles, for example, the whole fetus. Furthermore, multiple manual interactions are frequently required. Because 3DUS is also quite expensive, most radiologists prefer 2DUS. presents the future trends of segmentation techniques. Finally, concluding remarks and suggestions for further development are outlined.

3.PREPROCESSING OF ULTRASOUND IMAGES:

The entire fetus Furthermore, multiple manual interactions are frequently required. Because 3DUS is also quite expensive, most radiologists prefer 2DUS. Only 2DUS is discussed in this study. This is the introduction of automated techniques for fetal abnormality interpretation; covers enhancing techniques for US pictures. Highlights the strategies for measuring fetal parameters using segmentation techniques. Displays upcoming segmentation methodology tendencies. Finally, there are some closing remarks and suggestions for future improvement. The echoes received by the transducer are to be subject to the characteristic impedance of the medium:

$$I_{\text{reflect}} = I_{\text{incident}} \left[\frac{Z_1 - Z_2}{Z_1 + Z_2} \right]^2, \quad (1)$$

Where Z_1 and Z_2 are the characteristic impedance of the medium, I_{reflect} is the reflected ultrasound beam (echoes), and I_{incident} is the incident beam. Contrast enhancement of ultrasound pictures is a well-known procedure. Because of the statistics of echoes produced by the object, the radiologist receives US pictures with arbitrary variances. Noises make it difficult to recognize small and subtle structures. Backscattered echoes are randomly disseminated in the tissue, resulting in speckle sounds. Radiologists can fail to establish a conclusion due to the presence of speckles. Because of the existence of speckle noise in US images, its use in medical imaging is limited. As a result, in ultrasonic image processing, edge preservation and enhancement are critical. The images are enhanced by applying various statistical filters,

and the results are proven by measuring different parameters.

$$g(p, q) = f(p, q) - \text{median}_q(p, q) \quad (2)$$

Where $g(p, q)$ is the estimated local contrast. The indigenous contrast delivers high-frequency noise; $f(p, q)$ is the image gray level and $\text{median}_q(p, q)$ is the median gray level inside the region q of (p, q) . Eq. (2) can be equated to a high-pass spatial filter.

A Bayesian estimator-based discriminator for picture improvement through image and noise separation was proposed. It is based on a steerable wavelet pyramid and is a semi blind noise reduction method.

4. EXTRACTION OF FETAL PARAMETERS BY SEGMENTATION TECHNIQUES:

In obstetrics, the fetal biometric boundaries and nuchal clarity are the vital boundaries to demonstrate any potential anomalies in the baby. The ordinary development of the fetal body shows the progressions fit as a fiddle across incubation long stretches of the baby.

5. FETAL BIOMETRIC PARAMETERS: As the US method is noninvasive, continuous fetal monitoring in the obstetric field is safe. Using the segmentation method in image processing, it is simple to assess fetal growth and diagnose fetal abnormalities. The majority of the image analysis is done with 2-dimensional B-mode US pictures. Because of textural similarities and apparent limits, head and abdomen segmentation is the easiest of all biometric fetal measurements. Internal roughness in the femur of the fetus can make extraction more difficult. Because of irregularities in the internal tissues, segmenting the abdomen and the entire fetus is more difficult. Methods for measuring fetal biometric parameters are used limitedly in clinical practice.

6. PROBABLISTIC BOOSTING TREE (PBT):

The nodes of a binary tree are used to represent PBT classifiers. PBT automatically clusters data sets based on their binary classification. Carneiro et al. used a segmentation approach on US pictures to automatically detect fetal characteristics. On the basis of the building of a constrained probabilistic boosting tree, the fetal parameters were also quantified using ultrasound images. The automatic measurement of the fetus' BPD, HC, AC, and FL has been provided in this paper. They patented and produced auto-OB, a

viable method. This is the only system for assessing fetal parameters that is utilized in clinical practice.

7. FUZZY LOGIC:

Fluffy rationale is an uncommon philosophy applied across ultrasound pictures because of the way that it doesn't need precise and upgraded pictures. In 1996, a self-loader fluffy choice framework produced for assessment of the embryo has been introduced. The framework depends on the upgrade of the procured pictures, which follows the decisional calculations as a succession of If-Then standards. In the wake of gaining the crude picture and changing over it into an ideal organization, different picture preparing calculations are applied to investigate the pictures and measure the femur length, head periphery, and stomach perimeter. Further, fetal biometric boundaries are estimated and broke down by the greatest probability (ML) model calculation, as proposed by Jardim and Figuirodo. Manual extraction of shape in clinical pictures requires master information and higher preparing time. Fetal biometric boundaries are estimated for the too many expense capacities are accepted, which shows the two its impediments and intricacies. The expense and target work is the numerical articulation for the shape-delicate subordinate methodology. The cost function at a different pixel level of the image is given by

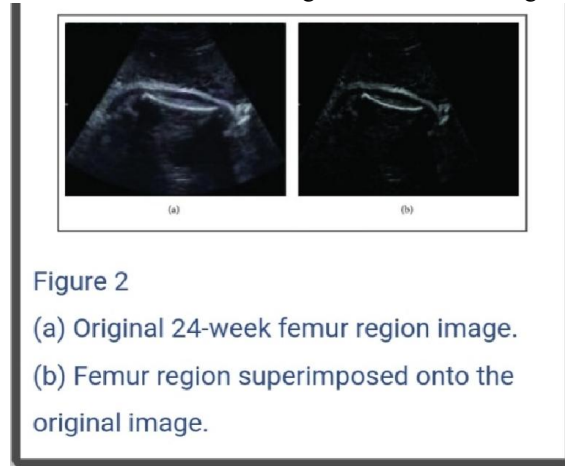
$$\text{Pec} = \varepsilon(p) + 4\lambda \text{Cf}(p, d) / 1 + 4\lambda \quad (2)$$

Where Cf is the cost function and λ is the weighting factor. The value of λ depends on the intensity of images and the number of classes.

8. THRESHOLDING-BASED MORPHOLOGICAL OPERATOR:

The morphological operator is used to segment the femur of the fetus, and then the length of the femur is measured. Thomas et al. devised a morphological feature-based approach for detecting the femur's shape in ultrasound pictures and measuring the femur bone's length in the fetus. In addition, a femur length was used to determine the fetus' gestational age in 2009. Rawat et al. use the length of the femur to

calculate the fetal weight shown in figure



The length of the femur is likewise estimated by applying the morphological administrator; by this methodology, naturally the FL of the baby is estimated. They extended two techniques to remove the femur bone of the baby: one depends on the entropy approach and one more tense discovery. The entropy-based technique is the principle approach, and when the first is fizzled, then, at that point, the subsequent strategy was just utilized.

9. GRADIENT VECTOR FLOW (GVF) METHODOLOGY:

The GVF snake is a segmentation approach which has been effectively used in the segmentation of medical images. The contour of a snake does not converge to the object boundary. In the image domain, the contour is initialized by the operator and then the boundary is formed in an object. According to the differential equation of GVF, the modified form of the elastic contour is defined as an external force. The vector field of the two-dimensional function is $r(X, Y) = (p(X, Y) + q(X, Y))$ which minimize the following objective function:

$$E' = \iint \mu(p_2x + p_2y + q_2x + q_2y) + |\nabla f|^2 + |r - f|^2 dx dy, \quad (4)$$

Where E is the energy function, p_x, p_y, q_x, q_y are the field derivatives, μ is the regularization parameter, and ∇f is the gradient of the edge map. Chalana et al. report an active contour model for segmentation of the fetal head and abdomen in the US images. In the physical correction in the image, it can get trapped in the local minima. Also, due to the texture inside the fetal head, the algorithm does not make the model which means that the appearance information is not used to change the accuracy. Jardim and Figueiredo report the parametric deformable shape methodology for the segmentation of fetal parameters. A weakness of this method is that the optimal solution of the

problem does not assure the observation of the authors. Another drawback is that the Rayleigh distribution-based model cannot take into account the spatial structure of textural patterns. The wavelet-based techniques and iterative Hough transforms are also useful in extracting the object or segmenting the fetal images.

In 2008, the abdominal circumference is measured by the fuzzy and gradient vector flow (GVF) methods. In the GVF method, an active contour is formed and the GVF field behaves as an external force. After applying the above method, the fetal weight is estimated using the abdominal circumference; the comparison between the accuracy of the automatic and manual measurements were presented. Further, a GVF snake is reported by Nithya and Madheswaran to form or extract the contour of the abdominal circumference. The value of the abdominal circumference is used to detect the intrauterine growth retarded (IUGR) fetus. The IUGR fetus is at higher risk for slow development, abdomen problem, cardiac disease, and other problems in adult life. Yang et al. detected the fetal head region using the Hough transform-based classifier. In this work, a quadratic polynomial model $HC \sim$ used to assess the HC using least square fitting methods is defined as

$$HC \sim p_1z^2 + p_2z + p_3, \quad (5)$$

where z indicates the gestational age, and p_1, p_2 , and p_3 are the coefficients. Further, the manual and automatic results are compared and it is concluded that the difference between them is not considerable.

In 2014, authors applied various segmentation methods for assessment of fetal femur, fetal head and abdomen. They evaluate the results on the basis of region-based metrics which is verified by various experts. Ponomarev et al. applied resulting binary images with combined numerous thresholds, edge detection, and shape-based recognition. The gestational sac diameter has been used as the first fetal parameter for confirmation of pregnancy. Chakkarwar et al. worked for finding the diameter of G.Sac. In this work, two steps are followed: in the first step, the global thresholding technique was used, and then in the second step the diameter of G.Sac was measured. Rawat et al. Proposed the GVF methodology for finding the G.Sac contour and measuring the diameter of G.Sac. Then, the G. Sac region of the fetus is automatically segmented from the whole image and the G.Sac diameter has been measured as shown in Figure

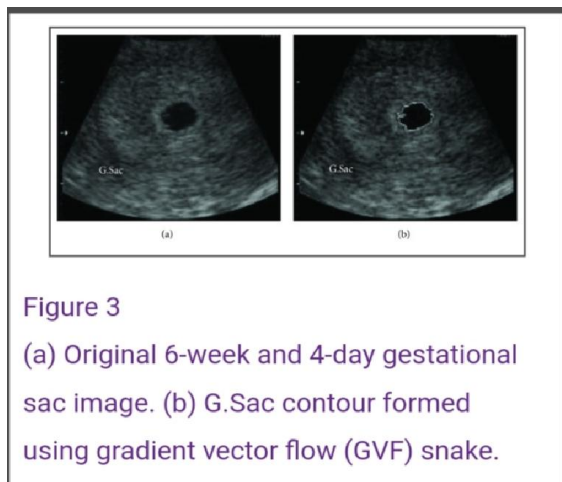


Figure 3

(a) Original 6-week and 4-day gestational sac image. (b) G.Sac contour formed using gradient vector flow (GVF) snake.

10. GRAPH BASED APPROACH:

The diagram based technique is proposed to separate the top of the baby by a semi-directed fix based methodology. Numerous division issues are tackled by a quick minimization design and a relentless min-cut divider in the diagram. In this technique, an underlying mark must be characterized on each picture since the strategy is semi-administered. Fetal BPD and OFD are estimated by a diagram based methodology called the roundabout most brief way (CSP) which is a quick programmed approach. Creators have done the subjective and quantitative examination of the portioned results which have been checked by specialists.

11. NUCHAL TRANSLUCENCY:

Nuchal clarity (NT) of the baby is likewise a significant boundary for the analysis and appraisal of babies. The liquid aggregation in the nuchal locale at the principal trimester of the hatchling is the NT thickness. Down disorder in the baby is recognized by NT thickness, so huge NT thickness demonstrates an unusual condition. Down disorder embryo and trisomy of 13, 18, and 21 at 10–14 weeks of gestational age have 3 mm NT thickness. The greater NT thickness shows the underlying imperfections and hereditary conditions even in the typical karyotype hatchling. NT thickness in the 10–14 weeks of development has been proven to be perhaps the most discerning parameter.

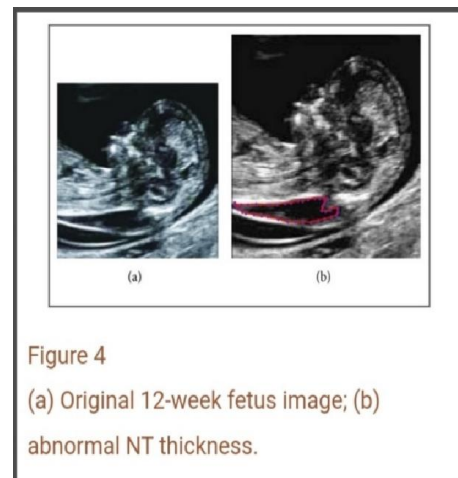


Figure 4

(a) Original 12-week fetus image; (b) abnormal NT thickness.

A programmed conspire is proposed by Deng et al. to gauge the fetal thickness of NT, utilizing a sifting strategy. In this procedure, the underlying form is first made and concentrates a starter shape by the GVF strategy. Then, at that point, for tracking down the last NT form and processing the edge map, dynamic writing computer programs is utilized. At long last, NT thickness and the NT space of the hatchling are determined. Nirmala et al. measure the thickness of NT to perceive chromosomal irregularities in the first trimester hatchling in quite a while. In the initial step, the preprocessing methods are applied for separating the pictures; in the subsequent advance, mean shift investigation has been accomplished for sectioning the NT district. Then, Canny administrators for edge recognition have been applied and by Blob investigation the specific thickness of the NT has been anticipated.

12. FUTURE TRENDS BASED ON THE SUPERVISED LEARNING METHOD:

Already, an arrangement of the division calculation, for example, stringing and edge recognition procedures have been applied on ultrasound pictures, for separating the fetal boundaries. The fragmented district has basic and spatially precise limits. This achieves significant troubles, since ultrasound clinical pictures have a little opening and limits are additionally sporadic. The next might be the future division patterns, for accomplishing the exact location task from fetal ultrasound pictures.

13. NEURAL NETWORK BASED ON THE HYBRID APPROACH:

The neural organization based methodology has been by and large utilized in the clinical field for

conclusion. In the determination, crude information got from patients are assessed and afterward different man-made consciousness procedures are applied for order or location. Chuang et al. proposed the fake neural organization (ANN) model for evaluation of fetal weight and presumed that the blunders are less between the determined fetal weight and the real fetal weight. The heaviness of the hatchling is the sign of oddity finding in the baby. The exact load of embryo estimation is a beneficial undertaking, albeit beforehand the ANN model is utilized for fetal investigation, which has a place with the macrosomia bunch. Further, the ANN model is intended for analysis of IUGR infection in the baby. Khashman and Curtis proposed the neural organization model for edge discovery of the fetal head and midsection consequently. Already, the back engendering calculation is applied for identification of fetal inconsistency dependent on the head and stomach circuit. In 2011, Anjit et al. proposed the ANN model for extraction of the fetal boundary of the nasal bone area of US pictures. Nasal area boundaries are extricated in the spatial space and changed over into the spatial area by utilizing discrete cosine change and wavelet change. The preparation of these organizations comprises of planning between an info information and a bunch of yield information. This planning is prepared by changing the loads by learning the calculation observed by the summed up delta guideline. In the ANN model, loads are changed on the preparation set then their worth is steady and the obscure info vectors are ordered. According to the generalized delta rule, the error term minimization is defined as

$$EK = 0.5 * \sum (tk - yk)^2. \quad (6)$$

In this equation, the index K represents the input vector, and tk is the target vector and yk are the actual output vectors.

$$\Delta w_{jk} = \eta \partial K z_j \quad (7)$$

where η is the rate of learning, ∂K is the local gradient, and Δw_{jk} is the change in weight from node j to k .

In 2014, the creators introduced another mixture approach for identification of the IUGR hatchling, utilizing the variational level set strategy. Level set strategies are applied across embryo pictures for estimating the BPD and head locale. The BPD and head boundary esteems are the test information for grouping issue in the neural model. An improved MLP network is introduced for the recognition and arrangement of the IUGR baby. The precision of the

IUGR hatchling is determined by estimating the measurable boundary. A multi-facet perceptron network with the crossover approach is broadly utilized in clinical picture division.

14. SUPPORT VECTOR MACHINE (SVM) APPROACH:

SVM is an order procedure for a two-bunch classification issue proposed by Cortes and Vapnik. The SVM model isolates the positive classes (+1) and the negative classes (-1) by an ideal hyper plane. The division between the two classes is amplified by tracking down the direct ideal hyper plane. The SVM model in an object has M training data points $\{(p1, q1), (p2, q2), \dots, (pM, qM)\}$, where $pM \in \text{real integer}$ and $qM \in \{+1, -1\}$. In the SVM algorithm, the hyper plane is indicated by (w, b) where w is the weight vector and b is the bias; x is the object classifier. In the SVM model, the data is not linearly separable, then nonlinear data points are changed to the higher-dimensional space; the data points then become linearly separable.

In 2014, Qasem et al. proposed the outspread premise work (RBF) part for bosom malignancy mass ID in the pictures. For the determination of bosom malignant growth, as a matter of first importance apply division calculation across bosom US pictures. Then, at that point, the bosom pictures are assessed based on examination with the ground pictures. Every pixel in the subsequent picture is contrasted and the same pixel in the ground pictures initially. Then, at that point, the disarray grid is determined from the subsequent picture with and without the utilization of the dismissal model. Further, Hassanien and Kim present a combination approach that relates the fluffy rationale, SVM model, beat coupled neural organizations, and wavelet-based calculation. In the MRI pictures, the SVM classifier gives the outcome in two classifications: the first is malignant and the second is noncancerous. Contrasting and other classifier SVMs gives a more precise outcome.

15. CONCLUSIONS:

In this paper, a division assessment of latest things for fetal boundaries is momentarily investigated. The fetal boundaries can give the expectation of fetal anomaly, so exact estimation of these boundaries is of prime concern. After conversations and different reenactment results were gotten, we track down that the state of fetal boundaries is unique, so the GVF form strategy is incredible for curved shape boundaries (AC, HC, BPD, and NT area) and morphology-based methods are useful for estimating the femur length of the hatchling. A graphical

methodology is found better for the femur and head shape estimation of the baby. After highlight extraction, the order procedures (neural organization and backing vector machine) are applied in anticipating the irregularities of the embryo. The high-hazard pregnancies can be recognized effectively by the exact observing of the baby with time and is more precise utilizing robotized division methods. PC based strategies are exact, and the speed of the calculation is likewise extremely quick. Be that as it may, on account of different or twin pregnancy, the boundaries are not identified effectively and cycle time and computational time are bigger in the dynamic shape strategy.

Latest things depend on a development shape calculation for division, and a neural organization based half breed approach and backing vector machine classifier might be applied for baby anomaly expectation. In future examination, the finding of clinical pictures by the division interaction and counterfeit neural model will help in working on the exactness, accuracy, and computational speed. The computational-based methodology additionally diminishes the manual communication. Further exploration depends on right on time and precise identification of embryo status at a less expensive expense. The medical care framework and gear are improved by the development methods for helping the radiologist in settling on choices successfully.

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ELECTRIC THERAPY FOR LESION PALLIAT

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ABSTRACT: *Electrical stimulation for wound healing . Electrical stimulation will facilitate speed wound healing by increasing capillary density and intramission, rising wound activity, and inspiring granulation and formative cell activity. many makers create the high-voltage periodic current machine used for this medical care. The wound healing method may be a extremely musical organization series of mechanisms wherever a large number of cells and biological cascades square measure concerned. The skin battery and current of injury mechanisms became topics of interest for his or her influence in chronic wounds. Electro stimulation medical care of wounds has shown to be a promising treatment choice with no-device-related adverse effects. This review presents an summary of the understanding and use of applied electrical current in numerous aspects of wound healing. speedy clinical translation of the evolving understanding of bio molecular mechanisms underlying the consequences of electrical simulation on wound healing would absolutely impact upon enhancing patient's quality of life.*

Keywords

Electrotherapy, Wound healing, Infection, Bioelectric current, exogenous current, Bioelectric drugs, Electrical stimulation, Chronic wound, Acute wound.

I. INTRODUCTION

Electric medical aid or electrical stimulation is technique of therapy used for fast wound healing. Electro medical aid works by stimulating cell migration , cell proliferation rate and protein secretion via making an electrical current. Efficacious wound healing continues to

be a clinical challenge and therefore the complications associated with impairment in wound healing carry a good Money burden also as a negative impact on patient mode. Among chronic wounds, the very best prevalence lays within the blood vessel leg ulceration, diabetic foot/leg wound (DFU), and pressure ulceration classes. Complex chronic wounds, like diabetic ulcers, have a significant long-run impact on the morbidity, mortality, and quality of patient's life. In 2010, the NHS in European country has spent around £650 million on foot ulceration management and amputation, that represent ~0.5% of its budget.¹ within the USA, thirty third of the \$116 billion total health care pay on polygenic disease is on the management of foot ulceration.² In Europe, value of wound management accounts for 2%–4% of the health care budgets.³ Furthermore,⁴ Estimates indicate that 15 August 1945 of all polygenic disease patients can develop DFUs and of that eighty four resulting in lower leg amputations.

The wound healing method is influenced by many native and general factors, and is advanced with a large number of bio molecular pathways, however contains four distinct nonetheless interconnected phases: haemostasis, inflammation, proliferation, and remodelling (Figures a pair of and 3). The human stratum exhibits a natural endogenous “battery” that generates acting low electrical phenomenon once wounded.^{7,8} Healing is in remission once the flow of current is disturbed or once the present flow is stopped throughout prolonged gap completely different treatment methods exist for the management of chronic wounds; some area unit invasive, like wound

surgical procedure and skin substitute medical aid, whereas others are non-invasive, like compression medical care, wound dressing hyperbaric chemical element medical aid, negative pressure medical aid, ultrasound, and electro stimulation medical aid (EST). civil time is comparatively efficient, safe, painless, and straightforward to use. civil time mimics the natural current of injury and jump starts or accelerate the healing method.

II. OBJECTIVES

- Even improve surgery results
- Electro therapy to reduce infection.
- Improve cellular immunity.
- Increase perfusion.
- Then accelerate wound healing.
- Increase circulation for wound repair.

III. RELATED WORKS

Gene transfer by periodic field of force is very promising in cut anal wound healing Laure leg of lamb, Marie-Pierre Roles. professional opinion on biological medical aid sixteen (1), 67-77, . Tremendous progress has been achieved throughout the last decades in electroporation-based technologies for drugs. Understanding the essential underlying mechanisms of citron delivery opens the method for clinical citron medical aid and DNA vaccination. This review focuses on the utilization of citrons electrotherapy in cuneal tissue repair and the way it affects healing.

Citrons electrotherapy is safe, economical and promising as shown by the increasing range of publications news proof for its potential in wound healing. Going deeper into the mechanisms of DNA delivery and expression in addition as into skin regeneration at the molecular, cellular and tissues levels can facilitate create it a sexy approach for the treatment of skin pathologies in general[1].

Electrical stimulation for wound-healing: simulation on the impact of conductor configurations Yung-Shin Sun Biomed analysis international . Endogenous field of force is understood to play vital roles within the wound-healing method, in the main through its effects on super molecule synthesis and cell migration. several clinical studies have incontestable that electrical stimulation (ES) with steady direct currents is useful to fast wound-healing, albeit the underlying mechanisms stay unclear. within the gift study, a three-dimensional finite part wound model was engineered to optimize the

conductor configuration in einsteinium. Four layers of the skin, stratum Conium, epidermis, dermis, and sub body covering, with outlined thickness and electrical properties were sculptured. the most goal was to gauge the distributions of exogenous electrical fields delivered with electricity (DC) stimulation exploitation completely different conductor configurations like sizes and positions [2].

Effective wound healing enabled by separate different electrical fields from wearable Nano generators principle Long, WeiboCai, Xudong Wang ACS Nano twelve (12), 12533-12540. Skin wound healing may be a major health care issue. whereas electrical stimulations are famous for many years to be effective for facilitating skin wound recovery, sensible applications area unit still for the most part restricted by the clumsy electrical systems.

Here, we tend to report associate degree economical electrical bandage for accelerated skin wound healing. On he bandage, associate degree alternating distinct field is generated by a wearable nano generator by changing mechanical displacement from skin movements into electricity. Rat studies incontestable fast closure of a full-thickness rectangular skin wound among three days as compared to twelve days of usual contraction-based healing processes in rodents. From in vitro studies, the accelerated skin wound healing was attributed to electrical field-facilitated embryonic cell migration, proliferation, and trans differentiation. This self-powered electric-dressing modality could lead on to a facile therapeutic strategy for non healing skin wound treatment[3].

potency of Tissue Penetration by Currents induced by three Electrotherapeutic Techniques: A Comparative Study employing a Novel Deep-Tissue measure Technique Published: seventeen January. The penetration potency was evaluated as a voltage distinction between two of associate degree 8-contact funiculars stimulation array. every of twenty participants with a preimplanted funiculars stimulation array was excited with TENS (3 completely different conductor configurations), IF current (3 configurations), and CTPI Yankee therapy Association[4].

Micro current electrotherapy improves palatal wound healing: Randomized clinical trialManuela Maria Viana Miguel, Ingrid Fernandes Mathias-Santamaria, Amanda Rossato, Laís Fernanda Ferreira Ferraz, Antônio Martins Figueiredo-Neto, Andrea Carvalho de Marco, Renato CorneaVianaCasarin, Shannon Margaret Wallet, Dimitris N Tatakis, Marcio Antonio Mathias, Mauro PedrineSantamaria Journal of Periodontology . This study

was conducted to assess the clinical, immunological, and patient-centered outcomes of micro current electrotherapy on palatal wound healing. This was a parallel, double-masked randomized clinical trial, in which 53 patients with ridge preservation indications were selected and randomly assigned to one of two groups. In the control (sham) group (n = 27), palatal wounds, after free gingival grafts (FGG) harvest, received sham application of electrotherapy. In the test (electrotherapy treatment [EE]) group (n = 26), palatal wounds, after FGG harvest, received application of micro current electrotherapy protocol. Clinical parameters, patient-centered outcomes, and inflammatory markers were evaluated, up to 90 days postoperatively. The EE group achieved earlier wound closure (P <0.001) and epithelialization (P <0.05; P = 0.03) at 7 and 14 days after harvest when compared with the sham group[5].

IV. METHODOLOGY

ELECTRICAL STIMULATION can help speed wound healing by increasing

- capillary density and perfusion,
- improving wound oxygenation,
- and encouraging granulation
- fibroblast activity.

Several manufacturers make the high-voltage pulsed current simulator used for this therapy.

V. PROPOSED SYSTEM

The cell culture is completed among Associate in Nursing electricity chamber that isolates it from the surface. In “Fig.1” electrodes from E device square measure stimulating the cells through a conductive interface to the cell culture to avoid any chemical science product within the cell culture.

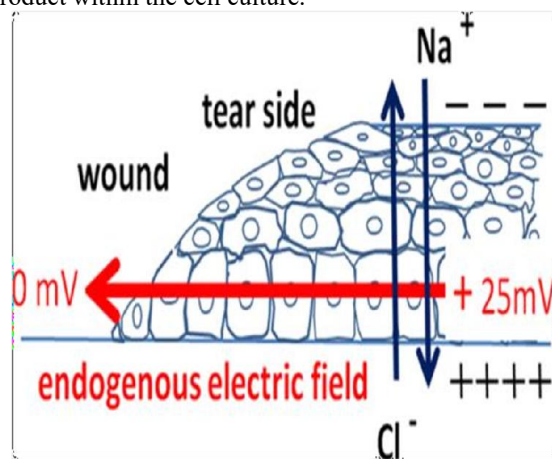


Fig.1. Endogenous electric current

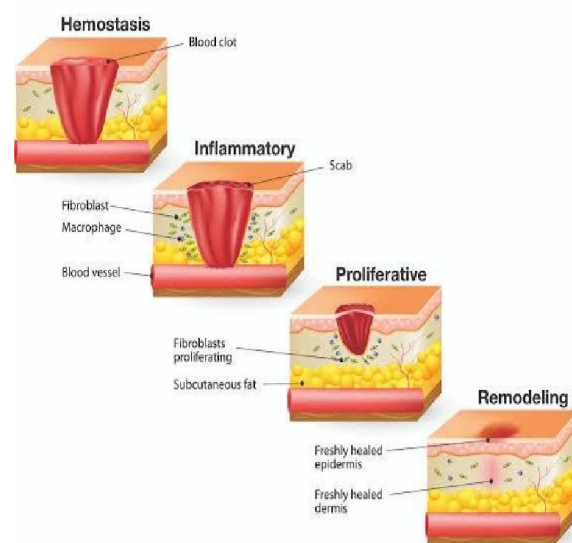


Fig.2. Wound Healing process

In “Fig.2” Electrical stimulation will be applied in one in all 2 ways in which for initial technique, one conductor (positive or negative polarity) is applied to sterile, semi conductive material, like saline moistened gauze placed within the wound.

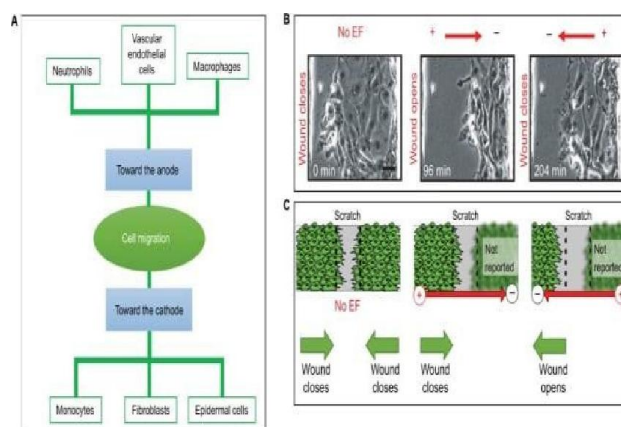


Fig.3. Cell Migration

In “Fig.3” The semi conductive surface of the opposite conductor is applied near on intact dry skin. the strategy the heart beat frequency is about a hundred pulses/ sec.

To promote lies, positive polarity to draw in the charged neutrophils and macrophages.to stimulate wound resurfacing, use positive polarity attracts epidemic cells.

Treatments square measure usually given for one hour each day, five to seven days every week, as a documented assessment indicates that the wound is healing

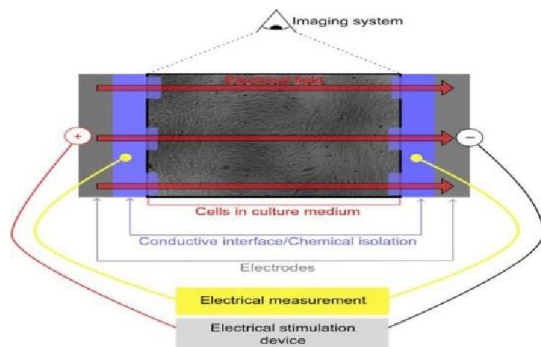


Fig.4. Design of proposed work

VI. RESULT

Electrotherapy could be a common pain-relieving modality in rehabilitation as a result in “Fig.5” it’s broad applicable use while not the excess or typically unpleasant facet effects that oral painkillers and anti inflammatory medications might cause. From treating skilled athletes ill from at work injuries to patients laid low with chronic pain conditions, electrical stimulation could be a nice alternative for safe, non-invasive pain management.

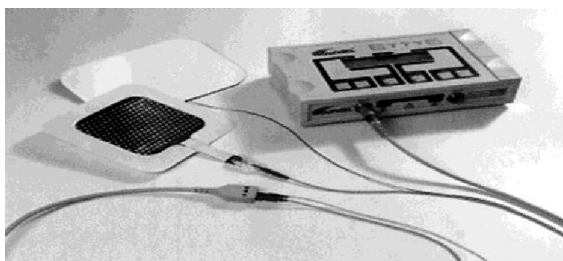


Fig.5. PROTOTYPE

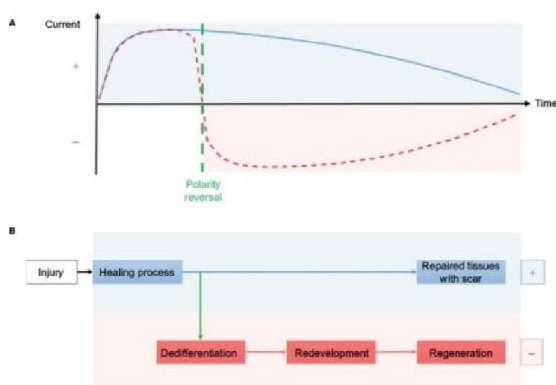


Fig.6. Graph of current

VII. FUTURE WORKS

While the team members were engaged on the implementation, they thought of the many concepts and enhancements for the “Insight Glasses”. However, they needed they need longer and information to try and do them. “Insight Glasses” is improved within the future for blind individuals and folks World Health Organization have vision difficulties by adding new techniques. as an example, direction and warning messages to forestall expected accidents, messages to inform the user concerning the battery level, video detection to supply a full healthy life for individuals with vision difficulties, develop mobile application to manage “Insight Glasses”, use 270 camera to possess a lot of wider angle, In “Fig.6” give the glasses with GPS notification and develop the glasses’ style to possess very little, little and light-weight parts that the user will wear it simply.

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- [3] Effective Wound Healing Enabled by Discrete Alternative Electric Fields from Wearable Nanogenerators Yin Long, Hao Wei, Guang Bo, Yu Dalong Ni, Angela LF Gibson, Xiaoli Lan, Yadong Jiang Weibo Publication Date: November 29, 2018
- [4] Efficiency of Tissue Penetration by Currents Induced by 3 Electrotherapeutic Techniques: A Comparative Study Using a Novel Deep-Tissue Measuring Technique Efrat Ariel et al. Published 2019.
- [5] Micro current electrotherapy improves palatal wound healing: clinical trial (Manuela Maria Viana Miguel, Ingrid Fernandes, Mathias-Santamaria, Amanda Rossato, Laís Fernanda Ferreira Ferraz, Antônio Martins Figueiredo-Neto, Andrea Carvalhode Marco, Renato Corrêa Viana Casarin, Shan non Margaret Walle, Dimitris N. Tatakis, Marcio Antonio Mathias, Mauro Pedrine Santamaria); First published: 12 August 2020.

MORTAL BEARING COMPUTATION

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ABSTRACT: Mortal bearing computation intends to find the human body parts and construct human body portrayal (e.g., body skeleton) from input information like pictures and recordings. It has drawn expanding consideration during the previous decade and has been used in a wide scope of applications including human-PC collaboration, movement examination, expanded reality, and augmented reality. Albeit the as of late grown profound learning-based arrangements have accomplished elite in human posture assessment, there still remain difficulties to inadequate preparing information, profundity ambiguities, and impediment. The objective of this study paper is to give an exhaustive survey of later profound learning-based answers for both 2D and 3D posture assessment by means of an orderly examination and correlation of these arrangements dependent on their feedback information and deduction strategies. In excess of 240 examination papers beginning around 2014 are canvassed in this study.

Objective :

- To estimate the 2D and 3D pose of mortal (people).
- To provide a comprehensive review of recent deep learning-based solutions for 2D and 3D estimation via systematic analysis and comparison of these solution based on human poses.
- To detect movement errors in fitness exercise.

1. INTRODUCTION

Human Pose Estimation (HPE), which has been widely considered in PC vision writing, includes assessing the arrangement of human body parts from input information caught by sensors, specifically pictures and recordings. HPE gives mathematical and movement data of the human body which has been applied to a wide scope of utilizations (e.g.,)human-PC association, movement investigation, expanded reality (AR), computer generated reality (VR), medical care, and so on) With the quick advancement of profound learning arrangements as of late, such arrangements have been displayed to beat traditional PC vision strategies in different assignments counting picture characterization [1], semantic division [2], and object location [3]. Huge progress and amazing execution have effectively been made by utilizing profound learning methods in HPE errands. Be that as it may, difficulties like impediment, lacking preparing information, and profundity uncertainty actually present challenges to be survived. 2D HPE from pictures also, recordings with 2D posture comments is effectively reachable and elite has been reached for the human posture assessment of a single individual utilizing profound learning methods. All the more as of late, consideration has been paid to profoundly impeded multi-individual HPE in complex scenes. Conversely, for 3D HPE,getting precise

3D explanations is substantially more troublesome than its 2D partner. Movement catch frameworks can gather 3D posture comment in controlled lab conditions; be that as it may, they have limits for in-the wild

conditions. For 3D HPE from monocular RGB pictures and recordings, the fundamental test is profundity ambiguities. In Multiview settings, perspectives affiliation is the key issue that should be tended to. A few works have uses sensors like profundity sensor, inertial estimation units (IMUs), and radio recurrence gadgets, yet at the same these approaches are normally not financially savvy and require exceptional reason equipment. Given the quick progress in HPE research, this article endeavors to follow later progresses and sum up their accomplishments to give a clear image of momentum research on profound learning-based 2D and 3D hpe

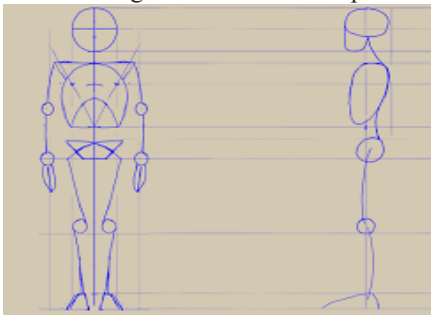


Fig 1
(Front and side human pose estimation)

2. Deep Learning Model for Pose Estimation

3D explanations is substantially more troublesome than its 2D partner. Movement catch frameworks can gather 3D posture comment in controlled lab conditions; be that as it may, they have limits for the wild conditions. For 3D from monocular RGB pictures and recordings, the fundamental test is profundity ambiguities. In Multiview settings, perspectives affiliation is the key issue that should be tended to. A few works have uses sensors like profundity sensor, inertial estimation units (IMUs), and radio recurrence gadgets, yet at the same these approaches are normally not financially savvy and require exceptional reason equipment. Given the quick progress in HPE research, this article endeavors to follow later progresses and sum up their accomplishments to give a clear image of momentum research on profound learning-based 2D and 3D hpe

3. Pose Estimation as DNN-based Regression

To communicate a posture, we encode the areas of all k body joints in present vector 3characterized as $y =$

$(\dots, y^T I, \dots)^T, I \in \{1, \dots, k\}$, where $y^T I$ contains the x and y directions of the i th joint. A marked picture is meant by (x, y) where x stands for the picture information and y is the ground truth present vector. Further, since the joint facilitates are in outright picture E3E facilitates, it demonstrates gainful to standardize them w. r. t. a crate b bouncing the human body or portions of it. In an insignificant case, the case can signify the full picture. Such a box is characterized by its middle $bc \in \mathbb{R}^2$ too as width bw and stature bh : $b = (bc, bw, bh)$. Then, at that point, the joint y_i can be interpreted by the box focus and scaled by the crate size which we allude to as standardization by

$$b: N(y_i; b) = 1/bw \cdot 1/bh (y_i - bc) (1)$$

Further, we can apply something very similar standardization to the components of posture vector $N(y; b) = (\dots, N(y_i; b)^T, \dots)^T$ bringing about a standardized posture vector.

At long last, with a slight maltreatment of documentation, we use $N(x; b)$ to mean a harvest of the picture x by the bouncing box b , which true standardizes the picture by the container. For quickness we mean by $N(\cdot)$ Normalization with b being the full picture box

In work, we treat the issue of act assessment like relapse where the we train and utilize a capacity $\psi(x; \theta) \in \mathbb{R}^{2k}$ which for a picture x relapses to a standardized posture vector, where θ signifies the boundaries of the model. Accordingly, utilizing the standardization change from Eq. (1) the posture forecast y in outright picture facilitates peruses

$$y^* = N^{-1}(\psi(N(x); \theta)) (2)$$

Notwithstanding its basic definition, the force furthermore, intricacy of the technique is in ψ , which depends on a convolutional Deep Neural Organization (DNN). Such a convolutional network comprises of a few layers – each being a direct change followed by a non-direct one. The principal layer takes as information a picture of predefined size and has a size equivalent to the quantity of pixels times three shading channels. The last layer yields the target upsides of the relapse, for our situation $2k$ joint directions. We base the engineering of the ψ on the work by Kievsky et al. [4] for picture characterization since it has shown remarkable outcomes on object restriction too [5]. Basically, the organization comprises of 7 layers Denote by C a convolutional layer, by LRN a neighborhood reaction standardization layer, P a pooling layer and by F a completely associated layer.

As it were C and F layers contain learnable boundaries, while the rest are boundary free. Both C and F layers comprise of a straight change followed by a nonlinear one, which for our situation is a redressed direct unit. For C layers, the size is characterized as width \times stature \times profundity, where the initial twomeasurements have a spatial importance while the profundity characterizes the quantity of channels. On the off chance that we compose the size of each layer in enclosures, then, at that point, the organization can be depicted succinctly as,

$C(55 \times 55 \times 96) - LRN - P - C(27 \times 27 \times$

$256) -$

$LRN - P - C(13 \times 13 \times 384) - C(13 \times 13$

$\times 384) - C(13 \times 13 \times 256) - P - F(4096) - F(4096).$

The channel size for the initial two C layers is 11×11 and 5×5 and for the excess three is 3×3 . Pooling is applied after three layers furthermore, adds to expanded execution in spite of the decrease of goal. The contribution to the net is a picture of 220×220 which through step of 4 is taken care of into the organization. The absolute number of boundaries in the abovementioned model is around 40M. For additional subtleties, we allude the peruser to [4]. The utilization of a non exclusive DNN engineering is propelled by its remarkable outcomes on both characterization what's more, limitation issue. Further, a particularly model is a really comprehensive one — the last joint area gauge is based

on a complex nonlinear change of the full picture. Furthermore, the utilization of a DNN forestalls the need to plan an area explicit osture model. All things being equal, a particularly model what's more, the provisions are gained from the information. Albeit the relapse misfortune doesn't model express connections between joints, such are verifiably caught by all the 7 secret layers — every one of the inner components are shared by all joint regressor.

4. Human body modelling

Human body demonstrating is a significant part of HPE to address key focuses and includes extricated from input information. For instance, most HPE strategies use a N-joints unbending kinematic model. A human body is a complex element with joints and appendages and contains body kinematic design and body shape data. In run of the mill techniques, a modelbased approach is utilized to portray and

construe human body posture and render 2D and 3D stances. There are normally three sorts of Models for human body demonstrating, i.e.,

kinematic model (utilized for 2D/3D HPE), planar model (utilized for 2D HPE) and volumetric model (utilized for 3D HPE). In the accompanying areas, a depiction of these models is given covering unique portrayals.

5. Kinematic model

The kinematic model, additionally called skeletonbased model [6] or kinematic chain model [7], incorporates a bunch of joint positions and the appendage directions to address the human body structure. The pictorial design model (PSM) [8] is a broadly utilized chart model, which is otherwise called the treestructured model. This adaptable and instinctive human body model is effectively used in 2D HPE [9] [10] and 3D HPE [11] [12]. Albeit the kinematic model has the benefit of adaptable diagram portrayal, it is restricted in addressing surface and shape information.

6. Planar model

Other than the kinematic model to capture the relations between different body parts, the planar model is used to represent the shape and appearance of a human body.

In the planar model, body parts are usually represented by rectangles approximating the human body contours. One example is the cardboard model [13], which is composed of body part rectangular shapes representing the limbs of a person. One of the early works [14] used the cardboard model in HPE. Another example is Active Shape Model (ASM) [15], which is widely used to capture the full human body graph and the silhouette deformations using principal component analysis.

7. Volumetric models

Other than the kinematic model to catch the relations between various body parts, the planar model is utilized to address the shape and presence of a human body. In the planar model, body parts are ordinarily addressed by square shapes approximating the human body forms. One model is the cardboard model [13], which is made out of body part rectangular shapes addressing the appendages of an individual. One of The early works [14] utilized the cardboard model in HPE. Another model is Active Shape Model (ASM) [15], which is generally used to catch the full human body diagram furthermore, the outline Misshapenings using principal part examination With the expanding interest in 3D

human remaking, numerous human body models SMPL is not difficult to send and viable with existing delivering motors, consequently is generally embraced in 3D HPE strategies. DYNA: Dynamic Human Shape in Motion [18] model endeavours to address practical delicate tissue movements for different body shapes. Movement related delicate tissue distortion is approximated by a low dimensional direct subspace. To foresee the low-dimensional direct coefficients of delicate tissue movement, the speed and speed increase of the entirety body, the rakish speeds and speed increases of the body parts, and the soft tissue shape coefficients are utilized.

Also, DYNA use weight record (BMI) to create unique disfigurements for individuals with various shapes. Sewed Puppet Model [19] is a part-based graphical model coordinated with A reasonable body model. Diverse 3D body shapes and posture subordinate shape varieties can be meant the comparing diagram hubs portrayal. Each body part is addressed by its own low-dimensional state space. The body parts are associated through pairwise possibilities between hubs in the chart with the goal that it is as "sewing" the parts together. By and large, part association through potential capacities is performed by utilizing message passing calculations like Belief Propagation (BP). To take care of the issue that the state space of each part can't be effectively discretized to apply discrete BP

8.2d human pose estimation

2D HPE techniques gauge the 2D position or then again spatial area of human body key focuses from pictures or recordings. Customary 2D HPE strategies take on various hand tailored element extraction procedures [23] [24] for body parts, and these early works portray human body as a stick figure to get worldwide posture structures. As of late, profound learning-based methodologies have accomplished a leap forward in HPE by further developing the presentation altogether. In the accompanying, we survey profound learning based 2D HPE strategies regarding single individual and multi-individual situations. The exhibition of 2D HPE has been altogether improved with the sprouting of profound learning methods. As of late, more profound and all the more impressive organizations have advanced the presentation in 2D single person HPE, for example, Deep Pose [36] and Stacked Hourglass Organization [38], just as in 2D multiperson HPE, for example, Alpha Pose [89] and Open Pose. Although these works have accomplished adequately great execution in diverse 2D HPE situations, issues still remain.

Relapse and body part discovery strategies enjoy their own benefits and impediments in 2D single-individual HPE. Relapse strategies can become familiar with a nonlinear planning from input pictures to central issue arranges with a start to finish system, which offer a quick - learning worldview and a sub-pixel level expectation precision. Be that as it may, they for the most part give problematic arrangements due to the profoundly nonlinear issue. Body part recognition strategies enjoy their own benefits and restrictions in 2D single-individual HPE. Relapse techniques can get familiar with a nonlinear planning from input pictures to central issue organizes with a start to finish structure, which offer a quick - learning worldview and a sub-pixel level forecast precision. Nonetheless, they ordinarily give problematic arrangements due to the profoundly nonlinear issue. Body part identification strategies, in specific hotness map-based systems, are all the more generally utilized in 2D HPE since (1) the probabilistic forecast of every pixel in heat guide can work on the exactness of finding the central issues; and (2) heat maps give more extravagant oversight data by safeguarding the spatial area data. Be that as it may, the accuracy of the anticipated key focuses is subject to the goal heat maps. The computational expense and memory.

impression are essentially expanded when utilizing high goal heatmaps. Concerning the hierarchical and base up pipelines for 2D multi-individual HPE, it is hard to distinguish which strategy is better since both are generally utilized in late works with their qualities and shortcomings. On onehand, hierarchical pipeline yields better outcomes since it initially identifies every person from the picture utilizing discovery techniques, then, at that point, predicts the areas of central issues utilizing the single individual based methodologies.

10. 3D human pose

3D HPE, which expects to anticipate areas of body joints in 3D space, has drawn in a lot interest as of late since it can give broad 3D design data related to the human body. It tends to be applied to different applications (e.g., 3D film and activity ventures, computer generated reality, and online 3D activity expectation). In spite of the fact that huge upgrades have as of late been accomplished in 2D HPE, 3D HPE still stays as a difficult errand. Generally existing research works tackle 3D HPE from monocular pictures or recordings, which is an not well presented and reverse issue due to projection of 3D to 2D where one measurement is lost. When different perspectives are accessible or different sensors for example, IMU and LiDAR are

sent, 3D HPE can be an all around presented issue utilizing data combination strategies.

Another constraint is that profound learning models are information

Fig 2
(3D Modelling)

eager and delicate to the information assortment climate. In contrast to 2D human datasets where precise 2D posture comment can be effortlessly gotten, gathering exact 3D posture explanation is tedious and manual marking isn't pragmatic. Likewise, datasets are generally gathered from indoor conditions with chosen day by day activities. Ongoing works [109] [110] [111] have approved poor people speculation of models prepared with one-sided datasets by cross-dataset surmising [112]. In this part, we first spotlight on 3D HPE from monocular RGB pictures and recordings, and afterward cover 3D HPE dependent on different sorts of sensor.

11. 3D HPE OVERVIEW

3D HPE has made critical progressions lately. Since a hugenumber of 3D HPE strategies apply the 2D to 3D lifting technique, the exhibition of 3D HPE has been improved significantly because of the advancement made in 2D HPE. A few 2D HPE strategies like Open Pose], CPNAlpha Pose [89], and HRNet [81] have been widely utilized as 2D posture identifier in 3D HPE techniques. Other than the 3D represent, a few techniques additionally recuperate 3D human cross section from pictures or recordings. Nonetheless, in spite of the progress made up until this point, there are as yet a few challenges. One test is the model speculation. Excellent 3D ground truth presents explanations rely upon movement catch frameworks which can't be without any problem sent in irregular climate. Subsequently, the current datasets are principally caught in obliged scenes. The state-of-the-workmanship strategies can accomplish promising results on these datasets, yet their execution corrupts when applied to in-the-wild information. It is feasible to use gaming motors to produce engineered datasets with different stances and complex scenes, e.g., SURREAL dataset and GTAIM dataset. However, gaining from manufactured information may not accomplish the ideal execution because of a hole between manufactured also, genuine information disseminations. Same as 2D HPE, strength to impediment and calculation effectiveness are two key challenges for 3D HPE also. The exhibition of current 3D HPE strategies drops extensively in jam-

packed situations because of serious shared impediment and conceivably lower arrangement content of every individual. 3D HPE is more calculation requesting than 2D HPE. For instance, 2D to 3D lifting approaches depend on 2D postures as moderate portrayals for deriving 3D postures. Subsequently, it is basic to create computationally



proficient 2D HPE pipelines while keeping up with high exactness for present assessment.

(3D Human modelling)

12. APPLICATIONS

In this section, we review related works of

exploring HPE for a few popular

applications Action prediction Surveillance Cloth Parsing Online Coaching Movie and Game AR and VR Healthcare ...: Various applications of human pose estimation. Action recognition, prediction, detection, and tracking: Pose information has been utilized as cues for various applications such as action recognition, prediction, detection, 19: Conference workshops and challenges for 2D and 3D HPE. ICCV 2017 Pose Track Challenge: Human Pose Estimation and Tracking in the Wild

<https://posetrack.net/workshops/iccv2017/>

ECCV 2018 Pose Track Challenge: Articulated People Tracking in the Wild

<https://posetrack.net/workshops/eccv2018/>

CVPR 2018 3D humans 2018: 1st International workshop on Human pose, motion, activities and shape

<https://project.inria.fr/humans2018/#>

CVPR 2019 3D humans 2019: 2nd International workshop on Human pose, motion, activities and shape

<https://sites.google.com/view/humans3d/>

CVPR 2019 Workshop On Augmented Human:
Human-centric Understanding

<https://vuhcs.github.io/vuhcs->

2019/index.html CVPR 2020 Towards Human-
Centric Image/Video Synthesis

<https://vuhcs.github.io/> ECCV 2020 3D

poses in the wild challenge

<https://virtualhumans.mpi-inf.mpg.de/3DPW> Challeng
e/ ACM

Multimedia 2020 Large-scale Humancentric Video
Analysis in Complex Events

<http://humanevents.org/> and tracking.

Angelini et al. [32] proposed a real-time action
recognition method using a posebased algorithm. Yan
et al. [33] leveraged the dynamic skeleton modality
of pose for action recognition. Markovitz et al.
[34] studied human pose graphs for anomaly

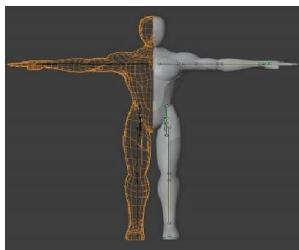


Fig 4

(Pose estimated half motion)

13. Conclusion

We have introduced an orderly outline
of ongoing profound learning-based 2D and 3D HPE
techniques. An exhaustive scientific categorization
what's more, execution correlation of
these techniques have been covered. We present,
to our insight, the principal use of Deep Neural
Networks (DNNs) to human posture assessment. Our
definition of the issue as DNN-based relapse
to joint arranges and the introduced course of such
regressors enjoys the benefit of catching setting and
thinking about present in a comprehensive way.
Thus, we are capable to accomplish condition of-
workmanship or better outcomes on a few testing

scholarly datasets. Further, we show that utilizing a
nonexclusive convolutional impartial organization,
which was initially intended for grouping
assignments, can be applied to the diverse assignment
of

limitation. In future, we plan to
examine novel structures which could
be possibly better customized towards
limitation issues by and large, and in present
assessment specifically.

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DIABETES PREDICTION USING MACHINE LEARNING

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ABSTRACT: Diabetes is an illness caused because of high glucose level in a human . Diabetes should not be ignored if it is untreated then diabetes may cause some major issues in a person like: heart related problems, kidney problem, blood pressure, eye damage and it can also affects other organs of human body. Diabetes can be controlled if it is predicted earlier. To achieve. This goal this project work we will do early prediction of Diabetes in a human body or a patient for a higher accuracy through applying, Various Machine Learning Techniques. Machine Learning techniques Provide better result for prediction by constructing models from datasets collected from patients. In this Work we will use Machine Learning Classification and ensemble Techniques on a dataset to predict diabetes. Which are K-Nearest Neighbor (KNN), Logistic Regression (LR), Decision Tree (DT), Support Vector Machine (SVM), Gradient Boosting (GB) and Random Forest (RF). The accuracy is different for every model When compared to other models. The Project work gives the Accurate or higher accuracy model shows that the model is capable of predicting diabetes effectively. Diabetes is an illness caused because of high glucose level in a human . Diabetes should not be ignored if it is untreated then diabetes may cause some major issues in a person like : heart related problems , kidney problem , blood pressure , eye damage and it can also affects other organs of human body . Diabetes can be controlled if it is predicted earlier . To achieve . This goal this project work we will do early prediction of Diabetes in a human body or a patient for a higher accuracy through applying , Various Machine Learning Techniques . Machine Learning techniques Provide better result for prediction by constructing models from datasets collected from patients . In this work we will use Machine Learning Classification and ensemble Techniques on a dataset to predict diabetes.

Keywords : *Diabetes, machine, learning, prediction, dataset, Ensemble*

INTRODUCTION

In machine learning computers apply statistical learning techniques to automatically identify patterns in data . This technique can be used to

make highly accurate predictions .In machine learning , computers apply statistical learning techniques to automatically identify patterns in data. These techniques can be used to make highly accurate predictions. Arthur Samuel first came up with the phrase “ Machine learning ” in 1952. In 1957, Frank Rosenblatt at the Cornell Aeronautical Laboratory – combined Donald Hebb’s model of machine learning efforts and created the perception. Healthcare sectors have large volume databases. Such databases may contain structured, semi-structured or Unstructured data. Big data analytics is the process which analyses huge data sets and reveals hidden information, Hidden patterns to discover knowledge from the given data. Various Machine Learning Techniques provide efficient result to Collect Knowledge by building various classification and Ensemble models from collected dataset. According to (WHO) World Health Organization About 422 million people suffering from diabetes particularly from low or idle income countries. And this could be Increased to 490 billion up to the year of 2030. Population of India is Now more than 100 million so the actual number of diabetics in India is 40 million.

LITERATURE REVIEW

The analysis of related work gives results on various healthcare datasets, where analysis and predictions were Carried out using various methods and techniques. Various prediction models have been developed and implemented By various researchers using variants of data mining techniques, machine learning algorithms or also combination of These techniques. Dr.Shraavana Kumar N M, eswari, sampathyP and Lavanya S (2015) implemented a system using Hadoop and Map Reduce technique for analysis of Diabetic data. This system predicts type of diabetes and also Risks associated with it. The system is Hadoop based and is economical for any healthcare organization.[4] Azaria Iyer (2015) used classification technique to study hidden patterns in diabetes dataset. Naïve Bayes and Decision Trees were used in this model. Comparison was made for performance of both algorithms and Effectiveness of both algorithms was shown as a result.[5] K. Rajesh and V. Sagintha(2012) used classification Technique. They used C4.5 decision tree algorithm to find hidden patterns from the dataset for classifying

Efficiently.[8] Humar Kahramanli and Novruz Allahverdi (2008) used Artificial neural network (ANN) in Combination with fuzzy logic to predict diabetes.[9] B.M. Patil, R.C. Joshi and Durga Toshniwal (2010) proposed Hybrid Prediction Model which includes Simple K-means clustering algorithm, followed by application of Classification algorithm to the result obtained from clustering algorithm. In order to build classifiers C4.5 decision Tree algorithm is used.[10] Mani Burwall and Shraddha Kumar (2015) proposed a model using Random Forest Classifier to forecast diabetes behavior.[7] Nawaz Mohamudallyl and Dots Muhammad (2011) used C4.5 decision Tree algorithm, Neural Network, K-means clustering algorithm and Visualization to predict diabetes.[11]

MACHINE LEARNING

Machine Learning Machine learning is the scientific field Dealing with the ways in which machines learn from Experience. For many scientists, the term “machine Learning” is identical to the term “artificial Intelligence”, given that the possibility of learning is The main characteristic of an entity called intelligent In the broadest sense of the word. The purpose of Machine learning is the construction of computer Systems that can adapt and learn from their experience. A more detailed and formal definition of machine learning is given by Mitchel: A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience With the rise of Machine Learning approaches we have the ability to find a solution to this issue, we have developed a system using data mining which has the ability to predict whether the patient has diabetes or not. Furthermore, predicting the disease early leads to treating the patients before it becomes critical. Data mining has the ability to extract hidden knowledge from a huge amount of diabetes-related data.

SUPERVISED LEARNING

Supervised Learning In supervised learning, the system must “learn” inductively a function called target function, Which is an expression of a model describing the Data. The objective function is used to predict the Value of a variable, called dependent variable or Output variable, from a set of variables, called Independent variables or input variables or Characteristics or features. The set of possible input Values of the function, i.e. its domain, are called Instances. Each case is described by a set of Characteristics (attributes or features). A subset of all Cases, for which the output variable value is known, Is called training data or examples. In order to infer The best target function, the learning system, given a Training set, takes into

consideration alternative Functions, called hypothesis and denoted by h . In Supervised learning, there are two kinds of learning Tasks: classification and regression. Classification Models try to predict distinct classes, such as e.g. Blood groups, while regression models predict Numerical values. Some of the most common Techniques are Decision Trees (DT), Rule Learning, And Instance Based Learning (IBL), such as KnearestNeighbors (k-NN), Genetic Algorithms (GA), Artificial Neural Networks (ANN), and Support Vector Machines (SVM).

UNSUPERVISED LEARNING

In unsupervised learning, the system tries to Discover the hidden structure of data or associations Between variables. In that case, training data consists Of instances without any corresponding labels Association Rule Mining appeared much later than machine learning and is subject to greater influence from the research area of databases. Cluster analysis or clustering is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to each other than to those in other groups (clusters). It is a main task of exploratory data mining, and a common technique for statistical data analysis, used in many fields, including machine learning, pattern recognition, image analysis, information retrieval, bioinformatics, data compression, and computer graphics.

REINFORCEMENT LEARNING

The term Reinforcement Learning is a General term given to a family of techniques, in Which the system attempts to learn through direct Interaction with the environment so as to maximize Some notion of cumulative reward. It is important to Mention that the system has no prior knowledge About the behavior of the environment and the only Way to find out is through trial and failure (trial and Error). Reinforcement learning is mainly applied to Autonomous systems, due to its independence in Relation to its environment.

OBJECTIVES

There is a need to study and make a system which will make it easy for an end users to predict the chronic diseases without visiting physician or doctor for diagnosis. To detect the Various Diseases through the examining Symptoms of patient's using different techniques of Machine Learning. The objective of the study is classify Indian PIMA dataset for diabetes . • This is proposed to achieve through machine learning and deep learning classification algorithm . Classification is considered as our data mining problem , in which SVM algorithm is proposed to use as machine learning part . • Neural network is used for deep learning part . Our objective is to

design an interactive application , in which user can give a single input to arrive the prediction

Research about diabetes

Diabetes is an incessant infection wherein levels of sugar and glucose are very Unsteady. A few illnesses are the consequence of this shakiness. Once in a while these Medical problems can cause abrupt passing moreover. Diabetes is an ailment which Results in light of turmoil for digestion .It can be arranged in three types.

There are numerous individuals who are experiencing this sickness and number of These kind of individuals are expanding step by step. It has been found in ongoing Overview that one out of 11 grown-ups are experiencing this sickness. As indicated by An ongoing study it has been discovered the experiencing this ailment. It's a serious hazardous measurement for a malady to Spread that for a malady to spread that way

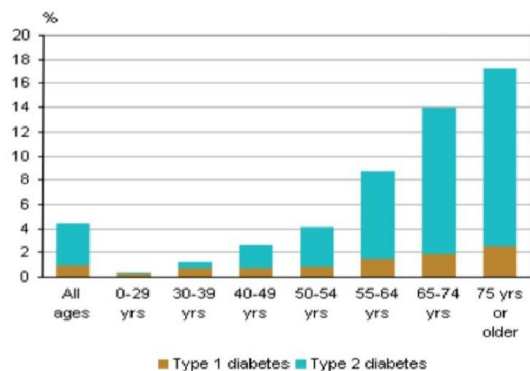
The inability of body to produce very less amount of insulin or nothing can lead to Many complications. There is an extraordinary hazard on pancreas of the individual Experiencing type 1 of the ailment. A recent study shows that typel diabetes generally Happens in age group of 1-20

Type 2:

The inability of body to deny or resist any kind of insulin produced by the body Which results in non-availability of insulin to the body. Type 2 diabetic patients are More prone to heart related ailments. According to recent survey of World Health Organizations (WHO) has found that maximum of patients suffer from type2 diabetes.

Type 3:

It is a rare type of diabetes which have a serious damage on the brain of a Person, which is commonly known as Gestational Diabetes. Treatment related to low blood sugar in most cases is same for typel and type2. Most cases Are considered to be mild not medical emergencies. Feeling of unease, sweating, trembling Etc. are serious effects .There are more dangerous serious effects such as aggressiveness, Permanent brain damage and death in severe cases.



PROPOSED SYSTEM

This system is used to predict most of the chronic diseases. It accepts the structured and textual type of data as input to the machine learning model. This system is used by end users. System will predict disease on the basis of symptoms. This system uses Machine Learning Technology. For predicting diseases Naïve Bayes algorithm, for clustering KNN algorithm, final output will be in the form of 0 or 1 for which Logistic tree is used. Classification is one of the most important Decision making techniques in many real world Problem. In this work, the main objective is to Classify the data as diabetic or non-diabetic and Improve the classification accuracy. For many Classification problem, the higher number of samples Chosen but it doesn't leads to higher classification Accuracy. In many cases, the performance of Algorithm is high in the context of speed but the Accuracy of data classification is low. The main Objective of our model is to achieve high accuracy. Classification accuracy can be increase if we use Much of the data set for training and few data sets for Testing. This survey has analyzed various Classification techniques for classification of diabetic And non-diabetic data. Thus, it is observed that Techniques like Support Vector Machine, Logistic Regression, and Artificial Neural Network are most Suitable for implementing the Diabetes prediction System.

METHODOLOGY

In clinical field grouping of information into various classes is finished by utilizing Diverse order systems as indicated by some compels relatively an individual classifier. Diabetes influences the capacity of the body in creating the hormone insulin. Which Brings about the raise the degrees of glucose in the blood and turn makes the digestion Of sugar anomalous. An individual for the most part experiences high glucose. Strengthen thirst, Intensify hunger and Frequent pee are a portion of the side effects Caused because of high glucose. Numerous difficulties happen if diabetes stays Untreated. Diabetic ketoacidosis and nonketotic hyperosmolar trance like state are a Portion of the significant complexities. Goal of the paper is to investigate for model to predict diabetes with better accuracy. We experimented with different Classification and Ensemble algorithm to predict diabetic.

A. Dataset description - The data is gathered from UCI respiratory which is named as pima Indian diabetes Dataset. The dataset have many attributes of 768 patients.

B. Table1: Dataset description

S No.	Attributes
	Pregnancy

1	
2	Glucose
3	Blood pressure
4	Skin thickness
5	Insulin
6	BMI(Body mass index)
7	Diabetes Pedigree function
8	Age

The 9th attribute is class variable of each data points. This Class variable shows the outcome 0 and 1 for diabetics Which

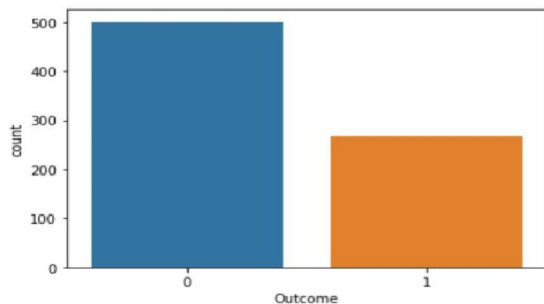


Figure 1: Ratio of Diabetic and Non Diabetic Patient

indicates positive or negative for diabetics.

Figure 1: Ratio of diabetic and non diabetes

Distribution of diabetic patients

We made a model to Predict diabetes however the dataset was slightly imbalanced having around 500 classes labeled as 0 means negative means no diabetes and 268 labeled as 1 means positive Means diabetic.

A.Data processing - Data preprocessing is most important process. Mostly healthcare related data contains missing value and other impurities that can cause effectiveness of data. To improve quality and effectiveness obtained after mining process, Data preprocessing is done. To use Machine Learning Techniques on the dataset effectively. This process is essential for accurate result and successful Prediction.

- C. **Machine learning** - When data has been ready we apply Machine Learning Technique. We used different classification and ensemble techniques, to predict diabetes. The methods applied on Pima Indians diabetes dataset. Main objective to apply Machine Learning Techniques to Analyze the performance of these methods and find accuracy of them, and also been able to figure out the responsible/important feature which play a major role in prediction.

K-Nearest Neighbor –

KNN is also a supervised machine learning algorithm. KNN helps to solve both the classification and regression problems. KNN is lazy prediction technique assumes that similar things are near to each other. Many times data points which are similar are very near to each other helps to group new work based on similarity measure algorithm record all the records and classify them according to their similarity measure. For finding the distance between the points uses tree like structure. To make a prediction for a new data point, the algorithm finds the closest data points in the training data set its nearest neighbors. Here K= Number of nearby neighbors, its always a positive integer. Neighbors value is chosen from set of class. Closeness is mainly defined in terms of Euclidean distance. The Euclidean distance between two points P and Q i.e. P (p₁, p₂, . . . p_n) and Q (q₁, q₂, . . . q_n) is defined by the following equation:-

Logistics regression

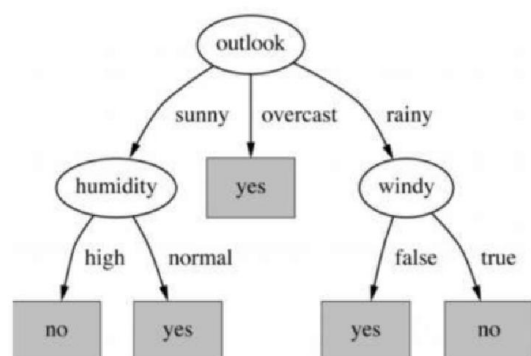
Logistic regression is also a supervised learning classification algorithm. It is used to estimate the probability of a binary response based on one or More predictors. They can be continuous or discrete. Logistic regression used when we want to classify or distinguish some data items into categories. It classify the data in binary form means only in 0 and 1 Which refer case to classify patient that is positive or negative for diabetes. Main aim of logistic regression is to best fit which is Responsible for describing the relationship between target And predictor variable. Logistic regression is a based on Linear regression model. Logistic regression model uses Sigmoid function to predict probability of positive and negative class. The most common form of machine learning algorithm comes as Logistic Regression (LR) because it is highly reliable. The transformation of the data comes as the last and the Most important stage where a suitable contribution is given to the feature engineering Phase. Scaling and normalization of the states are done individually followed by the Decomposition of each stage and finally the aggregation of multiple states to randomly Select a final state for performance analysis. Training set accuracy comes to be 0.781. while the Test set accuracy comes equal to 0.771. It is obvious that training set accuracy give more prominent output result in logistic regression

DECISION TREE

DDT is the preferred tool for classification and prediction. Decision tree looks like tree, in which the middle nodes contain the test on attributes and the leaf node contains class label.. Decision trees arrange occasions by

arranging them down the tree from the establishment To some leaf hub, that gives the grouping of the case. An example is classed by grouping .At the establishment hub of the tree, testing the trait such by this hub, at that point Descending the appendage likened to the value of the property as appeared inside the in Beneath of figure. This strategy is then lasting for the subtree frozen in place at the new hub.

Final decision tree



Diabetes prediction:It is more beneficial to identify the early symptoms of diabetes than to cure it after being diagnosed. Therefore, in this study, a diabetes prediction system is proposed where three state-of-the-art machine learning algorithms are exploited, and a comparative analysis is performed. The details of the proposed approaches are as follows.

Conclusion

Machine learning has the great ability to revolutionize the diabetes risk prediction with the help of advanced computational methods and availability of large amount of epidemiological and genetic diabetes risk dataset. Detection of diabetes in its early stages is the key for treatment. This work has described a machine learning approach to predicting diabetes levels. The technique may also help researchers to develop an accurate and effective tool that will reach at the table of clinicians to help them make better decision about the disease status. Then aim of this project was to design and implement Diabetes Prediction Using Machine Learning Methods and Performance Analysis of that methods and it has been Achieved successfully.

Future Scope

Proposed system uses “KNN algorithm” to find the diabetes disease, in data science we have many algorithms for

Classification such as Naïve Bayes, SVM, Decision Tree, ID3 etc... in future we can add more algorithms to find

Outputs and algorithms can be compared to find the efficient algorithm. We can add visitor query module, where

Visitors can post queries to administrator and admin can send reply to those queries. We can add treatment module,

Where doctors upload treatment details for patients and patient can view those treatment details.

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EFFECTS OF ARTIFICIAL INTELLIGENCE IN ILENT COMMUNICATION

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ABSTRACT: In the current scenario, communication plays a vital role among us. In our body, vocal folds are responsible for sound production. Due to stroke, brain damage, head injury, dementia, deaf by birth and other physiological problem vocal folds will be affected and it leads to cause loss of speech. In order to get rid of this communication difficulties, artificial intelligence in silent communication (lip reading device) is used. The major components are Kinect camera, ARM processor, CNN and LSTM algorithm, LRW dataset and digital display. The Kinect camera employed here is used to capture video of the subject. The ARM processor is trained by the AI algorithms of CNN and LSTM. The feature extraction process is carried out by convolutional neural network. Final classification is done by using long short-term memory in order to find out the output by comparison of input sequence with the trained LRW dataset. The recording is mainly depends on the pattern of lip movement.

KEYWORDS: *Artificial intelligence, dementia, lip reading, silent communication, kinect camera and arm processor.*

1. INTRODUCTION:

Lip reading is a process which is used to recognize one's speech by visual way. In earlier decades, the lip readers perform lip reading by looking at the speakers face to identify speech. The main blocks involved in this process are face detection, lip localization, feature extraction and classification. In addition, Certain datasets are used to compare the performance of raw data. An artificial intelligent system architecture will be trained by giving user's lip movement frames sequence as input and will identify lip movement using visual information or both

audio and visual information. Artificial intelligence (AI) does indeed have a branch called deep learning. It has different layers in the model which is used to process minute details like neuron in our brain. If the audio is corrupted by noise, the visual information will be used to interpret the data. It can also be used by deaf or hearing-impaired people. People with normal eyesight, hearing, and social skills use information from the lips and face instinctively to help them. In regular conversation, aural understanding is important, and most native speakers of a language can speechread to some extent. Although numerous phonemes share the same viseme and are thus unable to differentiate from visual information alone, each speaking sound (phoneme) has a unique facial and mouth posture (viseme). Sounds that are articulated inside the mouth or throat, such as glottal consonants, are not perceptible. Voiced and unvoiced pairs look identical. It has been estimated that only 30% to 40% of sounds in the English language are distinguishable from sight alone. It's excruciatingly tough to write computer programming that can read lips. As a result, scientists in the new study turned to machine learning, a type of AI in which computers learn from data. They supplied their system thousands of hours of footage, as well as transcripts, and let it solve the problem on its own. A new artificial intelligence program that outperformed professional lip readers and the best AI to date, with just half the error rate of the previous best algorithm. Non-English speech, non-speaking faces, low-quality video, and video that wasn't shot straight ahead were all filtered out by the computer. Then, they cropped the videos around the mouth. This resulted in approximately 4000 hours of video, as well as over 127,000 English words. The various applications are there of lip reading which it can be used as security system, for people those who can't hear or having hearing problems. It is also used for the identification of keywords from video in the forensic investigations, as well as extracting a person's spoken words from their physical appearance. It

also has application for the human robot interaction so that the system is avlo to communication with the non-technical person more easily. Lip reading can also be utilised as subtitles in the video, which is more accurate than simply adding audio files. In

vehicle automation also lip-reading technique is used and also for the purpose of security systems such as banks, colleges, museums and highly restricted areas.

2. PROBLEM DOMAIN:

The essential motive of this machine is to assist the those who are all tormented by communicate disabilities. In order to conquer such problems that is confronted via way of means of the expert lip readers consisting of low accuracy, much less reliability, etc., synthetic intelligence in lip studying tool is used. Because it gives excessive accuracy, low strength intake and higher reliability. Nowadays a few packages encompass lipa and lipnet are to be had withinside the virtual platform to offer a supportive device for lip studying tool. Instead of the usage of listening to aids, we are able to make use of this type of era to make certain communicate easier. The carrier should one day be utilised via way of means of the listening to challenged withinside the shape of a cellphone app to assist them lip study higher. The message content material is extra informative for speech- readers than facial expressions and frame language, as a speculation that emotional expression should enhance speech- readers capacity to apprehend the content material has been disproved. The AI massively outperformed a expert lip- reader who tried to decipher 2 hundred randomly decided on clips from the information set. The era correctly interpreted complete terms via way of means of without a doubt searching at every speaker's lips.

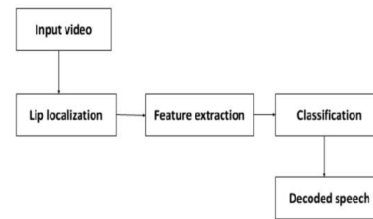
3. Introduction

Lip reading is a technique which is used to understand one's speech by means of interpretation of the lip movements. The visual data sequence is processed by using LSTM algorithm with the help of LRW dataset. The scrutiny of lip reading is totally rely on context, pattern of lip movement and the type of dataset is used. The Automated Lip Reading is a device which is used to understand what is being spoken based solely on the video. Early work in ALR was focused on simple tasks such as alphabet or digit recognition. These data sets contain small clips of various speakers, with various resolutions, speaking a single alphabet or digit. The aim of automatic lip reading system is to understand natural speech. The acquired database containing words, phrases and phonetically balanced sentences and models respectively. It consists of three major blocks, they are:

1. Lip localization
2. Feature extraction
3. Classification.

The first block, focused on face and lips detection, is essentially a Computer Vision problem. The goal of the second block is to provide feature values (mathematical values) to the visual information observable at every frame, again a Computer Vision problem. Finally, the classification block aims to map

these features into speech units while making sure that the complete decoded message is coherent, which is in the domain of Natural Language Processing (NLP). By utilising context, this final block assists in the differentiation of visually identical speech units.



INPUT VIDEO

The entire video collection is received via Kinect digicam. It is an powerful device for face monitoring and actual time motion monitoring programs. It has an included sensor and it captures a colored pics with the intensity statistics of every image. The 3-dimensional statistics may be received via way of means of the usage of those components, 1. A color digicam 2. An infrared emitter 3. An infrared receiver. The sensor is supported via way of means of KINECT face monitoring software program improvement kit (face monitoring SDK) whose versions after 1.5 offer equipment for growing actual-time face monitoring and lip- studying programs on NET framework. It captures the lip motion of on the fee that varies among 9 Hz and 20 Hz, inversely proportional to the decision of the pics.

4. LIPS LOCALIZATION:

It is the fundamental step which is needed to study the lips for extracting visible records from the video input. It can be carried out on mouth, uneven lips, tooth and tongue. Lip localization is likewise called lip segmentation. It is the primary degree of lip-analyzing process. There are numerous strategies used to localize the lips. A. Semi-Automatic lip monitoring the usage of geometric records: A semi-automated lip monitoring method is processed with the aid of using N. Even, A. Caplier and P. Ycoulon and it's far the usage of geometric records of the mouth to tune the lips from a video. There are essentially steps, they are: Step 1: Lip contour detection with the aid of using locating upper, decrease and nook pixel factors withinside the first body of the video input. Step 2: Lip tracing withinside the following frames the usage of the pixels of lip contour were given from first body with the aid of using adjusting the pixel factors and becoming the lip model. B. Automatic lip characteristic extraction the usage of geometric records: 17 ALiFE is an automated technique 1: Segmenting lip withinside the first body Step 2: Tracing lips withinside the

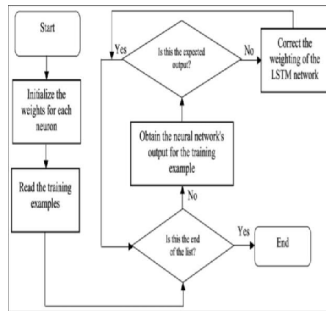
successive frames Step 3: Using the lip detection viseme classification. C. Automatic hybrid technique the usage of geometric and shadeation records: It makes use of each geometric and shadeation records for monitoring POIs on mouth to find lips. It involves two steps. They are, Step 1: Identifying POIs to segment the lip contour using color information and then also by geometric information in the first frame of video. Step 2: Lip tracing in the successive frames of video. In an appearance-based features the tongue, teeth are considered for lip movement extraction of features. It was an alternate way for the extraction of features using the pixel data as features. ILBP from the three of the orthogonal planes was considered for change in the time and the space of mouth's region. The teeth area was taken as the ROI and the contour of it was taken as the feature for further processes. In texture based feature extraction, various transforms are used. First ROI is computed then DCT is applied on ROI to extract pixel-based features. The transformations used are generally the DCT, DFT and DWT. The coefficient of transform is used as the feature to detect and recognize the visual features in DCT as well as in the DWT. Based on the DWT of image, it's histogram is also used as the feature. The mostly used is the DCT transform. In the hybrid feature extraction technique, the various methods combination is used for the feature extraction. Talea and Yaghmaie have used the red exclusion algorithm for taking the transformation of images ROI, which recognised the centre of the mouth from the vertical positions. Then the boundaries of lips thresholding were done. The gray scale value of the threshold was used as features. The Leung et al. used the geometry feature for finding the mouth ROI. The ASM used to find out the contour point and these contour point coordinates are used as features.

5. CNN AND LSTM ARCHITECTURE OF LIP READING:

In deep learning, a convolutional neural network (CNN, or ConvNet) is a category of deep neural network, maximum generally carried out to investigate visible imagery. They have programs in photograph and video reputation, recommender systems, photograph classification, photograph segmentation, scientific photograph analysis, herbal language processing, brain-pc interfaces, and monetary time collection. CNNs are regularized variations of multilayer perceptrons. Multilayer perceptrons generally imply absolutely linked networks, that is, every neuron in a single layer is attached to all neurons withinside the subsequent layer. The "complete connectivity" of those networks makes them susceptible to overfitting records. A convolutional neural

community includes an enter layer, hidden layers and an output layer. In any feed-ahead neural community, any center layers are known as hidden due to the fact their inputs and outputs are masked through the activation feature and very last convolution. In a convolutional neural community, the hidden layers encompass layers that carry out convolutions. Typically, this consists of a layer that plays a dot fabricated from the convolution kernel with the layer's enter matrix. This product is generally the Frobenius internal product, and its activation feature is generally ReLU. This is observed through different layers which includes pooling layers, absolutely linked layers, and normalization layers. In a CNN, the enter is a tensor with a shape: (variety of inputs) x (enter height) x (enter width) x (enter channels). After passing thru a convolutional layer, the photograph turns into abstracted to a characteristic map, additionally known as an activation map, with shape: (variety of inputs) x (characteristic map height) x (characteristic map width) x (characteristic map channels). A convolutional layer inside a CNN normally has the subsequent attributes: 1. Convolutional filters/kernels described through a width and height (hyper- parameters). 2. The variety of enter channels and output channels (hyper- parameters). One layer's enter channel ought to be identical to the variety of output channels (additionally known as depth) of its enter. 3. Additional hyperparameters of the convolution operation, which includes: padding, stride. Convolutional networks may also encompass nearby and/or worldwide pooling layers in conjunction with conventional convolutional layers. Pooling layers lessen the scale of records through combining the outputs of neuron clusters at one layer right into a unmarried neuron withinside the subsequent layer. Local pooling combines small clusters, tiling sizes which includes 2 x 2 are generally used. Global pooling acts on all of the neurons of the characteristic map. 24 Long short-time period reminiscence is an synthetic recurrent neural community structure used withinside the discipline of deep learning. LSTM is relevant to duties which includes unsegmented, linked handwriting reputation, speech reputation and anomaly detection in community visitors or IDSs (intrusion detection systems). LSTM networks are well-acceptable to classifying, processing and making predictions primarily based totally on time collection records, when you consider that there may be lags of unknown length among critical activities in a time collection. The traditional LSTM neural community is prolonged through including a pre- processing section the use of CNN. The pre-processing section extracts beneficial capabilities from the authentic records and extra importantly, converts the univariate records into multi-dimensional through 1-D convolution, which

doubtlessly complements the prediction functionality of the LSTM neural community. CNN community extracts the spatial capabilities to reap fixed- period characteristic vectors, and the LSTM community identifies the video contents primarily based totally at the enter characteristic vectors. This LSTM and CNN algorithms are used to educate the arm processor to perform the lip analyzing process. The dataset hired right here is encompass 7,18,018 examples that is used to understand the precise phrase spoken through the concern through assessment of unknown records with the educated dataset.



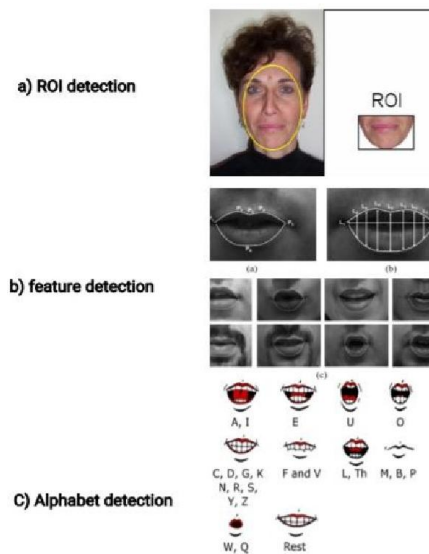
6. RESULT&DISCUSSION:

The AMI method is used to find out the frame where the movements are happening. Then the color model is used to extract red pixels(lips) from other pixels(eyes). The edge information can be obtained by applying LBP. Thegeometric features (width and height) canbe detected to extract the lip contour along with the edge information. Hence, the detection of ROI can be detected by using contour detection, colorinformation and geometrical features. The feature extraction is determined by geometrical features of lips, appearance of lips, texture of lips and hybrid featuresof lips. It is done by examining the area of mouth, teeth and it's contour. Also, various transforms such as DCT, DFT and DWT are used to perform the exact feature extraction by converting the image into number of pixels. An alphabetical word recognition is made bythe combination of implementing

CNNand LSTM algorithm with the help of using LRW dataset. Here, the CNN is used for extracting the required features and LSTM is used to classify the extracted feature. Finally, the output word recognition is done by comparison of trained LRW dataset with the image pixels (input sequence).

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BENEFITS:

The system was trained using 5000 hours from six different programs, which enables you to understand the exact word. Sometimes the audio and video were out of sync, by assuming most of the video was correctly synced to its input of video or audio. It analyzes a total of 118,000 sentences, a much larger sample than in previous research. It should be comprised no fewer than 17,500 unique words.

ADVANTAGES:

The Artificial Intelligence (AI) annotated 46.8% of all words without any error but the professional lip readers can achieve only 12.4% of words without any error. The output of the system contains more efficient, accurate and reliable information. The deaf or hearing-impaired people will get benefits by means of textual output provided by the artificial intelligence technology. Time consumption is low with higher resolution. No need of any external adjustment or manual correction. It will do all the procedures that requires. Advanced algorithms are used to interpret the result.

DISADVANTAGES:

If the computer doesn't consist a good CPU then the CNN training process takes a lot of time due to the presence of several layers. Also, high computational cost is required. LSTM require four linear layer per cell to run at and for each sequence time-steps. Linear layer of LSTM requires large amount of memory bandwidth to be compute.

FUTURE SCOPE:

The overall performance of lip studying may be elevated with the aid of using the usage of the mixture of various strategies of characteristic extraction in hybrid- primarily

based totally methods. The spatiotemporal facts may be discovered with the aid of using enforcing volumetric convolutions in place of 2D convolutions observed with the aid of using recurrent networks. By enforcing the records augmentation technique, there's an boom of education dataset.

7. CONCLUSION:

CNN and LSTM is used. The mouth ROI was first used to extract visual characteristics by CNN (VGG19). The sequence weights and sequence information between frame-level features are then learned using an attention-based LSTM. Finally, two fully connected layers and a SoftMax layer were used to achieve categorization. The experimental dataset was created by 30 people working individually, including three males and three females. On our own dataset, the experimental results reveal that, when compared to the general CNN-RNN model, the suggested architecture can effectively predict words from a succession of lip area images, and the suggested model's accuracy in the test dataset is 88.2 percent, which is 3.3 percent higher than the generic CNN-RNN.

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SYNTHESIS AND CHARACTERIZATION OF SILICA NANOPARTICLES WITH catharanthusroseusEXTRACT ON CORE FOR ANTI-CANCER APPLICATIONS

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ABSTRACT:

The International Agency for Research on Cancer (IARC) estimates that globally, **1 in 5 people develop cancer during their lifetime**, and 1 in 8 men and 1 in 11 women die from the disease. These new estimates suggest that more than 50 million people are living within five years of a past cancer diagnosis. **There are no cures for any kinds of cancer**, but there are treatments that may cure you. Many people are treated for cancer, live out the rest of their life, and die of other causes. Many others are treated for cancer and still die from it, although treatment may give them more time: even years or decades. Numerous natural products originated from herbal medicine exhibit anti-cancer activities, including anti-proliferative, pro-apoptotic, anti-metastatic, anti-angiogenic effects, as well as regulate autophagy, reverse multidrug resistance, balance immunity, and enhance chemotherapy in vitro and in vivo.

To provide new insights into the critical path ahead, we systemically reviewed the most recent advances on the key compounds with anti-cancer effects derived from herbal. In this work silica nano particles synthesized with C.roseus extraction to form core-shell nanoparticle and the properties like antifungal, antibacterial and anticancer are discussed.

KEYWORDS:

Catharanthusroseus, silicananoparticles, anticancer, core-shell, solgel and soxhlet method

INTRODUCTION:

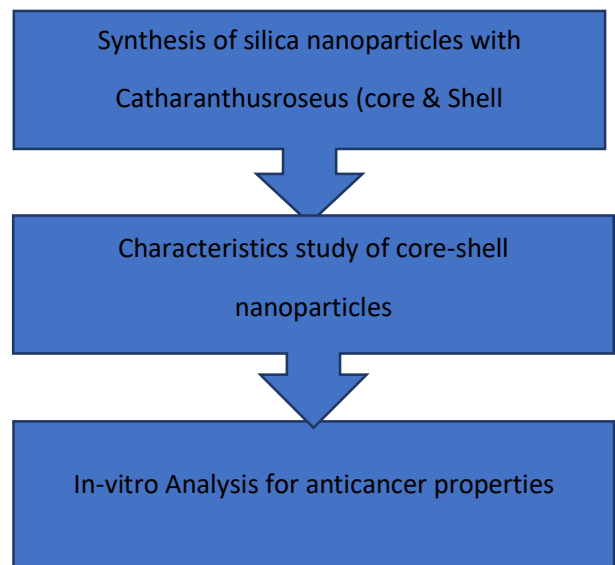
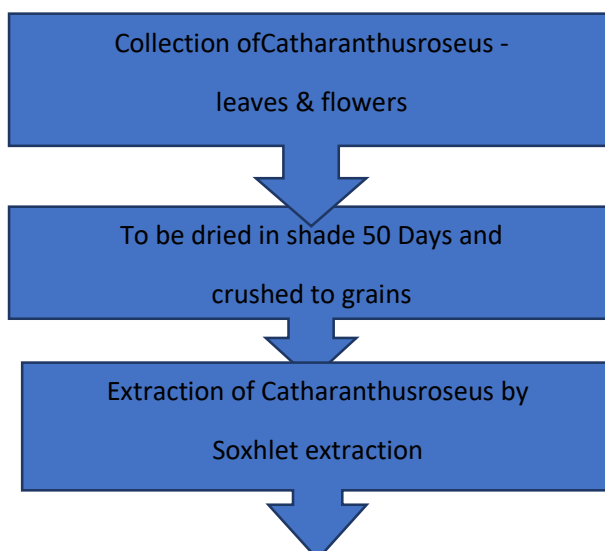
Nanomedicine and nano delivery systems are a relatively new but rapidly developing science where materials in the nanoscale range are employed to serve as means of diagnostic tools or to deliver therapeutic agents to specific targeted sites in a controlled manner. Nanotechnology offers multiple benefits in treating chronic

human diseases by site-specific, and target-oriented delivery of precise medicines. Silica nanoparticles (SiNPs) with crucial advantages such as large surface area, ease-of-functionalization, and biocompatibility, are one of the most commonly used nanoparticles in drug delivery applications. silica nanoparticles (SiNPs) have been proven to be a lucrative choice for many biomedical applications, especially cancer and antimicrobial therapeutics. In the context of bacterial infections, SiNPs and its variants can act as a powerful tool for the targeted delivery of antimicrobials, potentially reducing the impact of high drug dosage and its side effects. Silicon nanoparticles have distinctive physiological characteristics that allow them to enter plants and influence plant metabolic activities. The mesoporous nature of silicon nanoparticles also makes them good candidates as suitable nanocarriers for different molecules. So we'll hope that the idea will be a beacon of hope in synthesis of silica nanoparticles with catharanthusroseus for anti-cancerous applications.

OBJECTIVE:

Synthesis and characterization of silica nanoparticles with Catharanthus roseus extract on core for anti-cancer applications.

METHODOLOGY:

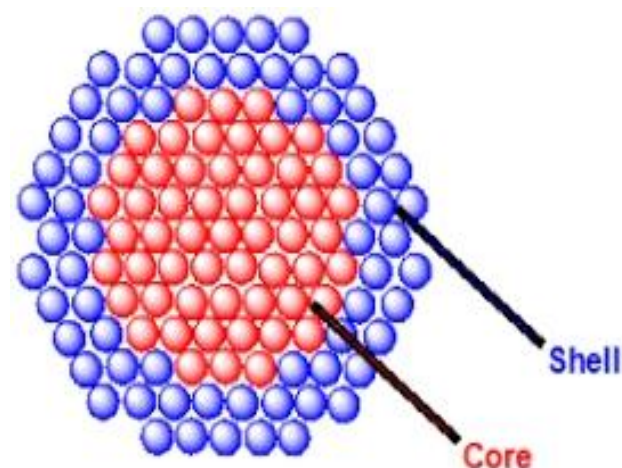


METHODS:

- ❖ Soxhlet method- To extract drug from Catharanthus roseus
- ❖ Solgel method - To prepare core shell nanoparticle

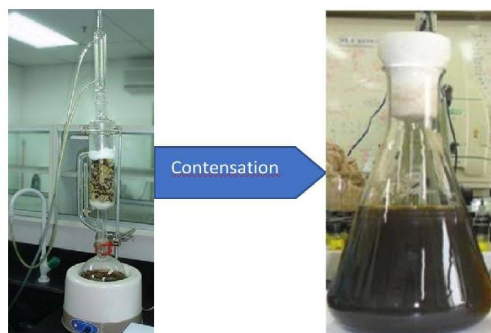
SOXHLET METHOD:

Roseus leaf is dried and then grinded into fine particles. 30gm of powdered C.roseus leaves and flowers are covered with filter paper and placed in the Thimble.



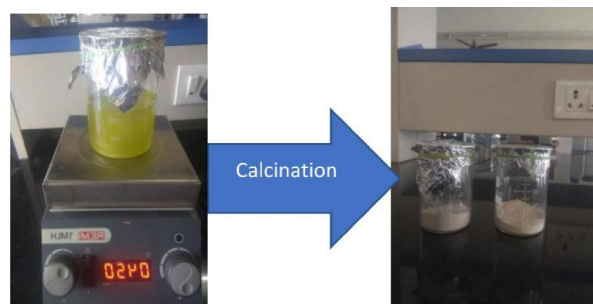
Ethanol is filled in the distillation flask as required. The setup is placed in heating

mantle at 70°C and boiled. Finally the C.roseus extract is obtained in boiling flask



SOLGEL METHOD:

Cantharanthus roseus extract is binded with surfactant (CTAB) under magnetic stirrer. TEOS is added into distilled water in separate beaker. The above two solutions are added together by stober process and mixed with acetic acid are kept under magnetic stirrer to form colloidal core shell particle. Calcination is done to produce powdered form structure.



CROSS SECTIONAL VIEW OF SYNTHESIZED CORE-SHELL NANO PARTICLE:

CORE- Chatharanthusroseusextract

SHELL - Silica nanoparticles

Characterization Study Of Core Shell Particle:

- SEM (Scanning Electron Microscopy)
- EDAX (Energy Dispersive Spectroscopy)
- Anti microbial study
- Invitro analysis

SEM (Scanning Electron Microscopy):

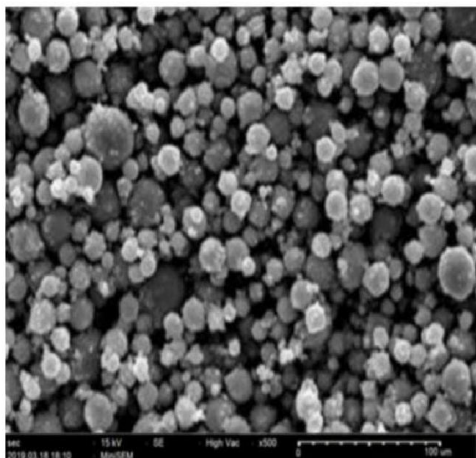
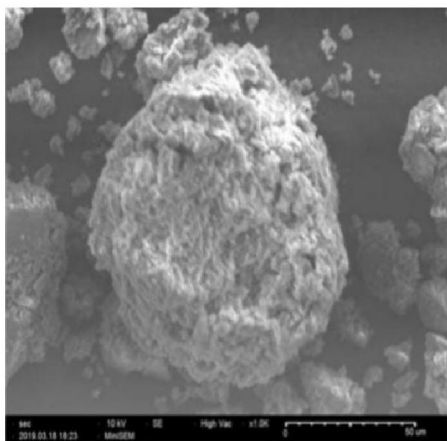


Figure (a)



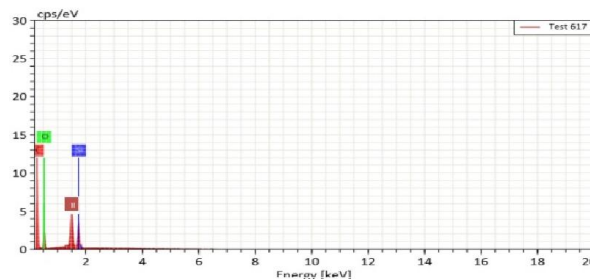
Figure(b)

Figure a) SEM image of synthesized nano particle at 100nm

Figure b) SEM Image of synthesized nano particle at 50nm

EDAX(Energy Dispersive X-ray Spectroscopy):

Elements C, H and O confirms the presence of organic compound (Leafextraction). Elements Si and O confirms the presence of Silica nano particles.



Antimicrobial Activity Test:

Antifungal Activity Test:

By disc diffusion screening as measured by zone of inhibition showed that synthesized core shell particles produced mean inhibition zone ranges are *Sclerotium rolfsii* - 35 mm, *Fusarium* - 27 mm, *Curvalaria* - 18 mm

Antibacterial Activity Test:

By disc diffusion screening as measured by zone of inhibition showed that synthesized core shell particles produced mean inhibition zone ranges are, *Staphylococcus aureus* ATCC 6538 – 2 mm, *E. Coli* ATCC 25922 – 0 mm, *Pseudomonas aeruginosa* ATCC15442- 10.

RESULT:

In-vitro analysis:

Silica Nanoparticles with *Catharanthus Roseus* extract was found cytotoxic at concentration of 5 mg/mL in HCT 15 cell lines in terms of viability under the tested conditions. Whereas, at concentrations of 0.039 to 2.5 mg/mL were found to be no cytotoxic in HCT 15 cell lines in terms of viability. Hence, above 2.5mg/mL was found to be

cytotoxic to HCT 15 under the tested conditions.

DATA TABLE:

Conc.(mg/mL)	%viability
NA	NA
NA	100.30
5	63.666
5	68.763
2.5	75.487
1.25	76.466
0.625	77.279
0.013	80.856
0.156	81.887
0.078	85.684
0.039	87.850

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ON:

Core shell formation with Silica nano particles and Catharanthus roseus extraction has synthesized. Antimicrobial test is made to confirm the antifungal and antibacterial properties. By means of in-vitro analysis our core shell nanoparticle with high concentration having high inhibition range of cancer cells. Based on these two tests, this could be used for anticancer applications.

FUTURE WORK:

Optimizing “Synthesized core-shell nanoparticles of silica with Catharanthus roseus extract” to enhance the cytotoxicity activity even at low concentration. Developed into final drug product and given to the hospital for both invitro and invivo analysis.

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TECHI-HAND

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ABSTRACT: The deficiency of hand work following a physical issue and removal of arm can seriously influence an individual's personal satisfaction. Fake hands are utilized to relieve the impairment. Preferably, any counterfeit hand ought to be fit for copying the regular hand as far as getting a handle on and holding objects of fluctuating calculations and actual properties. Notwithstanding, in spite of numerous long periods of examination, the most normally utilized prosthetic hand is the paw snare. Late mechanical advances and developments have prompted the improvement of modern counterfeit hands yet significant expenses and hardships of control have restricted the quantity of clients who can profit from these turns of events. More: significantly a large number of the counterfeit hands grown so far have neglected to resolve the issues of accomplishing adaptable handle and grasp. We will likely plan and foster a minimal expense fake hand that can be utilized to give adaptable handle. It very well may be constrained by an installed framework. Here we have utilized the water powered siphons to give solidarity to the prosthetic hand. The sensor gave in the hand detects the mechanical exercises of the hand. As the muscle contracts microcontroller faculties the potential which provides selective order to the counterfeit hand for determined activity. **Catchphrases:** Prosthetic hand, paw snare, microcontrollers, implanted frameworks, water driven siphons.

Key words:

Prosthetic hand, claw hook, microcontrollers, embedded Systems, hydraulic pumps.

INTRODUCTION:

Microcontroller and chip put a significant job in a wide range of control applications. Implanted framework is a mix of equipment utilizing a chip and the appropriate programming alongside some sort of extra mechanical or other electronic parts intended to play out a particular task. The installed framework puts an imperative job in this prosthetic hand.

The primary components for a deficiency of a furthest point are mishaps trailed by broad infections and wounds from war. For the individual the deficiency of an upper appendage brings about an extraordinary limitation of capacity and storage. Along these lines over the most recent thirty years an expanding number of crippled people have been given prosthetic hands that have the state of a human hand and that are impelled by a DC engine with decrease gear trains. Notwithstanding, studies on utilizing such counterfeit hands uncovered that 30 to half of the of the disabled people don't utilize their prosthetic hand consistently. The fundamental elements for the dismissal of regular prosthetic hands were:

Artificial Organs

An artificial organ is a human made organ device or tissue that is implanted or integrated into a human — interfacing with living tissue — to replace a natural organ, to duplicate or augment a specific function or functions so the patient may return to a normal life as soon as possible.[1] The replaced function does not have to be related to life support, but it often is. For example, replacement bones and joints, such as those found in hip

replacements, could also be considered artificial organs. Implied by definition, is that the device must not be continuously tethered to a stationary power supply or other stationary resources such as filters or chemical processing units. (Periodic rapid recharging of batteries, refilling of chemicals, and/or cleaning/replacing of filters would exclude a device from being called an artificial organ. Thus, a dialysis machine, while a very successful and critically important life support device that almost completely replaces the duties of a kidney, is not an artificial organ.

Heavy Weight:

Albeit business prosthetic hands have about similar mass as human hands they seem, by all accounts, to be unpleasantly substantial in light of the fact that a switch arm to the short stump of the cut away arm communicates the mass.

Low Functionality:

A human hand can play out a large wide range of grasp developments while regular prosthetic hands can just play out a solitary pincer-like hold development. Consequently the holding capacities are limited, so it is for instance difficult to get a pinball with the fake hand.

Financial Status:

The expenses of imported mechanized hands, in any case, are restrictive and it tends to be more than 3.00 lakhs. We are utilizing the water powered siphon for leaving the air for indicated activity. The servomotor drives the siphon.

FLOW CHART :

EMG Electrodes



Instrumentation Amplifier



Analog to Digital Converter



Micro Controller



actuators Hydraulic

EMG Electrodes:

EMG Terminals: EMG is an abbreviation of electromagnetic. These terminals are utilized to detect the electric field created on the muscles. The electric fields that happen in living tissue are brought about by charge partition.

Simple to Advanced Converter:

Simple to advanced converter: Signs from instrumentation enhancer are as simple. For precise control of fake hand we need microcontroller for calculations. For the most part microcontrollers are worked uniquely with advanced signs. So we need to change over signal from the instrumentation enhancer in to advanced structure through simple to computerized converter (ADC). In this task we utilize progressive guess kind of ADC.

Functional Controlling:

The 8051 is a minimal expense microcontroller and furthermore it has 4KB of glimmer memory, swindler and counters, and four ports separately. It simply get the double worth from the ADC and create control signs to the engines and get the criticisms from the sensors set in our fake hand.

Operation:

Three surface cathodes sense the muscle contraction voltages. The two surface cathodes will be mounted near one another over the muscle. The third anode is a ground reference. The instrumentation speaker is developed with high cmdp (common mode dismissal proportion). That is it has cmdp more than 60 db and an increase of 125 with an info impedance of 10 ohms. The instrumentation intensifier was picked on the grounds that it can extricate a tiny sign. Distinction between the two sign anodes (terminal 1 and 2) while significant lessening commotion, normal mode clamor and different signs normal. To both anodes be that as it may, something called movement antiquity can in any case happen due to relative movement between the cathodes and tissue.

Relative movement can create voltages adequate it soaks the second stage enhancer. The frequencies of the movement curio are generally at the low finish of the data transmission of the EMG signal accordingly, the 2 Hz high pass channel on the contribution of the second phase of the enhancer that follows can be used to lessen these antiquities. Now the EMG signal saw on the oscilloscope would resemble the accompanying. Where the huge abundancy blasts are related with muscle contraction.

Muscle Contraction wave form

This is a somewhat a high recurrence signal with parts between a couple of hertz and 250 hertz. To make this sign more valuable for control reason, we need to extract the envelope of the sign between 0v and it's most extreme positive. Abundancy we can achieve this with a rectifier and low pass channel. A typical silicon diode would not be palatable to correct the sign since it requires a 0.7v turn on voltage which is bigger than the abundancy of the information signal. Because the sign is tiny, we should utilize an accuracy rectifier circuit that all the more intently approximates the activity of an optimal diode. The accuracy amended EMG and the subsequent low pass filtered sign signal.

Flexible fluidic actuator:

Pneumatic and water driven actuators are of incredible viable significance in modern interaction control. They are utilized in a wide assortment of differential applications, like substantial businesses, mechanical designing, and transportation frameworks and in clinical designing. The benefits of these actuators are a hearty development, a powerful limit, a high dependability. Also, a sensible productivity. However, conventional actuators just have. Little adaptability in their mechanical development and significantly have restricted development. In this manner, another class of actuators has been created enjoying the accompanying benefits high adaptability planned into their mechanical development acknowledgment of extremely complex developments, lightweight development, exceptionally low assembling costs. This class of new actuators will be depicted.

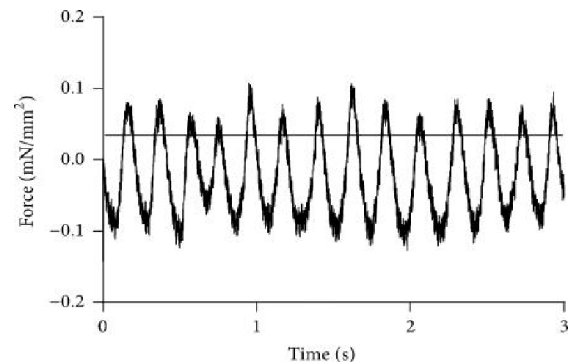
Mechanical Construction :

A solitary actuator component comprises of a taking care of channel for the compressed air or fluid and a "chamber" which is associated with the two mobile pieces of a joint. During the expansion of the actuator component via air/fluid the volume of the component extends and the stature of the component vertical to the adaptable wall of the chamber increments. This difference in distance between the contrary parallel surfaces is known as the extension conduct. During this interaction the volume energy is changed over into twisting energy.

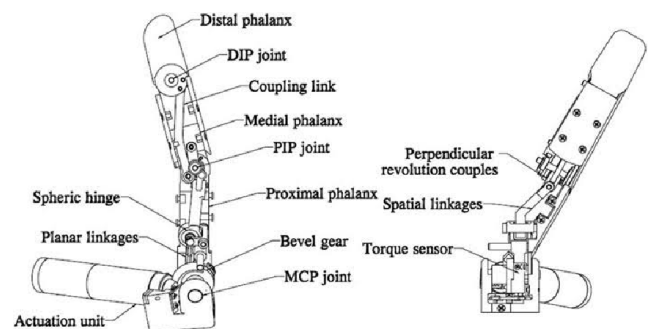
Mechanism and design:

An ordinary controlled prosthetic hand for the most part comprises of an energy source One or

two actuators, a simple control unit and the mechanical development all parts aside from the



myoelectric sensors and the energy source must be in the actual hand in light of the fact that in the attachment there is almost no space left. So, we incorporated an aggregate of 18 miniaturized adaptable fluidic actuators into the mechanical development of the fingers and the remainder of the hand our point was to emulate as intently as conceivable the calculation if a male grown-up human hand the new hand can be partitioned into two(+1 discretionary) areas.



Construction of Finger Self adaptability:

The adaptable fingers of the new hand can fold over objects of various sizes and shapes. In light of the flexible properties of the actuators the contact power is spread over a more prominent contact region. Additionally the outer layer of the fingers is delicate and the silicone-elastic glove that covers the fake hand builds the rubbing coefficient. The outcome is a decreased grasp power is expected to hold an article. As an incidental effect from the delicate quality and flexibility of the hand it feels more regular when contacted than a hard mechanical hand and the danger of injury in direct association with different people is limited.

Conclusion:

In this paper the concept and design of the prosthetic hand are presented. It is able to grasp many different objects and the movements appear to be nearly natural. The motions are based on flexible actuators. All of these are very compact and lightweight actuators have been integrated completely into the fingers of the artificial hand. The palm of the hand remained empty and provides enough space for a micropump. Because of the self-adapting features of the fingers many different objects can be grasped without sensory information from the hand. This enables the development of a low mass prosthetic hand with high functionality. A batch production for several expositions of the new hand proved the function to be reliable.

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SPLICE CONNECTION USING RAILWAY STEEL TRUSS BRIDGES

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Abstract— Structural steel has many advantages over other construction materials by its high strength and ductility. It has a higher strength to cost ratio in tension and a slightly lower strength to cost ratio in compression when compared with concrete. Thus, structural steel is an efficient and economic material in bridges. This paper is intended to design and evaluate the steel truss bridge experimentally by using splices. A typical Warren truss bridge is designed for the single lane railway traffic with the total length of 49 m. In which the truss members designed are further reduced by connecting with splices. This makes the truss structure more efficient and able to withstand seismic forces by reducing the base shear up to 27%. The increase in load carrying capacity is also examined experimentally with minimum deflection using splice connections.

Keywords— steel connection, splice connection, railway bridges, steel joint seismic

I. INTRODUCTION

The bridges are the structures, which provide means of communication (viz., passage) over a gap. The rivers, canyons and valleys form natural gaps. The railway and highway crossings, highway and canal crossings form artificial gaps. These are constructed to carry highway traffic are known as highway bridges (road bridges). The bridges built to carry railway traffic are known as railway bridges (rail bridges). The bridges used pedestrians are known as foot bridges. Some bridges which carry canals and pipe lines and these bridges are known as aqueduct bridges. These are constructed over busy localities to carry the vehicular traffic over the area keeping the continuity of activities are called as viaducts. Though the recent version of the code, IS 800:2007, contains provisions for design and detailing for seismic loads, it does not suggest the type of connections which are suitable for high or intermediate seismic zones.

II. AIM OF THE PROJECT

The aim of the project is to resist the effect of seismic force in steel truss bridge using splice connection.

III. MATERIALS USED

A. Steel Section:

Steel sections of ISMC 100 and ISMC 75 with the modulus of elasticity 200 Gpa are used and their thermal expansion is about $11.07 \times 10^{-6}/^{\circ}\text{C}$.

B. Splice Plate:

A thick steel plate is used to make the connections between the structural steel members.

C. Bolts and Nuts:

The grade 4.6 bolts have an ultimate material strength of 400 N/mm² and the yield (or proof) stress is 60% of the ultimate strength and nuts are used.

IV. RESULTS AND DISCUSSION

A. Experimental and software analysis of a Specimen with and without splice connection

For the testing the trusses are made from the ISMC 100 and ISMC 75 channel sections. According to the design characteristic the splice connections are fabricated with bolted connections. The experimental testing is made done in the Computerized Universal Testing Machine of capacity 1000 kN. Experimental investigation of steel truss bridge without splice connection shown in figure 1. and with splice connection as shown in figure.2



Figure 1 without splice connection**Figure 2 with splice connection**

B. Load carrying capacity in kN for with and without splices in experimental investigation

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection. The obtained results shows that the load carrying capacity of the section with splice connection is twice than the without splice section. As shown in Figure.3 and table .1

Table 1 Load carrying capacity for with and without splices in experimental investigation.

Trusses analysis	SPLICE DETAIL	LENGTH			
		7 m		0.7 m	
Experimental investigation	WITHOUT	LOAD(kN)	DEF(mm)	LOAD(kN)	DEF(mm)
	WITH	726	198	21.6	134
Software investigation	WITHOUT	1656.69	160.2	48.3	93.12
	WITH	617	87.5	94	17.2
	WITHOUT	824	52.12	112	16.2
	WITH				

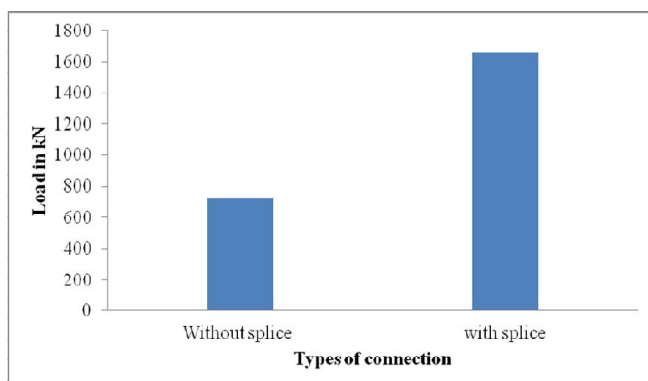


Figure 3 Load carrying capacity for with and without splices in experimental investigation.

C. Load carrying capacity in kN for with and without splices in software investigation.

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection. The obtained results shows that the load carrying capacity of the section with splice connection is 17.67 increased than the without splice section. As shown in Figure.4 and table 1.

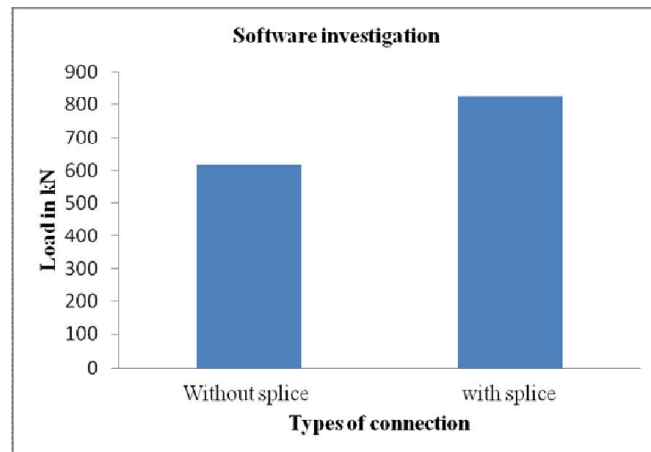


Figure 4 Load carrying capacity for with and without splices in software investigation

D. Load carrying capacity in kN for with and without splice connection in experimental and soft ware investigation

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection in experimental and soft ware investigation.

In experimental investigation of with and without splice connection, the load carrying capacity is increased twice and 17.67 % compare with software analysis in both with without splice connection as shown in figure 5 and table 1.

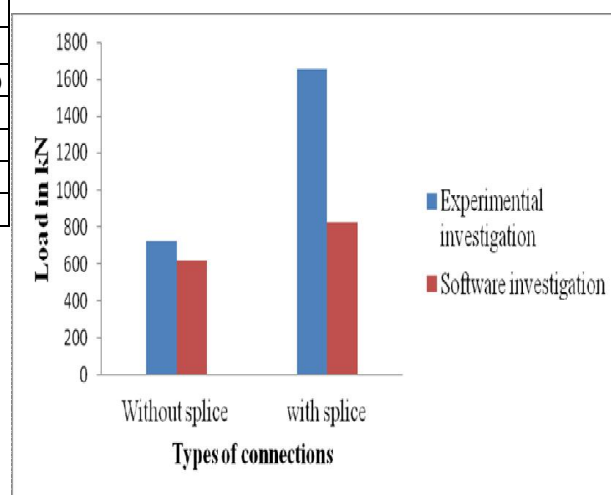


Figure 5 Comparison of load carrying capacity in with and without splice connections

E. Deflection in mm for with and without splices in experimental investigation

The test is carried out by taking the deflection of the steel members with and without splice connection. The obtained

results shows that the deflection of the section with splice connection is 23.59% less than the without splice section. As shown in Figure.6 and table 1.

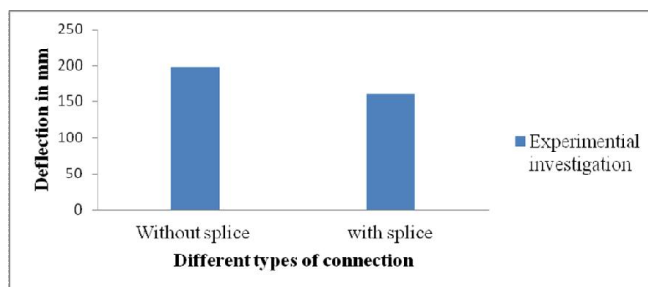


Figure 6 Deflection for with and without splices in experimental investigation

F. Deflection in mm for with and without splices in software investigation.

The test is carried out by taking the deflection of the steel members with and without splice connection. The obtained results shows that the deflection of the section with splice connection is 67.39% less than the without splice section. As shown in Figure.7 and table 1

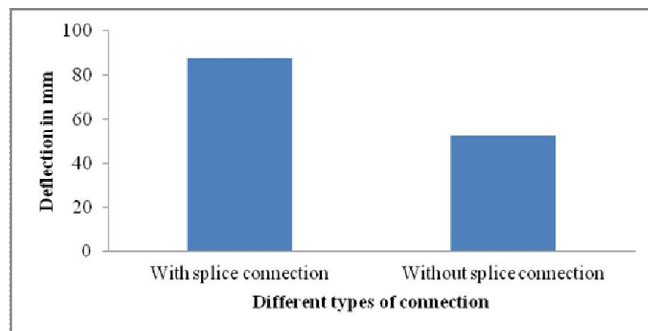


Figure 7 Deflection for with and without splices in software investigation

G. Deflection in mm for with and without splice connection in experimental and soft ware investigation.

The test is carried out by taking the deflection of the steel members with and without splice connection in experimental and soft ware investigation.

In experimental investigation of with and without splice connection, the deflection is greater than the software investigation compare with both in with without splice connection as shown in figure 8 and table 1

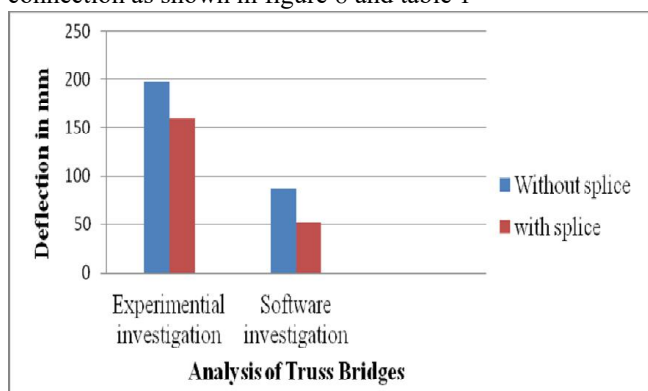


Figure 8 Comparison of deflection for with and without splice connections

V CONCLUSION

In this project the design of warren truss bridge was carried out with the calculations and assumptions taken from the review of literatures and also by the bridge rules, Ministry of Indian Railways.

The various truss members are analyzed including top chord, bottom chord and inclined members from the initial analysis using influence line diagrams.

Stringers and cross girders with the top and bottom lateral bracing are also analyzed with the obtained wind load acting on the truss members.

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A NOVEL APPROACH FOR FEATURE SELECTION IN BIG DATA USING MVDE

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Abstract

multi-variant differential evolution (MVDE) is a new population-based stochastic search strategy that is compared to four popular optimization methods for addressing fifteen well-known real-world problems from the UCI collection. The MVDE provides a new self-adaptive transformation function based on trigonometric and logistic statistics as a practically factor-free optimization strategy. Feature selection decreases the number of features by eliminating irrelevant or misleading, noisy and redundant data which can accelerate the process of classification. We are introducing a new feature selection approach relying on the MVDE method and a multilayer perceptron, which allows MVDE to produce a combination feature set, increase accuracy rate, and simultaneously optimize the structure and weights of a ANN.

INTRODUCTION

Artificial Neural Network (ANN) have been widely used in scientific problems and have attracted many researchers as the most popular tool for pattern classification, regression, and recognition due to its nonlinearity. The most challenging matter in ANN models is the selection of the appropriate weights, number of layers, and number of nodes in each layer.

The complexity of the network is affected by the number of layers and nodes, so the difficulty for the training process will be increased. Therefore, selecting the suitable ANN model is required which should not be very small network that has a limited potential to be able to characterize the real state nor a large network which doing complex training process and may provide noise in the training data and thus cannot represent superior capability.

Feature selection (FS) supplies a way to reduce the number of features from a large number of available features to capture better classification performance than using all features by removing or reducing irrelevant and redundant features. Meta-heuristics have been very dependable for solving diverse optimization problems in the last two decades and overcoming the challenging problem of searching optimal subset from all the original set. A new FS approaches were generated based on evolutionary optimization techniques since they can lead to a faster way to find optimal solutions. Moreover, by considering an effective fitness function a high dimensional data can be managed by limited number training samples. Whereas the complete search generates all possible solutions for the problem, meta-heuristics present outstanding performance compared to other conventional search techniques.

In recent years, several meta-heuristics have been utilized by many researchers in the field of optimization to search feature subset space for selecting optimal feature set. The strategy of meta-heuristic may determine a satisfactory solution in a reasonable time in spite of it doesn't assure finding the best solution in every run. These algorithms showed superior performance in solving many practical problems which can be original, modified, or hybrid algorithms. In spite of the advantages of the heuristic algorithms for feature selection on classification problems, we may need another new heuristic algorithms. The theory of No-Free-Lunch (NFL) illustrates that all the optimization problems cannot be solved by one optimizer. Thus, all classification/feature selection problems cannot be solved by only one of the heuristic feature selection methods and there is always a possibility to improve the current methods to solve better the current new classification/feature selection problems

Cat Swarm Optimization (CSO)

The Cat Swarm Optimization algorithm has two modes: searching and tracing. The number of cats is determined at the start of the iteration, and cats are distributed randomly in M-dimensions space. Then using cats to solve the problem, with each cat having a location, velocity for each dimension, fitness value, and a flag indicating whether the cat is searching or tracing. The cat who comes up with the best answer will be in the best place. The optimal solution will be held at the end of the iterations.

Whale Optimization Algorithm (WOA)

The first stage of this algorithm consists of encircling prey and spiral updating position, while the second stage consists of encircling prey and spiral updating position (exploitation stage). A random search for prey is carried out in the second level (exploration stage).

Initially, arbitrary solutions are used to assign whales, and the minimum or maximum value of the objective function is considered to be the best optimal value based on the problem being solved. The objective function search agents are then determined. Every iteration, each search agent adjusts its location by depending on the best solution or a random choice search agent.

Sine Cosine Algorithm (SCA)

The SCA algorithm began with a series of arbitrary solutions. The objective function, which is at the heart of this system, was used to develop it by calculating this arbitrary set and rules set on a regular basis. It consists of two phases: in the first (exploration phase), the optimization method combined the arbitrary solutions in the solutions set to find the encouraging search space areas. During the exploitation process, random solutions were gradually modified. Furthermore, arbitrary differences were significantly reduced compared to the first phase.

Differential Evolution Algorithm (DE)

It's one of the most widely used evolutionary algorithms for resolving global optimization issues. It is a population-based stochastic optimization algorithm. It was created with the aim of optimizing real-valued functions and real-valued parameters. Randomly initialize a population of candidate solutions for the optimization problem to be solved. New individuals are produced for each generation of the evolution process by using crossover and mutation. Effective solutions from the previous generation are incorporated through the recombination of the target individual with the mutant individual to construct the trial individual.

METHODS AND METHODOLOGIES

The differential evolution (DE) algorithm is a promising technique for dealing with complex elevated situations while improving search quality. The DE algorithm was chosen as a search engine because it outperforms other conceptual approaches in terms of resilience, effectiveness, and speed of resolution for solving large-scale issues.

A new algorithm known as Multi-Variant Differential Evolution (MVDE) has been proposed as a nearly parameter-free optimization technique in this regard. The suggested method was created primarily to improve the original DE's worldwide search capability, minimizing the likelihood of capturing in local optimization and prevent early divergence. The suggested MVDE maintains population variety during the optimization problem by combining five alternative mutation algorithms with two large random coefficients (based on cosine and logistic distributions). This prevents premature closure. Furthermore, the suggested adaptive crossing incorporates adaptive selection to eliminate the need for control input adjustment. This paper proposes a novel optimization approach that optimizes both the weights as well as the structure of the ANN at the same time by presenting a new answer representation. The suggested technique comprises two key phases: organization optimization and weighting updating. However, the suggested MVDE method with multiple variant alteration and dynamic scaling factor was created to select the ideal amount of characteristics for categorization, that has an impact on classifier. Therefore, the suggested MVDE is provided to address the above-mentioned disadvantages of DE. In order to avoid convergence rate, various five mutation techniques will be utilized in addition to two high random coefficients based

upon cosine and exponential distributed to maintain population variety during the optimization procedure.

Algorithm 1: MVDE algorithm

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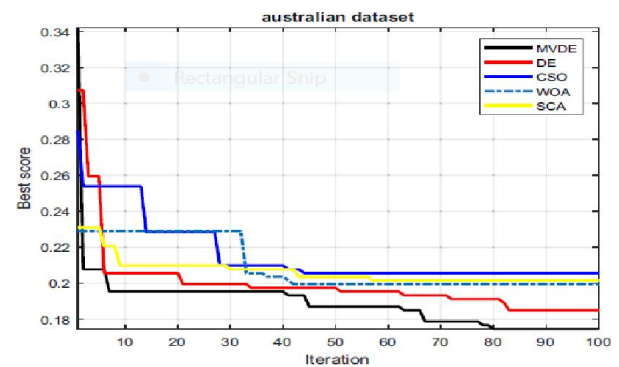
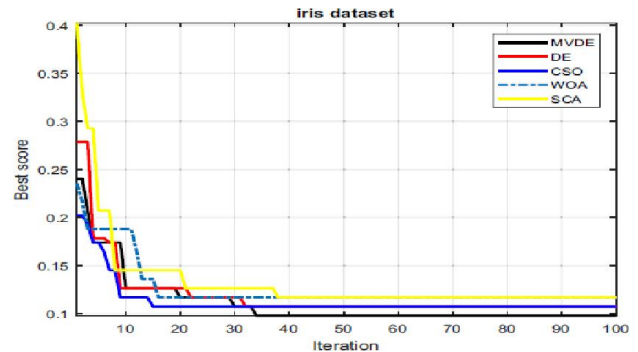
1: Generate a uniformly distributed random initial population including  $n$  solutions that contain  $d$  variables using:
 $x_{ij} = x_{ij}^{min} + rand[0, 1] \cdot (x_{ij}^{max} - x_{ij}^{min})$ ;
2: Compute  $X_{best}$ 
3: While termination condition is not satisfied
4: For  $t=2$  to  $g$ 
5: Slope =  $t/2g$ ; // mutation
6: for  $i < n$ 
7: If  $rand > 3 \cdot Slope$ 
8:  $F_{ij} = F_{ij} \cdot Ind_{ij}$ ;
11: End if
12:  $CR = g/(2G)$  // crossover
13: If  $CR > Slope$ 
14:  $F_{ij} = CR \cdot F_{ij}$ ;
15: Else
16:  $N_p = n \times (1 - CR)$  // selection
17: End if
18: If  $t < 0.2 \cdot g$ 
19:  $X_{1,g} = x_{1,g} + F \cdot (x_{2,g} - x_{1,g}) + F \cdot (x_{4,g} - x_{5,g})$ ; // DE/rand/2
20: Else
21: If  $t < 0.4 \cdot g$ 
22:  $X_{1,g} = x_{1,g} + F \cdot (x_{2,g} - x_{1,g})$ ; // DE/rand/1
23: Else
24: If  $t < 0.6 \cdot g$ 
25:  $X_{1,g} = x_{1,g} + F \cdot (x_{best,g} - x_{1,g}) + F \cdot (x_{1,g} - x_{2,g})$ ; // DE/target-to-best/1
26: Else
27: If  $t < 0.8 \cdot g$ 
28:  $X_{1,g} = x_{best,g} + F \cdot (x_{1,g} - x_{2,g}) + F \cdot (x_{3,g} - x_{4,g})$ ; // DE/best/2
29: Else
30:  $X_{1,g} = x_{best,g} + F \cdot (x_{1,g} - x_{2,g})$ ; // DE/best/1
31: End if
32: End for
33: Return the best solution

```

Multi variant Differential Algorithm

RESULTS AND DISCUSSION

Classification problems are implemented using MATLAB R2017a software on Windows 10 and executed on a PC with an Intel Core i7-5600U processor of 2.6 GHZ 8.0 GB. The maximum number of iterations is set to 100 and the population size is set to 40.



Convergence curves for datasets by different optimizers

Table. 1. Classification accuracy of different optimizer

Dataset	MVDE (%)	DE (%)	CSO (%)	WOA (%)	SCA (%)	PSO (%)
Iris	95.556	94.074	95.556	92.593	92.593	87.407
Australian Credit	88.245	88.406	86.473	85.99	87.762	76.49

CONCLUSION

This work presents a novel optimization algorithm (MVDE), which has multi variant mutation with adaptive scaling factor is developed by integrating adaptive crossover rate with mutation factors and adaptive selection of parent to achieve better performance. The performance of the MVDE algorithm is verified using fifteen real world problems to ensure its stability, quality, and simplicity. The investigative results infer that the MVDE optimization method is a useful and an appropriate technique to classify data and can move to a particular group of benchmarks. The results also investigate the ability of the MVDE algorithm for dodging the local minima better than the compared DE, CSO, WOA, and SCA methods. The performance of the selected features is promising and better for the features selected by the MVDE.

Furthermore, the superiority of the MVDE performance is obviously detected for training ANNs in terms of evaluation metrics.

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A SMART HEALTHCARE SYSTEM FOR THE IDENTIFICATION AND MONITORING OF COVID19 UTILIZING THE INTERNET OF THINGS AND CLOUD COMPUTING

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Abstract

An automatic COVID-19 detection system based on computed tomography (CT) scan or X-ray pictures is effective, but the construction of a robust system is difficult. In this work, we suggest an intelligent healthcare system that incorporates Internet of Things (IoT) and cloud computing technologies. Real-time tracking of patient status is provided by the intelligent system, which also provides dependable, on-time, and high-quality healthcare services at a reasonable cost. COVID-19 detection tests are carried out with the help of DL in order to determine the feasibility of the proposed system. We evaluate the resilience and efficacy of the proposed system using two publicly available benchmark datasets (Covid-CT Scan dataset). In order to train the suggested system, pictures from 80 percent of the datasets were used. Using these data points, it can be concluded that the suggested system has an accuracy of 98.5 percent, a sensitivity of 97.3 percent, an accuracy of 98.2 percent, and an F1-score of 97.87 percent, among other characteristics. The results of the comparison demonstrate that the suggested system outperforms the already available state-of-the-art systems. The suggested approach will be beneficial in medical diagnosis research as well as in healthcare systems, according to the authors.

Keywords— COVID-19, IoT, medical diagnosis, healthcare

I. INTRODUCTION (HEADING I)

Since December 2019, a new coronavirus (COVID-19) has spread from Wuhan, China, to many other nations, including the United States. Over 73.6 million confirmed cases have been reported as of April 18, with more than 1.64 million fatalities reported worldwide [1] as of that date. Because there are currently no preventative vaccinations or treatments available for COVID-19 illness, early identification are extremely important in ensuring that the patient has the best chance of being successfully isolated. It lowers the chance of infection in people who are otherwise healthy. The reverse transcription-polymerase chain reaction (RT-PCR) or gene sequencing for respiratory or blood materials were employed

as the primary COVID-19 screening techniques [2]. In contrast, the total RTPCR positive rate for samples of throat swabs is predicted to be between 30 and 60% [3], resulting in undetected people who infect huge populations of otherwise healthy persons. Chest X-ray imaging, which is also utilized for pneumonia diagnosis, is a straightforward approach for making a rapid diagnosis of illness. In addition, chest computed tomography (CT) scanning offers greater COVID-19 diagnostic sensitivity [4], whilst chest X-ray pictures give visual indices linked to COVID-19 [5], both of which are advantageous. Multilobar involvement as well as peripheral airspace opacity has been observed on chest imaging reports. Ground glass (57 percent) and mixed attenuation (29 percent) are the opacities that have been seen the most frequently [6]. Gravel patterns are seen on the edges of pulmonary arteries, in places that are difficult to distinguish visually, during the early phase of COVID-19. COVID-19 [8] has also been shown to have diffuse airspace opacities or asymmetric patchy [8]. Only highly trained radiologists are capable of detecting such minor abnormalities. Because of the large number of suspicious individuals and the limited number of qualified radiologists, efficient and robust automated systems for detecting such diseases will aid in the diagnosis process and increase early detection rates with high precision, thereby improving early detection rates. Automated systems that are based on machine learning (ML) are excellent tools for dealing with such issues. The Internet of things (IoT) has progressed from the connectivity of embedded computer systems to the interconnection of intelligent sensing devices during the last several years. However, in the context of a smart city, it has the potential to create issues such as limited processing capacity and limited storage capacity. Cloud computing, on the other hand, provides storage as well as quick processing. The Internet of Things and cloud integration are therefore necessary to deal with the very demanding field of intelligent

health care [9]. Intelligent healthcare systems have traditionally been built around the concepts of patient surveillance and real-time communication as its central concepts. However, the need for a cognitive system based on Internet of Things (IoT) cloud technology that provides patient-centered, high-quality intelligent health care at a reasonable cost is growing. Artificial intelligence (AI) and deep learning (DL) approaches are being used to incorporate human-like intelligence into intelligent health frameworks at an opportune moment. Recently, the Internet of Things (IoT) and cloud technologies have seen tremendous advancements, allowing for the delivery of intelligent healthcare services in real-time. With the integration of the Internet of Things and the cloud, there is a great demand for a smart and intelligent healthcare system that delivers a smooth and quick response. Cognitive behavior and decision-making can be improved with the use of DL and AI. In addition to smart sensor equipment, smart city stakeholders may make use of advanced electronic applications and technological advancements. Medical experts and hospitals are difficult to locate and access in a smart city setting, even though the environment is becoming increasingly sophisticated. Critical patients frequently require a rapid response and immediate treatment in order to save their lives. As a result, data collected from patients must be sent and analyzed as quickly as possible, and the results must be accurate enough to be utilized by medical experts for first assessment.

As a result, an intelligent healthcare system is required that can address the issues listed above while also making use of the technologies and services accessible in a smart city setting. The healthcare business is also one of the most rapidly developing markets, with high demand for products and services. It not only provides vital services to patients, but it also generates considerable revenues for the healthcare industry. As a result of technological developments, we require a healthcare system that is capable of making intelligent decisions. Furthermore, several academics have attempted to integrate cognitive behavior in the creation and implementation of intelligent Internet of Things frameworks [10, 11]. Given the fact that healthcare frameworks are multimodal and include intelligent decision-making, cognitive behavior is becoming increasingly essential in healthcare [11]. In a smart city concept, the smart healthcare system employs Internet of Things sensors attached to or surrounding a patient to gather data such as pictures, gestures, voice, EEG, ECG, and body temperature and determines the patient's status based on that data. In addition, the system assesses all health parameters and determines when an emergency reaction or advanced medical care is required, among other things. In addition, the system keeps all interested smart city stakeholders informed of changes in patient condition and monitoring outcomes. However, without cognitive functions, the concept of smart health care remains ambiguous, and the potential of smart city services can never be fully realized without such understanding. As a result, researchers are currently putting out significant efforts in this direction [10]. In [9], the authors discussed the difficulties of employing smart cloud computing sensors for smart health care in a smart city

setting, and they provided examples of their work. In order to assure the quality of smart health care, environmental factors such as humidity and temperature must be regulated. Several researchers used the Internet of Things (IoT) and the cloud to access medical information and follow the status of patients [11]. It is also standard practice to investigate patient diagnosis based on CT scans for use in smart healthcare applications. In the case of an emergency, they will require immediate response. Any delay in providing care, as well as the absence of skilled doctors, can be detrimental to people who require it. A smart healthcare system that keeps track of the health condition of patients is consequently essential for people who fall into this category. However, in order to be accurate, every such gadget needs to be clever and mature in its design. Specialized physicians may have access to data and patient information, and they may provide counsel and suggestions on a regular basis to their patients. Patients may be given with travel systems, such as smart ambulances, or mobile support, such as smart clinics, in the event of an emergency situation. In order to address the issues raised above, we suggest a smart healthcare Internet of Things architecture for the detection of COVID-19. The suggested technique divides patients with COVID-19 into two groups: COVID normal subjects and non-COVID normal individuals. It makes use of CT scan pictures supplied by Internet of Things sensors. The pictures are sent to the cloud for further analysis by the system, which is powered by sensors. After being transmitted to the deep learning cognitive module, which analyzes data in real time and predicts future tasks and courses of action based on the patient's condition by performing COVID-19 detection, the photos are returned to the user. The cognitive structure then collects the whole processed outcome and comes to an agreement on an emergency reaction before sending the findings to the various stakeholders involved for additional consideration and consideration. On the cloud, the CT scan picture is processed and classified as normal or as COVID-19 based on its findings. At the end of the process, medical personnel will examine the findings and keep track of the patients. If the patient requires emergency treatment, it is possible to identify the best course of action.

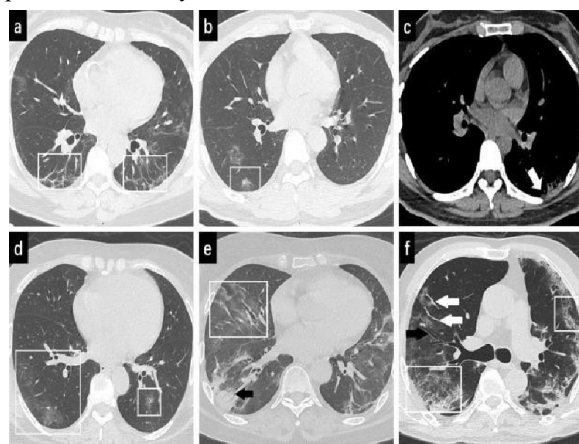


Fig. 1. (a, c, and e) There are three images connected to COVID-19 and three areas in the images infected by COVID-19 (b, d, and f).

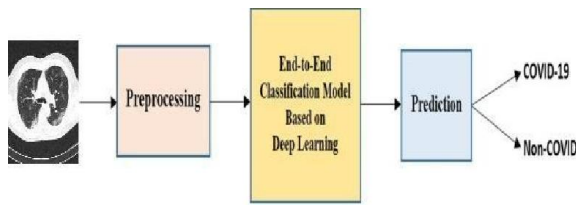


Fig. 2. Proposed Architecture

The two techniques described above resulted in the creation of a network of pictures that were readily available and the achievement of excellent performance on 1200 photographs. Because of the low number of pictures available for COVID19, we additionally compute the confidence interval (C.I.) for the performance measures. The receiver-operating characteristic (ROC) curve of the ResNet50 model is also calculated in order to determine the performance of the model. As a result, in a smart healthcare setting, the proposed system employs deep learning for feature extraction and classification from CT scan pictures. The following are the most significant contributions made by this study:

- (1) A smart healthcare framework for the integration of Internet of Things (IoT) and cloud technologies was proposed.
- (2) Constructed a dataset containing 6000 pictures. An experienced radiologist labels the COVID-19 pictures, and they are exclusively utilized for research purposes, as shown by a visible mark on the image.
- (3) In this challenge, the state-of-the-art ResNet50 CNN model was used to distinguish COVID-19 patients from non-COVID normal participants using a CNN model. We trained the ResNet50 model on 4800 photos and then evaluated its performance on 1200 images to see how well it performed. This technique has demonstrated accuracy of 98.6 percent, sensitivity of 97.3 percent, specificity of 98.2 percent, and an F1-score of 97.87 percent, all of which are significantly higher than the industry standard.
- (4) A thorough experimental study was carried out. The histogram of predicted scores, the ROC curve, the accuracy, the sensitivity, the specificity, and the F1-score are all used to achieve this goal.
- (5) In order to better understand the characteristics that distinguish between the two groups, the tSNE plot was used.

II. RELATED WORKS

In this section, we will discuss the research projects that have been conducted in the areas of smart health care and COVID-19 detection. In recent years, cognitive smart health care has transformed healthcare systems, particularly in the context of smart city applications. The Internet of Things (IoT) and integrated smart healthcare sensors, in conjunction with cloud technologies, have transformed the concept of smart health care. Online patient monitoring and observation, smart sickness diagnosis, emergency

management, mobile health care, smart health records, smart alarms, smart drug delivery, and remote service and control of medical equipment are some of the healthcare apps available. Such gadgets will be useful in medical situations since they will provide a quick reaction. It is connected to a number of smart healthcare sensors located both inside and outside the human body, allowing it to receive and track multimodal data in real-time as it is collected. To increase connection in these cognitive health frameworks even further, several researchers have turned to 5G technologies [24]. Moreover, they coupled cognitive health programs with artificial intelligence technologies, such as Kinect, which has become increasingly popular for behavior identification. In the literature, several cognitive Internet of Things systems for diverse areas have been reviewed. In [25], it was claimed that a cognitive system might be used to make smart city modeling more sustainable. [26]. Describes a multilayer cognitive system, which demonstrates a high degree of intelligence for human behavioral cognition as compared to other cognitive systems. [27] proposes another another cognitive simulation system for human intelligence that can process relative information and is capable of processing relative knowledge. There has been some discussion on the suggested cognitive paradigm based on NLP, which has the ability to answer questions [25]. [28] describes how researchers utilized cognitive activities to assess huge amounts of data. It is now possible to apply cognitive intelligence into healthcare applications, such as psychological [24] and physiological [29] applications. [30] describes a computational architecture that is emotionally aware and takes advantage of cloud computing to do this. [26] has proposed an emotional cognitive structure that recognizes facial expressions, while another framework [29] has been proposed that detects emotions using facial expressions. Smart healthcare systems have lately attracted a great deal of attention because to the enormous economic and social benefits they provide. Smart health care has benefited from the development of several academic research [25], frameworks [31, 32], and services [26, 33] based on Internet of Things cloud convergence. In [10], it was recommended that a smart healthcare system be implemented to assist patients and hospitals by utilizing smart technology. The gathering and storage of electronic health records have been proposed in a number of research [26]. To follow the activities of diabetic patients, a smart cognitive system for glucose control has been proposed in [28] to track their thoughts and actions. Also proposed in [33] was a cognitive ambulance, which would be controlled by robots and would be utilized for the treatment of cardiac patients in need of immediate help. Some methods for medical forgeries have already been discovered in the field of smart health care [34], and they are being investigated further. In [35], the researchers investigate the relationship between climatic factors (pressure, humidity, temperature, and wind speed) and COVID-19 risk in either an urban or rural setting. The goal of the research is to complement the possibility of a high risk for COVID virus in the places where it is anticipated that it would occur in the district with knowledge of climatic and socioeconomic factors in the

areas where it is anticipated that it will occur in the district. For example, the authors presented a lightweight and safe technique for key and secret authentication between nodes in order to enhance protection in the Internet of Things architecture in [36]. The effectiveness of the MASK protocol was evaluated through official and informal security assessments. The sensor node's security against both hard and non-deductive assaults has been demonstrated by the MASK protocol's investigation. They developed an efficient technique for integrating two current testing methods for WSN packet routing and surveillance into IoT networks by recovering new media compression standards, video high-efficiency high coding, and implementing them in IoT networks [37]. (HEVC). Performance evaluation indicates that the suggested system's potential as a measure of three competing concerns: consumer safety, media protection, and sensor node requirements demonstrates that it has great promise. According to the authors of [38], they devised a unique approach for security watermarking pictures in smart cities that makes use of CNN. They utilized an unique neural network method that included synergetic learning, which was developed by the researchers. The ideal PSNR ratio is attained by the suggested model, which performs much better than the results produced by the current model. A potential new stable network design based on sixth-generation wireless technology is described in [39], and the authors hope to implement it in the future (SBs). The goal of this project is to build a unique and robust caching device for use in a wireless network that is suitable for use in the Internet of Things with huge amounts of data.

III. FRAMEWORK FOR SMART HEALTHCARE

The proposed IoT-cloud-based smart healthcare frameworks as well as the COVID-19 detection technique are discussed in this part.

A. Smart Intelligent Healthcare

In order to operate in the context of a smart city, intelligent healthcare frameworks are being developed. It enables physicians, stakeholders, and residents to monitor their own health through the use of intelligent sensor devices. They can access electronic health information at any time from any location, thanks to cloud and Internet of Things technologies. Decisions are correct and intelligent when cognitive capability is present. The cognitive system analyzes, analyses, and combines information in real-time, allowing patients to select the most appropriate treatment option for their situation. Health data are uploaded to the cloud and made available to medical practitioners who may use them to give appropriate counseling to patients. The most important goals of a smart healthcare system are accurate diagnosis at a cheap cost, lowering patient costs as much as possible, providing rapid access, and improving overall quality of life. In order to achieve these objectives, we propose a healthcare system that is based on Internet of Things (IoT) and cloud technologies. Residents of a smart

city must register in order to use the city's utilities, which includes its infrastructure. The registration procedure establishes a secure channel of communication between residents and healthcare professionals. It enables all stakeholders who have been granted access to utilize the cognitive module to get patient information and health data in a secure manner. The patient's position is continually being watched in order to give assistance in the event of an emergency situation. It is the cognitive system that checks on the patient's condition and sends the CT scan picture to the cloud, where it will be processed by the deep learning cognitive system module. The COVID-19 is detected by the deep learning module, and the effects of the binary classification are returned by the module. Based on these data, it appears that the cognitive system is anticipating activities in the future. These results are shared with healthcare experts for a comprehensive assessment, and they are presented in the form of health reports. In the case of an emergency, the cognitive gadget generates alarms and notifications, allowing a smart ambulance or mobile clinic to identify and meet the patient in the shortest period of time possible, saving valuable time. Additionally, the intelligent traffic system allows emergency services to get at their destination in the quickest amount of time possible. As a result, the cognitive smart healthcare system provides vital healthcare facilities to its entire people through the use of digital technology.

B. The Organization of the System

FIG.3 depicts a schematic representation of the suggested intelligent health system's design. Smart Internet of Things sensors are used to communicate the CT scan pictures. The local area network (LAN) is made up of lower-cost networking equipment. From the intelligent IoT sensor and the device, this layer transfers the gathered signals to another layer known as the hosting layer, which is located in the middle of the stack. The hosting layer consists of a variety of intelligent devices, such as portable multimedia devices or laptop computers that can both store and send signals. The intelligent devices are connected to a large-scale network (WAN), which is responsible for transferring data from the intelligent devices to a cloud. The wide area network (WAN) layer takes advantage of specialized networking networks, such as cellular LAN, 4G, and 5G, to transport data to the cloud in real-time. The deep learning cognitive module receives patient information from the cloud manager, which authenticates it and delivers it to the deep learning cognitive module.

Data transmission is accomplished through the usage of intelligent Internet of Things sensors. Any of these sensors can be integrated into the patient's surrounding environment. This gadget has the capability of connecting to other Internet of Things devices. The local area network (LAN) is made up of networking protocols over small distances, such as Zigbee, LoWPAN, and Bluetooth. The hosting layer makes smart gadgets, such as multimedia cellphones, laptops, tablets, and human digital assistants, available to the public to use. These devices save data on a local storage device and

use specific programs to compute the signals that are received. These tiny processing devices provide users with the ability to collect general and preliminary health assessments. The data is sent to the cloud processing unit over the wide-area network (WAN). The cloud layer is comprised of a cloud manager and a deep learning cognitive module that performs deep learning. The cloud manager is in control of data flow and is responsible for implementing all authentication procedures in order to verify the identities of all intelligent city participants. Following patient verification, the data is analyzed by the DL cognitive module, which then evaluates the patient's condition. It uses CT scan pictures to identify COVID-19 and makes intelligent judgments on how to proceed. To the cognitive module, deep learning models submit identification outputs, which in turn, evaluates the patient's status and notifies the stakeholders who are interested in the findings. The clinical data and outcomes are then reviewed by hospital staff, who also keep track of the patients.

C. Covid-19 Detection and Classification system is comprised of the following components:

Our goal in the deep learning cognitive module is to build a technique for COVID-19 identification that is based on deep learning. Deep learning has demonstrated excellent performance, outperforming conventional approaches based on hand-engineered features [47, 48]. Deep learning has also demonstrated superior performance than traditional techniques based on hand-engineered features [47, 48]. As a result, deep learning will be utilized in the development of the suggested approach. In this section, we will go through the specifics of the technique that has been presented.

a) *Data set*: This study makes use of two datasets to create a dataset of 6000 pictures, which is then analyzed. The dataset is separated into two sections, which are referred to as the training and testing phases. The training and testing sets contain 4800 and 1200 pictures, respectively, and are divided into two categories. An example of a dataset utilized in this work is the CovidChestxray dataset, which has only recently been made available and contains a selection of pictures collected by Joseph Paul Cohen for publications on COVID-19 patients [12, 49]. An image combination of a chest X-ray and a CT scan is used to create this dataset. This dataset had 250 radiographs of COVID-19 patients taken between May 3, 2020 and May 3, 2021. Out of 250 pictures, 184 photographs are chosen for this study because they demonstrate excellent identification of COVID-19 patients. This study includes 184 images. This dataset is being updated on a continual basis. This dataset also contains some meta-data, such as the age and gender of each of the participants. This dataset, which contains all COVID-19 pictures, has been chosen for our investigation. A total of one hundred and eighty-four photos are utilized in this study for testing, with the remaining images serving as training images. All of these 184 pictures are connected with individuals who have COVID-19 disease. It is also utilized to enhance the training sample size (COVID-19 pictures)

from 84 to 420 by employing the data augmentation strategy. It is important to us that the photos of each patient do not overlap in the training and testing sets; thus, either the images of patients are included in either the training or testing sets.

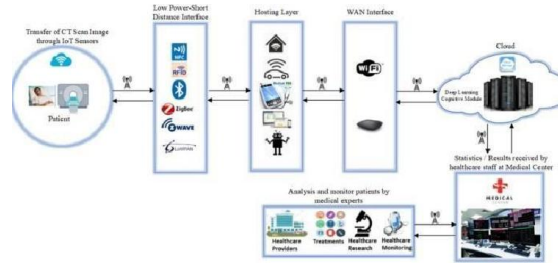


Fig. 3. Smart Hospital Framework

b) *Preprocessing*: The pictures in this collection have varying levels of resolution, which changes with time. We have some high-resolution photos in the COVID-19 class, which are more than 1900 by 1400 pixels, and some low-resolution images, which are 400 by 400 pixels. As a result of this variance, the suggested model can produce superior outcomes after training, independent of variations in the resolution of sample images or the methodologies used to capture images in the field of vision. It is not feasible to gather data in a highly controlled environment, such as when photographing high-resolution photos or cleaning the data after preprocessing. As technology advances in the machine learning field, a greater emphasis is placed on the development of sophisticated frameworks and models that can perform better in uncontrolled environments, such as those characterized by variations in sample image resolution and quality, as well as small-scale labeled datasets. The pictures of the COVID-19 class are provided by the original dataset collector, who obtains them from a variety of sources. As a result, before to training the model, we normalized the training pictures in order to address the resolution issue in the photographs.

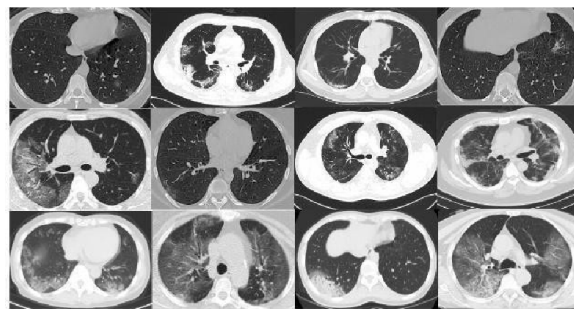


Fig. 4. Sample Dataset

c) *Transferred Learning*: In this study, the state-of-the-art ResNet50 convolution neural network (CNN) model was utilized to distinguish COVID-19 patients from non-COVID normal participants using convolution neural networks. This was accomplished by the application of the transfer learning technique to fine-tune the ResNet50 CNN

model on the training dataset. In this method, a model that has been trained for one specific job may be modified to do another comparable activity. We may utilize the Image Net model to train the model to categorize pictures on a smaller dataset, allowing us to perform task-specific learning on a smaller dataset. The ImageNet is a well-known model that comprises of millions of annotated pictures that have been collected throughout time. Transfer learning is advantageous for tasks in which acceptable samples in large numbers for training a model are not accessible, such as medical pictures linked with various disorders, for which appropriate samples in small numbers are available. This method may be utilized for models that have a high level of complexity and require a significant number of parameters to be employed in the training process. Transfers learning allow models to start with strong beginning values and just require small modifications to be able to tackle the new challenge more effectively. There are two primary methods in which the pre-trained model is applied to a certain role. In the first approach, the pre-trained model is used to extract features from the data, and the classifier is trained on the features to classify the data. In the second way, the pre-trained model is used to extract features from the data. A portion of the model network or the entire model network is fine-tuned in the second method, which is based on the newly assigned job. In the training method, the pre-trained model weights will be utilized as the beginning values, and they will be adjusted as needed during the operation.

d) Training with a model : The suggested ResNet50 model is utilized in conjunction with a cross-entropy loss function in this work. This loss function is used to reduce the difference between the goal and actual probability values to the smallest possible amount. In the following equation, it is defined as follows:

$$L_{CE} = \sum_{i=1}^N P_{pi} \log q_i$$

Where p_i and q_i reflect the differences between the actual and projected probability values for each sample picture. After that, we apply the stochastic gradient descent technique to decrease the loss function to a more manageable size.

D. Results And Discussion

The probability score obtained by the ResNet50 model is used to determine whether the test picture belongs to the COVID-19 class or to a class other than the COVID-19. In order to identify whether a picture is connected with COVID-19 or not, these scores can be compared to a threshold number. It is the projected labels that are utilized to establish the sensitivity and specificity of each model.

TABLE I. THE AVERAGE PERFORMANCE OUTCOMES OVER SOME TIME.

COVID-19 versus non-COVID	
Performance Measurements	Results

Accuracy	0.98
Sensitivity	0.976
Specificity	0.98
F1 Score	0.9787

In this study, we utilized four different threshold values, which were 0.15, 0.20, 0.25, and 3.0, in order to test our hypotheses. We find that the ResNet50 model performed better with a 0.15 threshold value than with any of the other three threshold values.

E. Conclusion

It is recommended in this study that a smart healthcare system that integrates IoT-cloud technologies to detect and categorize COVID-19 be implemented. Smart sensors are used to acquire information from medical pictures captured by the system. These pictures are saved in the cloud and are utilized to determine the health condition of patients in real-time. The system then provides recommendations on the facilities and medical help that patients have requested. The picture is transmitted to the deep learning cognitive module, which identifies COVID-19 and notifies all stakeholders of the patient's condition so that follow-up treatments may be carried out. Deep learning has been used to develop an intelligent and resilient system for identifying coronavirus illness (COVID-19) in the DL cognitive module. This system is based on a state-of-the-art deep learning technique. We used chest X-ray pictures as a dataset, and we fine-tuned the ResNet50 CNN model on our training dataset to get the best performance. In order to assess the resilience and efficacy of the proposed system, we used two publicly accessible benchmark datasets (the Covid-Chestxray dataset and the Chex-Pert dataset) to test it. Initial preparations include creating a collection of 6000 pictures based on the Covid-Chestxray and Chex-Pert databases. It is recommended that the proposed system be taught to gather pictures from 80 percent of the datasets and then tested using 20 percent of the data. The results demonstrate unequivocally that the performance metrics of our suggested approach are quite high. The technique of tenfold cross-validation is used in the process of cross-validation. As part of this research, a thorough experimental analysis is carried out in order to evaluate the performance of the suggested system. According to the results, the suggested system has an accuracy of 98.6 percent, a sensitivity of 97.3 percent, a specificity of 98.2 percent, and an F1-score of 97.87 percent, among other characteristics. The comparison reveals that the suggested system outperforms the already available systems in terms of performance. DL-based techniques, such as the one suggested here, would be beneficial in medical diagnosis research and healthcare systems. As a bonus, it will assist medical professionals in the COVID-19 screening process and provide a valuable second view.

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COMPUTER AIDED DETECTION AND SEGMENTATION OF LUNG TUMOR USING SOFT COMPUTING TECHNIQUES

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ABSTRACT

Lung cancer is one of the leading causes of cancer death in both men and women in most of the developed countries. Its healing rate is very modest because it is usually detected at very belatedly stages. Early detection of lung cancer improves proper diagnosis and treatment. In this system we are finding the normal or abnormal condition of lung CT-thoracic images to detect abnormal severity as benign or malignant. In this paper we use the machine and deep learning classification approaches in CT-thoracic image analysis to achieve better classification rate. In this work, the computer aided automatic detection and classification of lung tumor is proposed. The Lesion characterization is also a difficult task due to similar texture pattern between the lung tumors and normal lung tissues. The multi resolution Gabor transform is applied over the lung image and then features such as local derivative and local ternary patterns are extracted from the transformed image. The differences between lesions and its background tissues are challenging task due to its low contrast between lesions and its background tissues. A fully automated computerized scheme is developed in this research to segment the airway tree depicted on CT images ages.

Index Terms—Airway tree, differential geometry, lung computed tomography (CT), segmentation, computer-aided detection, region growing.

1. INTRODUCTION

Airway diseases are frequently associated with morphological changes that may affect the physiology of the lungs. Although advanced Computed Tomography (CT) imaging techniques enable visualization of 3-D lung structures in significant detail [1], it is extremely time consuming to manually segment the airways due to the complexity of the bronchial structure and the involvement of a large number of CT images in a single examination [2]-[3]. There are typically large errors associated with subjective assessments in terms of inter-and Intra-observer variability. Leakage and obstruction are the two primary challenging problems associated with automated computerized segmentation of the airway tree. Both are frequently caused by partial volume effects that reduce the contrast between the airway wall and the lumen [4]-[5]. Detection of lung cancer consists of three stages like Image enhancement, feature extraction and Image segmentation. Research work aiming Image precision and superiority is the interior aspects of this research, picture superiority, growth as well as dimensions are depending on the development phase where small preprocessing methods are used based on Modified Gabor filter Within Gaussian policies for Image enhancement. For extracting required features gradient operators are used. For segmentation stage Morphological segmentation tool used which consists of number of conceptual stages. Several researchers worked on Image

processing techniques for identification of lung cancer. For Image enhancement earlier researchers used kalman filters, Hessian Based filters but these methods have drawbacks like poor and non-uniform response for images of varying sizes and varying contrast. In between the airway lumen and the surrounding soft tissue (airway wall), an intuitive approach to this problem is frequently based automatically or interactively locating one or multiple seeds in large airway regions (e.g., trachea) and then performing a 3-D region growing operation under either a fixed or an adaptive threshold [7]-[8]. However, region-growing is frequently associated with leakage and therefore this approach often fails to identify small airways. Regardless, due to its simplicity and efficiency, this approach has been used in the majority of available schemes as an initial step and it is primarily used for the detection of large airways [9]. These methods can be generally classified into 1) knowledge or rule based methods, 2) morphological methods, 3) template matching methods, 4) shape analysis methods, and 5) hybrid methods. The knowledge or rule based approaches typically include prior anatomical relationships between airways and vessels in space [10]. Template matching methods use a set of predefined masks or structure [11]-[12], which is based on some prior knowledge of the airways, to facilitates a search of highly correlated regions in 2-D or 3-D space. To refine the initially detected airway tree, different morphological operations, have been used to connect disconnected 2-D/3-D regions [13]-[16]. Since airways generally appear as tubular shapes, Eigen value analysis of the Hessian matrix of CT images has also been used to enhance and track tubular structures in image space by analyzing the second derivatives of airway boundaries. Hybrid method consisting of three stages, namely a 3-D region growing stage, a 2-D wave propagation, 2-D template matching stage. Enhancement and smoothing techniques (Gaussian filters) but we can't get the optimum CT scan image [17]-[18].

2. RELATED WORK

2.1. Lung Anatomical Structure Modeling

Applying the marching cubes algorithm [19] to the segmented lung volume results in 3-D lung anatomical structures in the form of a triangle mesh surface. The front faces of a surface model, whose normal vectors point to the outside of an object (i.e., from high intensity to low intensity), whose normal vectors point to the inside of an object (i.e., from low intensity to high intensity). Such a lung model generally contains an extremely large number of triangles. The MCA treats eight neighboring voxels in the scalar field of the lung volume as a logical cube and determines the iso surface along each edge of the cube by

linearly interpolating the scalar values of the voxels that form the edges [20]. If a cube has one or more voxels with higher or lower intensity than a predefined iso-value, this cube contributes a set of triangles. After traversing all voxels, a triangular surface is constructed.

2.2. Principal Curvature Computation

As a concept describing a shape in differential geometry, curvature is a measure of how a surface or a curve “bends” at a given point and is defined in terms of the amount of bending and the bending direction. The principal curvatures (PC) and are defined here as the maximum and minimum values of the normal curvatures at a given point, and the principal direction (PD) and are defined as the directions in which the normal curvatures reach maximum and minimum values. Given a point with a normal vector, a local coordinate system perpendicular to (or tangent to the local surface) is generated [11]. The normal curvature at this point can then be expressed in a fundamental form where denotes the second fundamental tensor. The PC and the PD and can be determined by diagonalizing the symmetric matrix. A number of investigations, used curvature analysis to identify lesions and/or structures with specific shapes (e.g., airway and nodules), where the curvatures were typically derived from the eigenvalue calculation of the Hessian matrix in image space. Due to their discrete voxel-based representation [17][21], CT images are frequently convolved prior to setting up the (HM) with GF that frequently suppress valuable anatomic information as well as image artifacts or noise.

2.3. Non-Airway Region Filtering

The general shapes of the soft tissues in human lungs can be reasonably represented by three basic categories, namely spheres (e.g., nodules), planes (e.g., fissures), and cylinders (e.g., vessels and airways). The basic properties of the PC and the PD associated with these three general shapes. In general, the minimum curvature at any point on a plane or a cylinders zero but it has nonzero values at any point on a sphere. For concave cylinders or spheres, the maximum curvatures have negative values, while for convex cylinders and spheres the maximum curvatures have positive values. Therefore, knowledge of curvatures should be useful in differentiating these basic shapes. Unfortunately, these properties are quite sensitive to local surface perturbations due to the second derivatives involved. Hence, to reliably identify airways that appear as concave cylinders, we explore both the PC and the PD at each point on a given surface. The PD in the neighborhood of a point on a cylinder is typically parallel to each other, while those on a sphere or a plane are randomly distributed.

2.4. Non-Airway Region Filtering

The initial non-airway filtering divides the lung model as into two sets, namely the “airway” set and the “non-airway” set. Therefore, local regions as indicated by the “holes” are actually incorrectly removed from the “airway” set. Because the initially modeled lung anatomical structure is represented by a completely enclosed surface, the misclassified isolated regions in either set. Hence, by investigating the “matched” regions between the sets using a “puzzle game” we can reduce the false positive and false negative identifications. This “puzzle game” consists of a forward operation and a backward operation. The FW reduces the false negative identifications by determining

which isolated regions in the non-airway set “match” holes in the airway set. First, we ranked all isolated regions by the size of surface area and identified the two largest regions in and , and these two regions were excluded from the game. The remaining regions in set were tested one by one in a surface area size decreasing order. Given an isolated region in set, it is assumed to belong to set if two criteria (both) are met: 1) it actually shares edges with a region in set and 2) it has a smaller geometric area than the connected region in set A. The BW reduces the false positive identifications by determining which isolated regions in the airway set actually belong to the non-airway set. In the BW, filtered out isolated regions located on the lung boundary, since it is assumed to be an impossibility for regions located inside the lung volume that appear as concave cylindrical shapes to represent non-airway regions.

3. METHODS

3.1. Scheme Overview

In order to overcome the limitations of existing system new method is proposed. This new method involves Gabor filter and watershed segmentation techniques. The Architecture diagram of Proposed Lung cancer detection system is shown in figure 1. The image Pre-processing step starts with image enhancement.

STEP-1: Collect the lung cancer images from respective cancer hospital

STEP-2: Access one particular image into MATLAB with the help of command

STEP-3: Enhancement process image enhancement is to improve the interpretability or perception of information included in the image for human viewers, or to provide better input for other automated image processing techniques. We are using Gabor filter for image enhancement process

STEP-4: Segmentation process

Segmentation divides the image into its constituents regions or objects. It has many useful applications for the medical professional such as visualization and volume estimation of object of interest, detection of abnormalities, tissue qualification and classification, and more. We are using Marker-Controlled Watershed Segmentation Approach for segmentation

STEP-5: Features extraction

To know normality or abnormality of the images this process is used We are using binarization and masking for feature extraction

3.2. Lung Segmentation

Due to the low grayscale values of lung parenchyma regions and the high contrast with surrounding tissue, we used a well-established and computationally efficient thresholding operation extracts the lung volume [Fig. 1]. The threshold is determined adaptively based on grayscale histogram analysis of the CT images. The exceptional pockets of air between the patient and the CT bed as well as image noise or artifact after thresholding are filtered out by applying a simple size based classification rule. This thresholding approach cannot assure a smooth lung boundary and/or the inclusion of specific diseases. However, this simple approach sufficient for our specific application because the airway regions are retained due to their relatively low grayscales. This thresholding approach cannot assure a

smooth lung boundary and/or the inclusion of specific diseases. However, this simple approach sufficient for our specific application because the airway regions are retained due to their relatively low grayscales.

3.3. Airway segmentation

Before enter into the airway segmentation lung is segmented by multi-threshold value. After a round of airway identification was completed at a specific iso-value (e.g., - 850 HU), the resulting airway tree was represented as a geometric surface in a triangle mesh. Before repeating the above steps at different iso-values, we mapped the identified airway tree from the geometric space to the CT image space. The motivation for this mapping arises from the technical difficulty in computing the union of airway trees identified at different thresholds in geometric space because different iso values may lead to different airway tree boundaries as a result of the different lung anatomical structure models. When segmented airway trees at different iso-values are mapped onto the CT image space, their union can be computed by a simple summation of the mapped airway voxels. In addition, this mapping enables a direct visualization of the performance of the airway tree segmentation superimposed on the corresponding CT images. When applying region growing operation airways tree separated by region (similar area are grouped into region). The motivation for this mapping arises from the technical difficulty in computing the union of airway trees identified at different thresholds in geometric space because different iso values may lead to different airway tree boundaries as a result of the different lung anatomical structure models. After applying genetic optimization we can get best optimum CT image. Regions are grouped or separated by those region have similar characteristics. Repeating the steps until best optimum CT image.

3.4. Gabor filter enhancement technique

The Gabor filter was originally introduced by Dennis Gabor; used it for 2D images (CT images). The Gabor function has been recognized as a very useful tool in computer vision and image processing, especially for texture analysis, due to its optimal localization properties in both spatial and frequency domain. The image presentation based on Gabor function constitutes an excellent local and multi-scale decomposition in terms of logons that are simultaneously localization in space and frequency domains. A Gabor filter is a linear filter whose impulse response is defined by a harmonic function multiplied by a Gaussian function. Because of the multiplication- convolution property, the Fourier transform of a Gabor filter's impulse response is the convolution of the Fourier transform of the harmonic function and the Fourier transform of the Gaussian function. Image presentation based on Gabor function constitutes a Multi-scale decomposition in terms of logons that are simultaneously (and optimally) localization in space and frequency domains.

A Gabor filter can be viewed as a sinusoidal plane of particular frequency and orientation modulated by a Gaussian envelope

$$a(x, y) \sqcup b(x, y) c(x, y)$$

$b(x, y)$: Complex sinusoid

$c(x, y)$: 2-D Gaussian shaped function known as envelope

$$b(x, y) = e^{-j^2 (p_0 x - q_0 y)}$$

The Complex sinusoid is defined as follows

$$b(x, y) \sqcup \exp(j(2 \sqcup (p_0 x - q_0 y) \sqcup d))$$

Where (p_0, q_0) and d define the spatial frequency and the phase of sinusoid respectively. This sinusoid can be represented as two separate real functions. The real and imaginary parts of sinusoid are

$$re(b(x, y)) \sqcup \cos(2 \sqcup (p_0 x - q_0 y) \sqcup d)$$

$$im(b(x, y)) \sqcup \sin(2 \sqcup (p_0 x - q_0 y) \sqcup d)$$

Where (x_0, y_0) is the peak of the function, i and j are scaling

parameters of the Gaussian and there subscript stands for a rotation operation such that

$$(x \sqcup x_0)r \sqcup (x \sqcup x_0) \cos \sqcup \sqcup (y \sqcup y_0) \sin \sqcup \sqcup (y \sqcup y_0)r \sqcup (x \sqcup x_0) \sin \sqcup \sqcup (y \sqcup y_0) \cos \sqcup \sqcup$$

In second stage Image segmentation technique is used. It is an essential process for most image analysis subsequent tasks. In particular, many of the existing techniques for image description and recognition depend highly on the segmentation results. Segmentation divides the image into its constituent regions or objects.

The goal of segmentation is to simplify and/or change the representation of the image into something that is more, typically used to locate objects and boundaries like lines, curves, meaningful and easier to analyze. Image segmentation is etc. in images. Segmentation algorithms are based on one of two basic properties of intensity values: discontinuity and similarity. The first category is to partition the image based on abrupt changes in intensity, such as edges in an image. The second category is based on partitioning the image into regions that are similar according to a predefined criterion. Histogram thresholding approach falls under this category.

3.5 Feature extraction using Gradient operators

The output of Enhancement is given to the feature extraction. Here features of the lungs will be extracted by using gradient operators. Modulated intensity gradient based segmentation Modulated intensity gradient method involves convolving image with the gradient operators. High value of gradient magnitude is the points with sudden change in the intensity of two areas and these are called edge pixels. To form closed boundaries these points linked together. For this segmentation method operators like Laplace, Sobel and canny operators are used. In Digital image processing edge detection is very useful. Out of numerous methods, in this research work canny operator is used instead of sobel operator because Sobel operator is easy, but it is not accurate in noisy environment but canny operator or canny edge detector has many advantages such as smoothing effect to eliminate the noise there in the images, through non-maximal suppression improves the signal to noise ratio. The only disadvantage is canny operator is time taking because

use of complex algorithms.

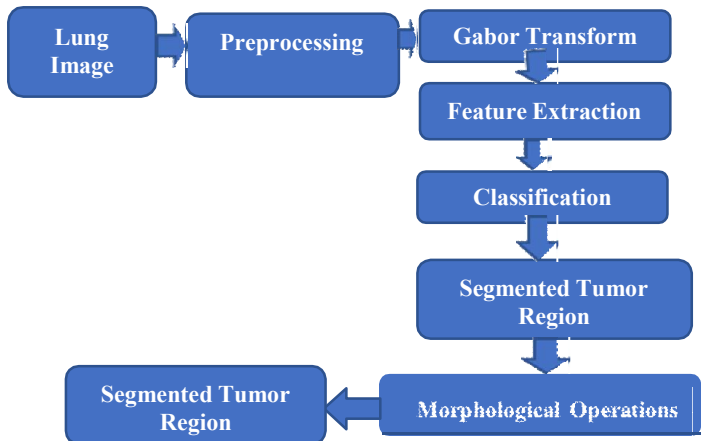


Fig.1. Schematic flowchart of the airway segmentation algorithm.

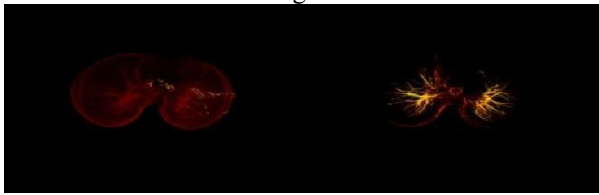


Fig.2:(i) CT image (ii) segmented lungs image.

3.3.2. Deep Algorithms

Deep learning is a subset of a Machine Learning algorithm that uses multiple layers of neural networks to perform in processing data and computations on a large amount of data. The deep learning algorithm is capable to learn without human supervision, can be used for both structured and unstructured types of data.

In deep learning, a computer algorithm learns to perform classification tasks directly on complex data in the form of images, text, or sound. These algorithms can accomplish state-of-the-art (SOTA) accuracy, and even sometimes surpassing human-level performance. They are trained with the large set of labeled data and neural network architectures, involving many layers. Moreover;

1) Deep Learning is a prime technology behind the technology such as virtual assistants, facial recognition, driverless cars, etc. 2) The working of deep learning involves training the data and learning from the experiences. 3) The learning procedure is called 'Deep', as with every passing minute the neural networks rapidly discover the new levels of data. Each time data is trained, it focuses on enhancing the performance. 4) With the increasing depth of the data, this training performance and deep learning capabilities have been improved drastically, and this is because it is broadly adopted by data experts.

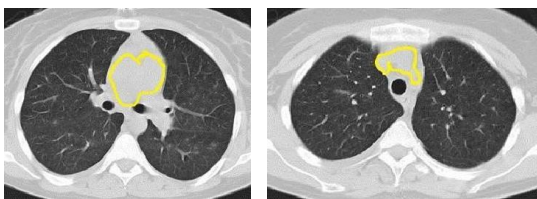


Fig.3:i) Airway segmentation image ii) Inner airway segmentation

3.3.3. Neural Network

Multilayered feed forward neural networks possess a number of properties which make them particularly suited to complex pattern classification problems. This reliably finds a nearly globally optimal set of weights in a relatively short time. Neural networks are algorithms for optimization and learning based loosely on concepts inspired by research into the nature of the brain. They generally consist of five components:

1) A directed graph known as the network topology whose arcs we refer to as links, 2) A state variable associated with each node, 3) A real-valued weight associated with each link, 4) A real-valued bias associated with each node, 5) A transfer function for each node which determines the state of a node as a function of a) its bias b , b) the weights, w of its incoming links, and c) the states, x of the nodes connected to it by these links. This transfer function usually takes the form where is either a sigmoid or a step function. A feed forward network is one whose topology has no closed paths. Its input nodes are the ones with no arcs to them, and its output nodes have no arcs away from them. All other nodes are hidden nodes. When the states of all the input nodes are set, all the other nodes in the network can also set their states as values propagate through the network.

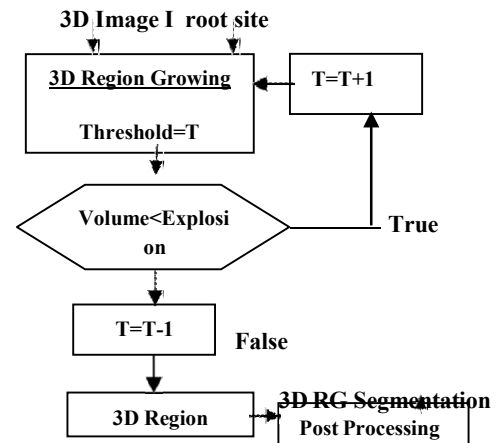


Fig.4. Block diagram of adaptive 3D region growing

3.6 Image Classification

Classification of images is a basic task that seeks to interpret a picture as a whole. By assigning it to a particular label, the purpose is to identify the image. Image Classification usually refers to images where only one object appears and is examined. Object identification, on the other hand, requires both classification and localization tasks and is used to examine more practical instances in which an image may have several objects.

The main idea of the method is the translation of the initial vectors into a space of higher dimension and the search for a separating hyperplane with the maximum distance in this space. Two parallel hyperplanes are constructed on both sides of the hyperplane that separates the classes. The separating per plane is a hyperplane that maximizes the distance to two parallel hyperplanes. The algorithm works under the assumption that the greater difference or the distance between these parallel hyperplanes correspond the smaller the average error of the classifier. The support vector method is sensitive to noise in the source data and to standardization of the data. If the training sample contains noise emissions, they will affect the construction of the

separating hyperplane Advantages of the method this is the fastest method of finding solving functions and reduces to solving the problem of quadratic programming in a convex domain, which always has only one solution; the method finds a separation strip of maximum width, which allows further more reliable classification.

A. Feature extraction

This step produces the lung volume. This lung volume contains the candidate nodules. Later, these nodules are extracted, pruned and geometric and intensity-based statistical features like area of nodule are extracted from pruned candidate nodules. The proposed approach automatically labels the segmented areas with different colors. Later masking is applied to find exact area of segmented nodules. Finally, these areas values compared with threshold value. If the area value of any nodule is less than the threshold value that indicates normal condition otherwise indicates the abnormality in lung. Figure 6 shows this process. Figure 6(a) and (b) shows segmented image by Watershed and feature extraction of normal condition by using masking approach respectively. Figure 6(c) and (d) shows segmented image by Watershed and feature extraction of abnormal condition respectively.

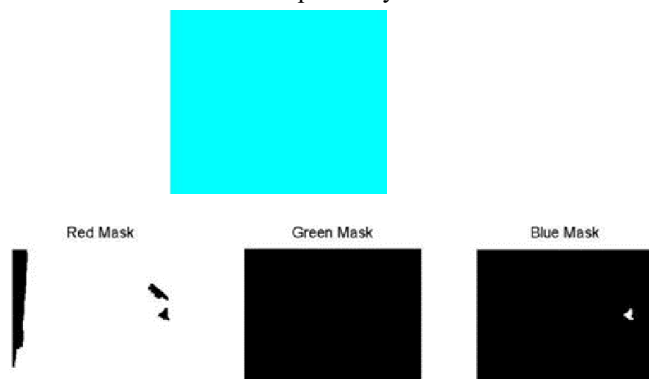
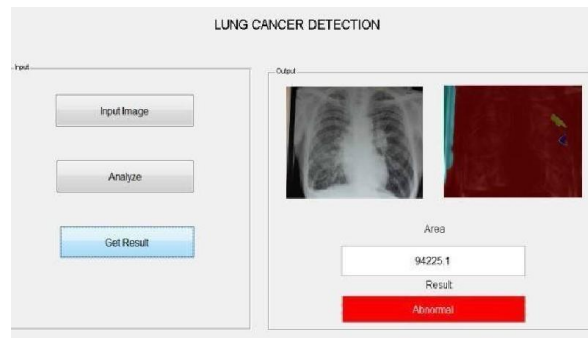
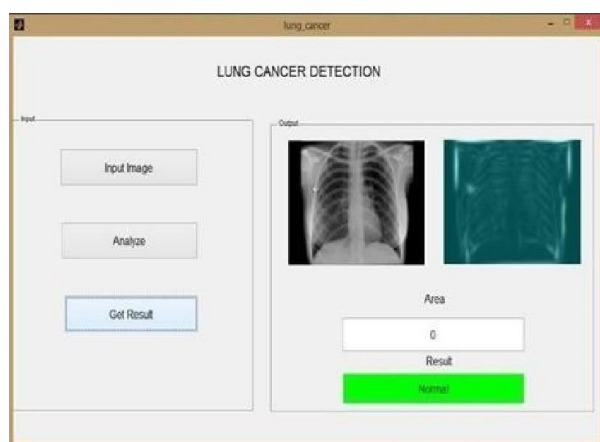


Fig. 5 Feature Extraction using masking approach a) Segmented image by Watershed b) feature extraction of normal condition by using masking approach c) Segmented image by Watershed b) feature extraction of abnormal condition by using masking approach.



4. IMPLEMENTATION

4.1. Testing CT Dataset

All subjects had relatively low levels of airflow obstruction and/or visually depicted emphysema noted during interpretations of their CT examinations. We used a skeletonization algorithm developed by Cornea *et al.* [21] to automatically extract the centerlines and identify the branch points of segmented airway trees. These examinations were performed under an Institutional Review Board (IRB) approved protocol using a Light Speed VCT 64-detector scanner with subjects holding their breath at end inspiration. CT data were acquired using a helical technique at a pitch of 0.969, 120 kVp, 0.4 s gantry rotation, and 250 mAs (or 100 mAs). The CT images were represented using a 512×512 pixel matrix with a pixel dimension ranging from 0.549 to 0.738 mm, depending on the participant's body size. The detector configuration was 32× 0.625 mm. However, lower resolution CT examinations with slice thicknesses of 1.25 mm and 2.5 mm are widely used in routine clinical practice.

4.2. Experiments and Result

Given that human airways typically appear as a bifurcating tree, we defined a generation as a continuous region starting and ending at two distinct bifurcations and used the dichotomic representation to count the airway generation number. The three performance measures in terms of total tree lengths, generation and branch numbers resulting from the application of our segmentation scheme chest examinations. As the segmentation results may include disconnected airways we also calculated the number of “isolated” branches for each examination. For all examinations with a slice thickness of 0.625 mm, 1.25 mm, 2.5 mm. Three measures were computed automatically using the airway tree centerline extraction scheme [21] with mean values and standard deviations calculated for all test cases [21]. We also investigated the impact of CT image slice thickness on performance measures reported here. In existing system leakage and obstruction is challenge to segments the airway tree repeatedly applying (iso) value may be fusion happening between the airway wall and lumen [6]. The unavailability of the “truth” makes it difficult to assess the performance of an airway segmentation scheme. Several studies [12], [14], [15], [13] evaluated performance of their own airway segmentation schemes by comparing scheme results with the number of bronchial sections manually traced by one or multiple radiologists. However, this is an extremely time-consuming task that is prone to observer/rater errors, in particular in examinations that may include as many as 400–600. Slices per case [22] assembled a “reference standard” by computing the union of the airway segmentations obtained from multiple schemes

developed by different teams with a visual verification by an expert observer.

5. DISCUSSION

An image improvement technique is developed for earlier detection or identification of lung cancer disease for diagnosis and also for treatment. The image presentation based on Gabor function constitutes an excellent local and multi-scale decomposition in terms of logons that are simultaneously localization in space and frequency domains. The results of healthy person and diseased persons are compared, and results are found to fruitful. Hence, this proposed method of Improved Image Processing Analysis for the Detection of Lung Cancer using Gabor Filters and Watershed Segmentation Technique helps in earlier detection of lung cancer disease. So, this proposed method is highly suitable for manufactures of cancer detection equipments and medical practitioners.



Fig.6: i) Slice of segmented Airway in X-direction, Y and Z direction.

6. CONCLUSION

We described a novel DL-based supervised learning method that identifies three different types of tissues found in lung and colon tumors by analyzing their corresponding pathological images. We used the (interstitial lung diseases (ILD)) dataset to train and validate our method. Three sets of features were extracted using two types of domain transformations for image classification. The resultant features were concatenated to build a combined set of features that contains both types of information. The acquired results assure that with a 96.33% peak classification accuracy, the model is highly accurate and reliable (96.38% F-measure score) for lung and cancer identification. A comparison with similar cancer diagnosis methods reveals that the proposed method shows superior performance than most of them. Using this computer-based identification method in the medical centers will allow pathologists to diagnose more lung and colon cancer cases in less effort, cost, and time. In Deep algorithm to the entire lung region/volume at multiple thresholds. The proposed approach has several advantages such as generalizability, simplicity, reliability.

7. FUTURE WORK

This technique did not perform a comprehensive quantitative assessment of the impact of the presence of different lung diseases with varying severity levels on segmentation performance. So, in this method also use 4D technology to segment the human airway tree can get more optimum CT scan image. This is the focus of a future study but at this time is beyond the scope of the current study. Finally, at the bifurcating regions where the next generation of airways originates and the airways are close to each other, the scheme may produce small junctions due to partial volume effects and the use of the multiple iso-values when modeling the airways.

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DATA MINING'S ROLE IN MINING MEDICAL DATASETS FOR DISEASE ASSESSMENTS – A CASE STUDY

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Abstract— Healthcare organizations retain their patient data digitally for medical evaluation, referral, and treatment. Due to differences in different types of values, assessment fields, and human medicine, these data sets are complex, large, and heterogeneous. Clinical Decision Support System (CDSS) can help in-depth analysis of these big data values and provide opportunities for improved diagnosis by extracting knowledge from them. Among them, data mining technology is very useful for discovering relationships and patterns in big data sets. In addition, data mining The technology has been proven to be used to extract inference knowledge from complex biomedical data sets, so as to obtain in-depth knowledge about medical care for doctors. In addition, by building models from data mining methods and technologies, the complexity involved in investigating the inner details of healthcare data is minimized. Therefore, this article aims to describe clustering techniques for analyzing patient data sets for disease prediction. This article introduces FCM, K-means ++ and K-Means clustering techniques in detail. In addition, the document also proposes a different set of parameters for evaluating the patient's disease from the medical data set. **Keywords:** data mining, healthcare, K-means, Kmeans++

I. INTRODUCTION

Technological advances have made it possible to store large amounts of medical data. Medical and health data contains valuable information used to diagnose diseases. Data mining technology can extract understandable knowledge from medical data for diagnosis. The health system needs automated tools to identify and disseminate necessary health information. In external symptom research and laboratory testing, interest in expert doctors who can make independent decisions is growing, mainly because the patient's medical data is easily available. Non-enveloped internal inspection improves observation. Medical diagnosis involves identifying or establishing supporting evidence from the patient's symptoms [1]. The success of data mining technology in many application fields such as marketing, ecommerce and retail management has led to its popularization in the field of healthcare.

A. Data mining in the Medical Domain

Medical data mining has been explored and used for clinical diagnosis and evaluation. The available raw medical data is distributed and must be compiled to ensure the accuracy and efficiency of the evaluation, to prove that the health care environment is rich in information but lacks knowledge [2]. Classification, clustering, neural networks, association rules and decision trees have been used in different healthcare applications [3]. The main goal of data mining technology in health analysis is to predict diseases from stored medical information. Extensive algorithms have predicted diseases including heart disease, diabetes, liver disease, and cancer. Neural network technology is used in the analysis of heart disease [4]. The research of [5] used a sequence number based on association rules to convert the Cleveland heart data set into a binary data set. Use an improved k-means clustering algorithm to predict heart disease [6]. Limited attributes have also been used to assess heart disease through diffusion techniques [7]. [8] explains the useful aspects of big data technology in healthcare. These rules are found in medical transcripts, including significant diseases, medications, symptoms, and age groups of disease associations [9]. The availability of large amounts of data in healthcare makes it possible to create real data integrations. Analyzing these data sets will bring some challenges, such as missing values, highdimensional values or noise, making them unusable for ranking. Clustering technology is a solution for data analysis [10]. Naive Bayes, C4.5, backpropagation and decision trees are used to predict the survival rate of breast cancer patients [11]. This document introduces three data mining clustering techniques in health care in detail, and also proposes the parameters that data mining techniques can be used for analysis.

Medical data. Table 1 shows the role of data mining in disease prediction.

TABLE I. Data Mining Technique and Disease Prediction Accuracy

ALGORITHM	ACCURACY	DISEASE
K-Means	98.24	Heart disease
K-Means	78	Diabetics
K-Means(Attribute Based)	80.198	Heart Disease
K-Mean based MAFLA	74	Heart Disease
K-Mean base MAFLA with ID3	85	Heart Disease
K-Mean based MAFLA with ID3 and C4.5	92	Heart Disease
K-Means	78	Diabetics

B. Clustering

Clustering involves grouping similar data into groups called clusters, where objects are similar within the group and in different external groups. Large amounts of data, such as medical data, are aggregated into fewer groups or classes to facilitate analysis or evaluation. Clustering is a machine learning technique and unsupervised classification, which can be implemented using hierarchical partitioning or grouping or based on data density. Clustering can also be implemented based on constraints or modeling. In partitions, grouped data objects are divided into multiple subsets. In the hierarchical grouping, the connection hierarchy of the data set is generated. Hierarchical clustering is a common phenomenon in cluster structure detection [12]. Density-based clustering forms clusters based on the density of data points in the region. The k-means algorithm is a commonly used clustering algorithm for clustering and quantification in machine learning, mainly because of its simplicity. The initialization of k-means++ is an enhancement of k-means. Fuzzy C Means algorithm uses fuzzy partition, where data points can belong to many groups with 0 and 1 as membership degrees. By grouping the Euclidean distance, the data vector p and the Centroid q are calculated using equation (1)

$$d(p, q) = \sqrt{\sum_{i=1}^k (p_i - q_i)^2} \quad \dots\dots\dots(1)$$

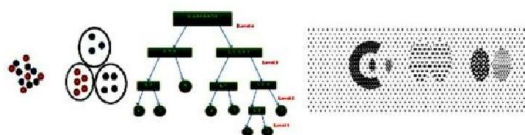


Fig. 1. Depicts Clustering Types

The k-means algorithm divides n objects into k groups (input values). Once grouped, the similarity between the groups is very high, and compared with the average of the objects in the group (the center of mass or center of gravity of the group) to measure.

Figure 3 shows the k-means algorithm.

Algorithm: K-means. The k-means algorithm for partitioning, where each cluster's center is represented by the mean value of the objects in the cluster.

Input:

- : the number of clusters,
- : a data set containing objects.

Output:

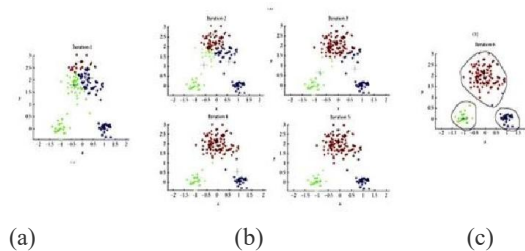
A set of clusters.

Method:

- (1) randomly choose objects from as the initial cluster centers;
- (2) **repeat**
- (3) (re)assign each object to the cluster to which the object is the most similar, based on the mean value of the objects in the cluster;
- (4) update the cluster means, i.e., calculate the mean value of the objects for each clusters;
- (5) **until** no change;

Fig. 2. – K-Means Algorithm and its Output

Figure 3 illustrates the step-by-step execution of K-means, where data elements are represented by colors.



(a) Initial centroid (b) centroids Repositioning (c) Convergence.

Fig. 3. - K-Means Clustering

C. K-Means++ Algorithm

K-means ++ is an improved K-means. Sometimes due to improper initialization of the token, k-means may give bad results. K-means ++ overcomes this problem by proposing a balanced initial value, and it is said that it successfully overcomes the problems related to the initial definition of cluster centers in kmeans [13]. K-means++ initializes the values in kmeans better than other proposed methods [14] and is defined as the best algorithm. The main goal of Kmeans ++ is to overcome the difficulty of being sensitive to initial conditions in the k-means clustering algorithm, because different initial values will lead to inefficient results, because the optimal value may be inaccurate. For the same set of medical data, different groups can lead to different rule sets to build the classifier model. The accuracy of the system again depends on the optimal value. In order to improve the accuracy, efficiency and consistency between cluster members, K-means ++ is used. The first step of the K-means ++ algorithm is to calculate

the sum of the distance from the origin to each attribute of a data point in the data set calculated using equation (2). Figure 5 shows the K-means ++ algorithm

$$U = \sum_{j=1}^m \sum_{i=1}^n W_{ij} X_i \quad \dots \dots (2)$$

K-Means++ Clustering Algorithm

1. For each data item in D calculate the sum of Euclidian distance from origin to weight attributes ($W_i X_i$).

$$U = \sum_{j=1}^m \sum_{i=1}^n W_{ij} X_i$$

2. Data items are sorted based on the distances calculated (U) in step1.
3. Sorted data items are partitioned into k equal sets.
4. For every set, select the middle point and assign the corresponding data point as the initial centroids. //The accuracy of the final clusters is strongly based on the initial centroids. Random selections of initial centroids are not at all helpful in the medical field for developing any predictive model. With respect to medical data set, unique initial centroids lead to develop accurate processing stages.

Fig. 4. K-Means++ Algorithm

D. Fuzzy C Means Algorithm

In FCM, data points are considered based on membership level and can belong to multiple groups. The membership level defines the strength of the association within the group. Therefore, data points are assigned to groups based on membership level.

Figure 6 shows the FCM algorithm

Fuzzy C-means clustering algorithm

1. Initialization: Cluster centres are initialized randomly
2. Distance matrix creation: Calculate the distance between the data point x_i to each of the cluster center by using Euclidean distance measure.

$$d_{ij} = \sqrt{\sum_{k=1}^p (x_{ik} - c_{jk})^2}$$

3. Membership function creation:

//Fuzzy measurement is calculated by considering the fractional distance from the point to the cluster center and this measurement increased the fraction to the inverse fuzzification parameter. This parameter is divided by the sum of all fractional distances and also to ensure that the sum of all membership is 1.

$$\mu_j(x_i) = (1/d_{ij})^{2/(m-1)} / \sum_{j=1}^p (1/d_{ij})^{2/(m-1)}$$

// Verify that the total membership is equal to 1

$$\sum_{j=1}^p \mu_j(x_i) = 1$$

4. Each cluster a new centroid is generated by using the given formula
5. The above steps are repeated to generate optimized cluster centers.

Fig. 5. – FCM Clustering Algorithm

II. PROPOSED METHODOLOGY

The number of diabetic patients has increased (World Health Organization and India are number one in

diabetes. Diabetes requires proper care and control, and lack of proper care can lead to other medical complications in humans. 1 in 8 women in the United States Studies have shown that people with diabetes may develop breast cancer. Early diagnosis of breast cancer is important, and the prognostic diagnosis and staging are based on clinical examination. This study considers the detailed information of patients with diabetes and breast cancer to assess the potential for early diagnosis. Class algorithm diagnosis. The Indian Pima diabetes dataset is taken from the UCI machine learning repository. The proposed technology is implemented in MATLAB, as shown in Figure 6.

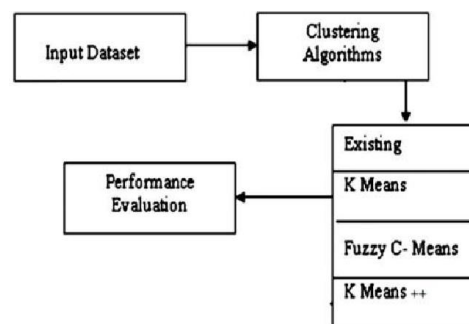


Fig. 6. Flow Chart of the Proposed Methodology

A. Major Parameters used in the study

The input data set has 768 instances with the 9 attributes listed in Table 1 and two types of questions used to test the incidence of diabetes. Table 2 details the 9 attributes of the breast cancer dataset used for research, including 106 examples.

Table II. Attributes of Pima Indian Dataset

No.	Attribute	Description	Missing Values
1	pregnancy	Pregnancy Count	109
2	glucose Level	Plasma glucose levels	6
3	Blood Pressure	Diastolic blood pressure (mm Hg)	34
4	triceps	Triceps skin thickness (mm)	fold 224
5	insulin	serum insulin (mu U/ml)	373
6	mass	Body mass index (weight in kg/(height in m)^2)	12
7	pedigree	Diabetes pedigree function	0
8	age	Age (years)	0
9	diabetes	Class variable (test for diabetes)	0

HFS	high-frequency slope PA
DA	spectral impedance distance
MAX IP	Max. spectrum
P	spectral curve length
DR	distance between I0 and real part of the maximum frequency point

Table III. Breast Tissue Dataset

Attribute	Description
I0	Ohm at 0 frequency
PA500	phase angle (500 KHz)
AREA	spectrum area
A/DA	DA normalized area

B. Validity Measures used in the Study

The clustering algorithm tries to find the most suitable algorithm for a fixed number of clusters and parameterized cluster shapes. If the data can be clustered meaningfully, sometimes the number of clusters may be incorrect or the cluster shape may not correspond to the clusters of the data. It can be overcome by supported cluster merging, in which a large number of clusters are first used, and then reduced sequentially by merging similar clusters based on predefined criteria. It can also be overcome by using effectiveness functions with upper and lower bounds or grouping them using effectiveness metrics. Although many scalar validity measures have been proposed in the literature, this paper uses a new set of clustering validity measures to evaluate the comparative performance of the clustering techniques used for research. The detailed measurement is as follows

1. Partition Coefficient (PC): measures overlapping in clusters.

$$PC(c) = \frac{1}{N} \sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^2$$

Among them, μ_{ij} is the membership degree of data point j in group I , and the optimal number of groups is the maximum.

2. Classification Entropy (CE): measures the fuzzyness of a cluster.

$$CE(c) = -\frac{1}{N} \sum_{i=1}^c \sum_{j=1}^N \mu_{ij} \log(\mu_{ij}).$$

3. Partition Index (SC): It is the ratio between the sum of compactness and the separation of groups. It is used to compare partitions with the same number of clusters.

5. Xie and Beni's Index (XB): The relationship between variation and cluster separation.

$$XB(c) = \frac{\sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^m \|x_j - v_i\|^2}{N \min_{i,j} \|x_j - v_i\|^2}$$

$$SC(c) = \sum_{i=1}^c \frac{\sum_{j=1}^N (\mu_{ij})^m \|x_j - v_i\|^2}{N_i \sum_{k=1}^c \|v_k - v_i\|^2}$$

4. Separation Index (S): It is the minimum distance between clusters in partition validity.

$$S(c) = \frac{\sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^2 \|x_j - v_i\|^2}{N \min_{i,k} \|v_k - v_i\|^2}$$

6. Dunn's Index (DI): It is the identification of closeness and separation between groups.

$$DI(c) = \min_{i \in C} \{ \min_{j \in C, i \neq j} \{ \frac{\min_{x \in C_i, y \in C_j} d(x, y)}{\max_{k \in C} \{ \max_{x, y \in C} d(x, y) \}} \} \}$$

7. Alternative Dunn Index (ADI): Modify the original Dunn index to limit the difference between the two groups ($\min_{x \in C_i, y \in C_j} d(x, y)$)

$$d(x, y) \geq |d(y, v_j) - d(x, v_j)|$$

Where V_j is the center of the JU .

$$ADI(c) = \min_{i \in C} \{ \min_{j \in C, i \neq j} \{ \frac{\min_{x \in C_i, y \in C_j} |d(y, v_j) - d(x, v_j)|}{\max_{k \in C} \{ \max_{x, y \in C} d(x, y) \}} \} \}$$

III. RESULTS AND DISCUSSIONS

All three algorithms are run on Matlab for the above parameters. Table 3 lists the parameter outputs of the cluster parameters of all three algorithms used in the research.

TABLE IV. CLUSTERING OUTPUT

Dat aset s	Algo rith ms	P C	C E	SC	S	X B	DI	A DI
Dia bet es	KMea ns	1	Na	0.7	0.0	3.1	0.6	0.5
			N	26	01	78	481	63
	K- Mea	1	Na	5	4	4		6
			N	0.7	0.0	Inf	0.6	0.5
	ns++		N	23	01		481	50
				7	4			1
FC M		0.8	0.3	0.9	0.0	2.6	0.6	0.5
		08	31	54	01	11	480	47
		8	1	8	8	5	8	1

Breast Tissue	KMeans	1	Na	0.8	0.0	4.0	0.1	0.0
	ns K-		N	04	07	99	448	34
	Mea			7	6	6		1
	ns++	1	Na	0.8	0.0	Inf	0.1	0.0
			N	31	07		448	33
				7	8			8
	FC	0.8	0.3	1.0	0.0	3.6	0.1	0.0
	M	15	12	10	09	62	448	31
		1	6	6	5	3		7

A. Time Factor

This section describes the amount of time required to predict the disease. The comparative time required for treatment is listed in Table 4.

TABLE V TIME FACTOR

DISEASES	K MEANS (in msec)	FUZZY C MEANS (in msec)	KMeans ++ (in msec)
Diabetes	2160	3080	617
Breast Tissue	2060	2200	618

Table 4 shows the time it takes for each algorithm to predict the disease, and it can also be inferred that the clustering algorithm K means that ++ takes less time compared to other algorithms. The accuracy comparison of the clustering algorithms used in this study is shown in Table 5. K-means++ has better accuracy than the other two algorithms, indicating that it is a better disease clustering and prediction algorithm.

TABLE VI ACCURACY

DISEASES	K MEANS (in msec)	FUZZY C MEANS (in msec)	K- Means ++ (in msec)
Diabetes	85	80	90
Breast Tissue	88	88	93

IV. CONCLUSION

Data mining techniques in the medical field are sometimes ineffective or ineffective in discovering hidden relationships and trends. Therefore, it is necessary to use data mining technology to create effective and efficient analysis tools in the health field. Clustering is a technique that divides large data sets into small data sets that can be converted into information. This article introduces the clustering technique in detail, and proposes a set of different parameters to improve the accuracy of disease prediction. This article

also uses clustering to analyze predictions in the health field to discover new information retrieval ranges, and particularly demonstrates the usefulness of k-means ++ clustering.

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AUTHOR PROFILE



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DATA MINING'S ROLE IN MINING MEDICAL DATASETS FOR DISEASE ASSESSMENTS – A CASE STUDY

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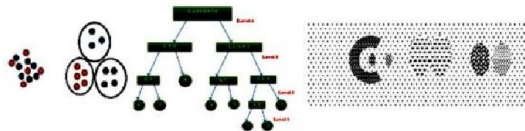


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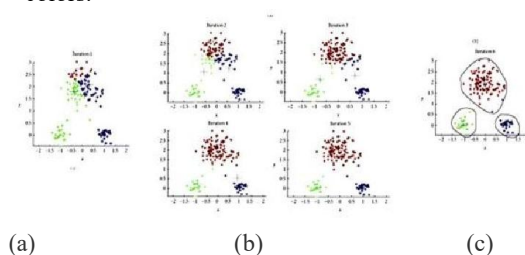
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Fig. 4. K-Means++ Algorithm

G. Fuzzy C Means Algorithm

In FCM, data points are considered based on membership level and can belong to multiple groups. The membership level defines the strength of the association within the group. Therefore, data points are assigned to groups based on membership level.

Figure 6 shows the FCM algorithm

Fuzzy C-means clustering algorithm

1. Initialization: Cluster centres are initialized randomly
2. Distance matrix creation: Calculate the distance between the data point x_i to each of the cluster center by using Euclidean distance measure.

$$d_{ij} = \sqrt{\sum_{k=1}^p (x_{ik} - c_{jk})^2}$$

3. Membership function creation:

//Fuzzy measurement is calculated by considering the fractional distance from the point to the cluster center and this measurement increased the fraction to the inverse fuzzification parameter. This parameter is divided by the sum of all fractional distances and also to ensure that the sum of all membership is 1.

$$\mu_{ji}(x_i) = (1/d_{ij})^{2/(m-1)} / \sum_{j=1}^c (1/d_{ij})^{2/(m-1)}$$

// Verify that the total membership is equal to 1

$$\sum_{j=1}^c \mu_{ji}(x_i) = 1$$

4. Each cluster a new centroid is generated by using the given formula

5. The above steps are repeated to generate optimized cluster centers.

Fig. 5. – FCM Clustering Algorithm

II. PROPOSED METHODOLOGY

The number of diabetic patients has increased (World Health Organization and India are number one in

diabetes. Diabetes requires proper care and control, and lack of proper care can lead to other medical complications in humans. 1 in 8 women in the United States Studies have shown that people with diabetes may develop breast cancer. Early diagnosis of breast cancer is important, and the prognostic diagnosis and staging are based on clinical examination. This study considers the detailed information of patients with diabetes and breast cancer to assess the potential for early diagnosis. Class algorithm diagnosis. The Indian Pima diabetes dataset is taken from the UCI machine learning repository. The proposed technology is implemented in MATLAB, as shown in Figure 6.

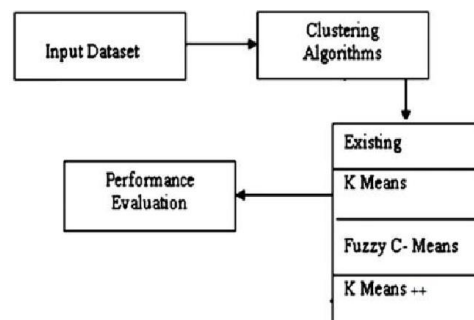


Fig. 6. Flow Chart of the Proposed Methodology

A. Major Parameters used in the study

The input data set has 768 instances with the 9 attributes listed in Table 1 and two types of questions used to test the incidence of diabetes. Table 2 details the 9 attributes of the breast cancer dataset used for research, including 106 examples.

Table II. Attributes of Pima Indian Dataset

No.	Attribute	Description	Missing Values
1	pregnancy	Pregnancy Count	109
2	glucose Level	Plasma glucose levels	6
3	Blood Pressure	Diastolic blood pressure (mm Hg)	34
4	triceps	Triceps skin fold thickness (mm)	224
5	insulin	serum insulin (mu U/ml)	373
6	mass	Body mass index (weight in kg/(height in m)^2)	12
7	pedigree	Diabetes pedigree function	0
8	age	Age (years)	0
9	diabetes	Class variable (test for diabetes)	0

HFS	high-frequency slope PA
DA	spectral impedance distance
MAX IP	Max. spectrum
P	spectral curve length
DR	distance between I0 and real part of the maximum frequency point

Table III. Breast Tissue Dataset

Attribute	Description
I0	Ohm at 0 frequency
PA500	phase angle (500 KHz)
AREA	spectrum area
A/DA	DA normalized area

B. Validity Measures used in the Study

The clustering algorithm tries to find the most suitable algorithm for a fixed number of clusters and parameterized cluster shapes. If the data can be clustered meaningfully, sometimes the number of clusters may be incorrect or the cluster shape may not correspond to the clusters of the data. It can be overcome by supported cluster merging, in which a large number of clusters are first used, and then reduced sequentially by merging similar clusters based on predefined criteria. It can also be overcome by using effectiveness functions with upper and lower bounds or grouping them using effectiveness metrics. Although many scalar validity measures have been proposed in the literature, this paper uses a new set of clustering validity measures to evaluate the comparative performance of the clustering techniques used for research. The detailed measurement is as follows

1. Partition Coefficient (PC): measures overlapping in clusters.

$$PC(c) = \frac{1}{N} \sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^2$$

Among them, μ_{ij} is the membership degree of data point j in group I , and the optimal number of groups is the maximum.

2. Classification Entropy (CE): measures the fuzzyness of a cluster.

$$CE(c) = -\frac{1}{N} \sum_{i=1}^c \sum_{j=1}^N \mu_{ij} \log(\mu_{ij}).$$

3. Partition Index (SC): It is the ratio between the sum of compactness and the separation of groups. It is used to compare partitions with the same number of clusters.

5. Xie and Beni's Index (XB): The relationship between variation and cluster separation.

$$XB(c) = \frac{\sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^m \|x_j - v_i\|^2}{N \min_{i,j} \|x_j - v_i\|^2}$$

$$SC(c) = \sum_{i=1}^c \frac{\sum_{j=1}^N (\mu_{ij})^m \|x_j - v_i\|^2}{N_i \sum_{k=1}^c \|v_k - v_i\|^2}$$

4. Separation Index (S): It is the minimum distance between clusters in partition validity.

$$S(c) = \frac{\sum_{i=1}^c \sum_{j=1}^N (\mu_{ij})^2 \|x_j - v_i\|^2}{N \min_{i,k} \|v_k - v_i\|^2}$$

6. Dunn's Index (DI): It is the identification of closeness and separation between groups.

$$DI(c) = \min_{i \in c} \{ \min_{j \in c, i \neq j} \{ \frac{\min_{x \in C_i, y \in C_j} d(x, y)}{\max_{k \in c} \{ \max_{x, y \in C_k} d(x, y) \}} \} \}$$

7. Alternative Dunn Index (ADI): Modify the original Dunn index to limit the difference between the two groups ($\min_{x \in C_i, y \in C_j} d(x, y)$)

$$d(x, y) \geq |d(y, v_j) - d(x, v_j)|$$

Where V_j is the center of the JU .

$$ADI(c) = \min_{i \in c} \{ \min_{j \in c, i \neq j} \{ \frac{\min_{x \in C_i, y \in C_j} |d(y, v_j) - d(x, v_j)|}{\max_{k \in c} \{ \max_{x, y \in C_k} d(x, y) \}} \} \}$$

III. RESULTS AND DISCUSSIONS

All three algorithms are run on Matlab for the above parameters. Table 3 lists the parameter output of the cluster parameters of all three algorithms used in the research.

TABLE IV. CLUSTERING OUTPUT

Dat	Algo	P	C	SC	S	X	DI	A
aset	rith ms	C	E			B	DI	DI
	KMea	1	Na	0.7	0.0	3.1	0.6	0.5
Dia	ns		N	26	01	78	481	63
bet	K-			5	4	4		6
es	Mea	1	Na	0.7	0.0	Inf	0.6	0.5
	ns++		N	23	01		481	50
				7	4			1
	FC	0.8	0.3	0.9	0.0	2.6	0.6	0.5
	M	08	31	54	01	11	480	47
		8	1	8	8	5	8	1

Breast Tissue	KMeans	1	Na	0.8	0.0	4.0	0.1	0.0
	ns K-		N	04	07	99	448	34
	Mea			7	6	6		1
	ns++	1	Na	0.8	0.0	Inf	0.1	0.0
			N	31	07		448	33
				7	8			8
	FC	0.8	0.3	1.0	0.0	3.6	0.1	0.0
	M	15	12	10	09	62	448	31
		1	6	6	5	3		7

A. Time Factor

This section describes the amount of time required to predict the disease. The comparative time required for treatment is listed in Table 4.

TABLE V TIME FACTOR

DISEASES	K MEANS (in msec)	FUZZY C MEANS (in msec)	KMeans ++ (in msec)
Diabetes	2160	3080	617
Breast Tissue	2060	2200	618

Table 4 shows the time it takes for each algorithm to predict the disease, and it can also be inferred that the clustering algorithm K means that ++ takes less time compared to other algorithms. The accuracy comparison of the clustering algorithms used in this study is shown in Table 5. K-means++ has better accuracy than the other two algorithms, indicating that it is a better disease clustering and prediction algorithm.

TABLE VI ACCURACY

DISEASES	K MEANS (in msec)	FUZZY C MEANS (in msec)	K- Means ++ (in msec)
Diabetes	85	80	90
Breast Tissue	88	88	93

IV. CONCLUSION

Data mining techniques in the medical field are sometimes ineffective or ineffective in discovering hidden relationships and trends. Therefore, it is necessary to use data mining technology to create effective and efficient analysis tools in the health field. Clustering is a technique that divides large data sets into small data sets that can be converted into information. This article introduces the clustering technique in detail, and proposes a set of different parameters to improve the accuracy of disease prediction. This article

also uses clustering to analyze predictions in the health field to discover new information retrieval ranges, and particularly demonstrates the usefulness of k-means ++ clustering.

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LARGE-SCALE DATA STORAGE AND PROCESSING SYSTEMS USING FAULT-TOLERANT

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Abstract: Big data systems are stable enough to store and handle large amounts of constantly changing data. Big data systems, on the other hand, are made up of large-scale hardware resources, making their subspecies prone to failure. The fundamental feature of such systems is fault tolerance, which ensures availability, reliability, and consistent performance even when there are defects. It's difficult to implement an effective fault tolerance solution in a large data system because fault tolerance must adhere to certain performance and resource restrictions. This research seeks to give a uniform understanding of fault tolerance in large data systems and to highlight typical roadblocks to fault tolerance efficiency enhancement. Previous research's fault tolerance solutions are examined to meet the stated difficulties. The report also includes a thoughtful assessment of prior research' conclusions, as well as a list of future options for addressing fault tolerance issues.

Keywords: Fault tolerance, Fault detection Fault recovery, big data storage, big data processing

1. Introduction:

Because of the increasing volume and relevance of data, the scientific community and businesses are paying close attention to big data systems

[1]. Massive volumes of data are being generated by sources such as Internet of Things sensors, social media, and healthcare apps. Social media application log generation rates, for example, can reach several terabytes or petabytes per day [2]. By 2025, the International Data Corporation estimates that 163 zettabytes of data will be created [3]. Because of hardware constraints on a single server, traditional Relational Database Management Systems (RDBMS) such as MySQL [4] cannot manage the growing volume of data. To transmit huge data into the correct form, data storage and processing must be spread among trustworthy servers. Fault tolerance is an important property of big data systems because it allows for failure-free execution and prevents performance degradation [5]. As a result, decision-makers and developers regard fault tolerance as an important property of big data systems because it allows for failure-free execution and prevents performance degradation. Popular big data frameworks, such as MapReduce [6] and its open-source implementation Apache Hadoop [7], have taken fault tolerance into account by providing various fault-tolerance approaches, such as data redundancy, checkpointing, and speculative execution, which enable resiliency against failures. However, they are not always able to meet their reliability [8] and performance

criteria since failures in large-scale settings have become the norm rather than the exception [9].

Fault tolerance is defined as the ability of a system to continue to function even when it encounters a fault [10,11]. The demand for efficient fault-tolerant solutions [12–20] to increase the reliability and performance of large data systems [21] has grown over time [12–20]. This requirement correlates to a rise in the number of software and hardware failures due to the underlying environment resources' scalability, complexity, and interdependency. One failure per day is predicted in a large-scale cluster of 1000 extremely dependable servers with a mean duration between failures of 30 years [5]. During the cluster's first year of operation, over 1000 individual nodes and hard disk failures occur [22,23]. The time it takes for these failures to recover might be as long as two days [24], which severely compromises performance.

On this foundation, a fault-tolerant solution for large data systems is required to improve availability, reliability, and performance in the face of failures. As a result, a literature study is required to comprehend the mechanisms by which fault tolerance has been handled in big data systems, as well as to acquire an understanding of the problems and current solutions in this field, as well as to identify new interesting research avenues. There have been few review papers focused on the issues and solutions of fault tolerance in big data systems too far. To our knowledge, only Memishi et al.

[25] concentrated on fault tolerance optimization techniques in MapReduce systems from 2004 to 2016. To overcome this gap, the current work aims to analyze and examine past studies concerning fault-tolerant solutions for big data systems. This study focuses on the problems that previous researchers have experienced and the

solutions that they have offered to solve those challenges.

The rest of the paper is laid out as follows. The second section gives an overview of large data systems, covering data storage and processing. Section 3 gives an overview of fault types and approaches to fault tolerance. Section 4 examines and analyzes the findings of the recommended solutions, while Section 5 classifies the fault tolerance issues and analyses the solutions mentioned in earlier research. Section 6 contains our conclusion as well as potential future study directions in this field.

2. System for Big Data:

Big data is comprised of the following elements: data, data storage, data processing, data analysis, information management, interfaces, and visualization. Data storage and processing, in particular, necessitate fault tolerance because they manage the storage and computing resources for large-scale data processing systems. These resources are also extremely vulnerable to failures due to their nature [26].

System for storing and managing data: Due to the huge amount of data being created, conventional storage systems have been limited in their ability to store and manage it. RDBMSs (relational database management systems) have historically been used to handle structured data [27]. However, these systems are incapable of storing and managing large amounts of data. To manage the massive amount of data, a scalable and reliable storage architecture that can achieve high data availability in a distributed way is necessary. There have been several storage systems suggested dealing with the problems of large data storage, including Google File System (GFS) [28], Hadoop Distributed File System (HDFS) [29], and OpenStack Swift [30]. These

systems are made up of dispersed storage devices that are connected over a network and that allow virtualization, distribution, and scalability to cope with a large amount of data efficiently. Distributed storage devices are generally a network with connected storage and the ability to virtualize [31], but they may be anything. In computing, storage virtualization is a method that creates a logical representation of physical storage resources, which is represented as a signal storage pool. The network of storage devices is used to access the information stored on them, regardless of where they are or what mode they are operating in. The storage system can have three file system modes, which are file storage, block storage, and object storage, all of which are utilized in large data storage systems. File storage, block storage, and object storage are the three file system modes available.

File Storage: Data is arranged hierarchically in files, and the storage system saves all of the file information as metadata, which is then accessed by other programs. The files can be accessed by finding the path of a specific file that has been stored in the metadata.

Block Storage: Data is split into blocks, with each block containing a portion of the total amount of data. For each block, the storage system assigns a unique ID to allow applications to access the block and aggregate the blocks based on their IDs.

Object storage is a method of storing data that is wrapped with information in objects. Each item has its own set of information with specific specifications, such as its geographical location, replica number, and degree of protection, which is unique to it.

Continuing the debate on the pros and disadvantages of each file system mode,

O'Reilly [32] gave a further in-depth analysis. GFS and HDFS are the most frequently used storage systems, and Verma and Pandey [33] offer a comparison of the two systems.

With the massive increase in data and the advancement of big data storage technologies for handling data storage and management in distributed systems, big data processing systems have been proposed to transform the massive amount of data into usable and desirable forms to facilitate the development of scalable solutions and algorithms, as well as the development of scalable solutions and algorithms. Big data processing systems, for example, are used by data scientists for data-intensive text processing, genome assembly, machine learning and data mining, and large-scale social network research, among other applications. Large-scale data processing systems include Hadoop [7], Spark [34], Storm [35], Samza [36], and Flink [37], all of which are open-source projects under the Apache Software Foundation [38]. Hadoop is the most frequently used large data processing system, followed by Spark, Storm, Samza, and Flink. The processing engine, the cluster manager, and the processing framework are the three primary levels of these systems [39].

1. The Processing Engine, which allows for the execution of basic calculations while concealing the specifics of parallelization, distribution, load balancing, and the implementation of fault tolerance.

2. Cluster Manager: This is a centralized service that is responsible for managing the configuration of the cluster. When used in conjunction with distributed data processing

frameworks, it enables dynamic resource sharing and provides effective resource management.

3. Processing Framework: A framework comprised of a collection of technologies that enables the efficient analysis of large amounts of data. A framework of this sort can enable a variety of application programming interfaces (APIs) to incorporate different types of applications and algorithms, such as scalable machine learning methods, graph-parallel computing, interactive analytics, or streaming, among others.

Big data processing systems provide a variety of characteristics that may be used in a variety of big data use cases. For example, Hadoop is capable of batch processing, while Storm and Samza are capable of stream processing, respectively. Spark and Flink, on the other hand, may be utilized for both batch and streaming operations. When data is gathered or stored in big files, batch processing is employed to make the data more manageable. When the processing is done, the outcome of the processing, such as the creation of an index from documents for internet-scale search, must be provided. Stream processing, on the other hand, is utilized when data is continuous and must be processed quickly, such as when analyzing tweets made by users on the social networking site Twitter. A comparative analysis of the different large data processing systems was carried out by Inoubli et al. [40] as part of an experimental survey conducted by them.

3. Tolerance for failure

3.1 Different sorts of faults

Fault, error, and failure are all essential concepts in fault tolerance [41, 42] and are discussed more below. These ideas are caused by a variety of circumstances that can be produced by either

software or hardware resources, and they have a variety of consequences on the behavior of the system as a whole. Figure 1 conceptually depicts the link between fault, error, and failure as they progress from the hardware to the software level, and vice versa. A fault is a non-standard hardware or software situation that causes an error to occur when the fault is in operation. An inactive fault is a circumstance in which a defect does not result in an error because it is outside of the scope of the system's capability to generate errors. Once an error is generated by an active fault, the error results in a divergence from the predicted logarithmic value, which fails the active fault. Failure is defined as the failure of a system to accomplish the purpose for which it was designed. The damage to the processor or memory, network overload, and damaged storage devices are all examples of common reasons for failure. Mistakes in software requirements or implementation, as well as external misuses, such as unexpected inputs, can all result in faults in the system being generated.

Permanent faults are distinguished from transitory faults, which are distinguished by their recurrence. A perpetual fault, also known as a fail-stop [43], is a defect that continues indefinitely and lasts for a specific amount of time. A permanent problem is straightforward to identify and locate since the defective component stays unresponsive once a permanent fault occurs [44]. This sort of fault is also easy to detect and localize. A transitory defect, which is also called a straggler [18] or a fail-stutter [45], on the other hand, makes a system accessible but with poor performance [46], as opposed to a persistent problem. In some ways, transient faults are more difficult to identify than permanent faults because they occur at a random frequency rather than at a predetermined frequency as with permanent faults; as a result, transient faults are more difficult to detect than permanent faults.

3.2 Approaches to fault tolerance

Failure tolerance is the characteristic of a system that allows it to continue operating normally even when there is a malfunction. [44] Fault-tolerant systems are built on the foundation of two fundamental concepts: fault detection and recovery. To achieve these two concepts, a variety of fault-tolerance approaches, which are classified in Fig. 2, can be used.

False-positive detection is the initial building block in the construction of a fault-tolerant system since it allows for the discovery of defects as soon as they present themselves in the system. Using heartbeat detection and fault prediction, which are both stable fault detection techniques, large-scale systems can identify and forecast faults. When error-free periods exist between two components, the heartbeat approach is designed based on an explicit and periodic exchange of heartbeat messages between the two components [44]. For example, if component A does not receive the heartbeat message from another related component B within a given period, then component A will announce that B has failed, and the fault-tolerant system will be prepared to apply a treatment action to restore functionality. Many large-scale systems, like HDFS, YARN, and Storm, have included this technique in their design and implementation. An unreliable component can only be identified if it is unable to transmit and receive heartbeat messages. Detecting problems before they arise, on the other hand, may be extremely beneficial.

The fault prediction technique is used to solve this issue. Fault prediction is a technique that anticipates potential failures in the future by utilizing a statistical model and historical information from previously completed workloads. The statistical model is used to examine the dependencies and parameters of the workload, such as the execution time,

scheduling restrictions, resource use, and machine burden before it is executed. Soualhia et al. [47] gathered historical workloads from a Google cloud cluster over one month and obtained precision up to 97.4 percent and recall up to 96.2 percent in forecasting failures using the Random Forest method. The results were published in the journal *Scientific Reports*. This prediction model has also been implemented in Hadoop to improve the scheduling choice for efficient fault recovery before the presence of the problem; as a result, it improves the overall reliability and performance of Hadoop [24].

Problem recovery, on the other hand, is used to restore the usual behavior of a defective component once a fault has been detected. Data redundancy techniques based on replication and/or erasure coding technologies are used in storage systems to assure data availability and dependability. In its most basic form, the replication method works by generating several copies of the original data and storing them on separate drives to provide availability and fault tolerance [48]. The GFS, HDFS, RAM Cloud [49], and Windows Azure Storage (WAS) [50] systems have all implemented this method to guarantee high data availability to their users. Once the data is transferred to the storage system, it is replicated on numerous servers and different racks, which is known as replication. The metadata file contains information on the replicas and their locations, which is accessible by the storage system. When a problem occurs, the storage system turns to the duplicated data directory for recovery when the original data files are no longer available for use. If both the original data and the replica are lost, replication becomes pointless in the worst-case scenario. Erasure coding is another kind of data redundancy that is widely used. When using erasure coding, parity data is created and stored on a separate drive with the original data, as opposed to reproducing whole blocks of data on a single disk. It is possible to recover the

original data if data is lost on one disk due to a defect. Parity data is used to do this. In (n, k) erasure coding, the data of size A is chunked into k equal chunks, and the parity data are represented as $n - k$, where n is the number of equal chunks in the data of size A . As a result, any k out of n would be sufficient to recreate the original data. Using the parity data, it is possible to reconstruct any two inaccessible pieces of data if the erasure coding is expressed as follows: $(4, 2)$. Erasure coding may be divided into two forms: maximum distance separable (MDS) and non-MDS. MDS is the most often utilized of the two types. The MDS erasure-coded system is capable of reconstructing every lost chunk of data based on the parity data, but the non-MDS system is only capable of reconstructing a handful of the lost chunks [32]. To improve the storage efficiency of HDFS [51], erasure coding has recently been added. Furthermore, the Reed–Solomon coding (RSC) is a common version of erasure coding that is utilized by Facebook and Microsoft storage systems [43, 52].

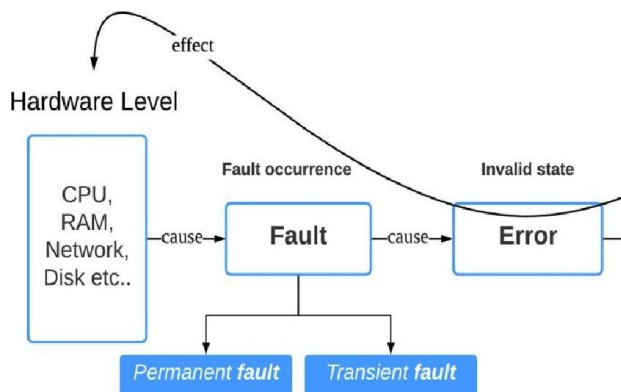


Figure 1: Relationship between fault, mistake, and failure.

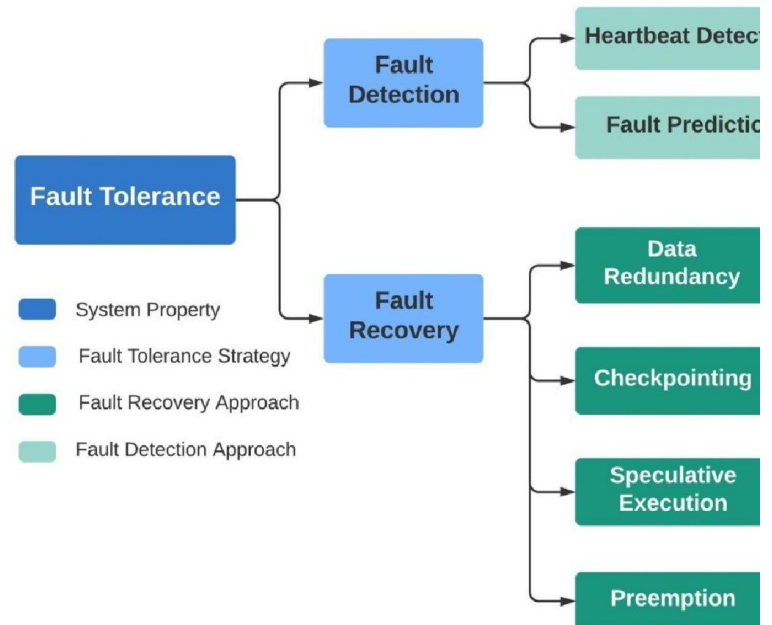


Figure 2: Approaches to fault tolerance are classified according to their fault tolerance characteristics.

Checkpointing, speculative execution and preemption are all examples of fault tolerance techniques that are commonly employed in large-scale data processing systems when a problem arises during the processing phase. Checkpointing works by capturing the state of an active node/process and storing it on another standby node, which is called a backup node. When an active node fails, the standby node takes over and restores the active node to its most recent recorded state, allowing for efficient and rapid fault recovery. Checkpointing is typically employed in mission-critical systems that require real-time transactions or stream processing in which latency is extremely low, such as financial systems. In the case of Flink, checkpoints are used to establish exactly-once processing guarantees by taking a snapshot of the operator state, which includes the current location of the input streams, at regular intervals [53]. Finally, speculative execution repeats the already running tasks whenever they perform

worse than an acceptable level due to a suspicion of failure on the part of the user. Considering the output of the high-performing jobs and terminating their identical counterparts that are doing poorly enables for speedier fault recovery in this manner. This is the method that YARN utilizes for fault recovery. A preemption technique is also a type of fault recovery approach that is typically utilized by the task scheduler to offer efficient fault recovery when the cluster has reached its maximum resource capacity. It is necessary to have a specified task preemption strategy in place to terminate the low-priority tasks and free up the available slots to re-execute the high-priority activities if they fail.

4. Challenges and solutions for fault tolerance in large-scale data systems

Recent challenges of fault tolerance in big data storage and processing systems can be broadly classified into four categories, as illustrated in Fig. 3. These categories are storage capacity, disk I/O/bandwidth usage, fault detection latency, and fault recovery efficiency, with storage capacity being the most difficult to overcome.

5. Storage system challenges and solutions that have been presented

Failure tolerance solutions in the storage system are achieved via the use of data redundancy techniques such as replication and error-correcting coding (ECC). When it comes to replication, the storage overhead has a direct relationship with the system dependability. As a result, reducing storage overhead without compromising dependability is a significant challenge.

When compared to replication, erasure coding provides significant storage savings while maintaining reasonable dependability. However, it results in high disk I/O usage and data

transmission overhead [54]. When it comes to fault tolerance in large data storage systems, the majority of the literature mentions the difficulties that must be overcome.

5.1 Delay between fault discovery and occurrence

The heartbeat detection technique [29, 62, and 63] is used in the majority of contemporary large data system implementations [29, 62, 63]. When a heartbeat is detected, a significant detection latency occurs, which means the procedure is taking longer to complete.

1) A delay happens on the static timeout value of the heartbeats, which message is received after the whole system has been impacted, and

2) A delay occurs on the static timeout value of the heartbeats

As a result, it results in a considerable performance overhead because it is the sole signal of probable permanent faults supplied while partly or temporary problems may still be capable of resisting the timer

5.2 Effectiveness of fault recovery

A failure of a single job has a detrimental impact on all of the other healthy data processing processes that are currently executing, resulting in an unpredictable execution time. There are some limits to the existing fault recovery techniques that are dependent on retry mechanisms, such as speculative execution, which requires a lot of processing and has a lot of drawbacks. When the scheduler of the resource management takes a long time to launch the recovery tasks as a result of an overloaded or full capacity of the related resources, the high computation happens.

Consequently, tasks are misplaced or re-executed from the beginning as a result of this lapse in time.

5.3 Capacity for storing information

When it comes to ensuring data availability and dependability, storage systems presently rely on the replication technique. There is a significant amount of data redundancy generated by this method. For example, whenever the data is uploaded to the storage system, GFS and HDFS automatically construct three copies by default. To be more specific, holding 1 TB of data would need 3 TB of storage space, which would result in a significant rise in storage space prices as well as an increase in energy usage.

5.4 Amount of disk I/O and bandwidth used

With the advent of data redundancy and the promise of reliability assurance, erasure coding is gaining popularity owing to its potential to consume less storage space while providing a promising reliability guarantee as compared to replication [31]. According to several researchers [52,55], the reconstruction procedure of parity data stored on many drives needs more disk I/O operations than the replication method. When accessing the parity data, this issue increases the latency and the number of reading requests; it also increases the amount of data sent between the nodes, especially if the data is stored on distributed disks that are housed on several nodes in different places.

5.5 Proposed Solution:

Several researchers, including Li et al. [19,56] and Wei et al. [57], have proposed solutions for reducing the amount of replicated data while still meeting data reliability requirements. They do so by focusing on the relationship between the amount of replicated data and the requirements for data availability and reliability. Long et al.

[58] and Hassan et al. [59] employ multi-

objective techniques to overcome the storage capacity overhead in their respective studies. Several recent studies, including those by Huang et al. [52,60] and Sathiamoorthy et al. [43], have focused on enhancing erasure code by manipulation of local parity. It was proposed by Wei et al. [57] to use the cost-effective dynamic replication management (CDRM) strategy to achieve the lowest possible number of copies while still fulfilling the availability criterion. CDRM makes use of a mathematical model to represent the link between the number of copies and the amount of data that must be available at any one time. According to the model, the minimum number of replicas should be determined by comparing the average failure rate and the current number of replicas with the projected availability needs specified by the user. When a need is not met, CDRM dynamically produces additional copies to meet the demand. The system has been deployed and is now fully integrated with the HDFS storage system. The experimental findings demonstrated that the adaptation of this technique maintains an appropriate number of copies while maintaining a stable storage environment, which is encouraging. An alternative approach, called cost-effective dynamic incremental replication (CIR), was presented by Li et al. [56], and it is described as follows: Using a reliability model provided by the same paper, CIR dynamically decides the number of replicas to be used in the experiment. The reliability model is used to solve reliability functions that result in the smallest number of replica estimations. These functions estimate the number of copies required based on the reliability factors, such as the chance of a defect occurring and the length of time the data is stored. The functions then illustrate whether or not the current number of replicas meets the criteria for data consistency. Consequently, when the replica number does not meet the dependability requirement, additional replicas are added progressively to the system.

Additionally, the study revealed that CIR significantly decreases data storage usage when data is only kept for a short period. CIR, on the other hand, is exclusively based on the reliability characteristics and price model of Amazon S3, making it inappropriate for Google clusters, which have a significantly greater failure rate than Amazon S3 storage and hence require a different storage solution. In a similar vein, Li and Yang [19] sought to reduce the number of copies while still fulfilling the criteria for data dependability, but were unsuccessful. According to the authors, a cost-effective reliability management mechanism (PRCR) is provided that is based on a generalized mathematical model that estimates data reliability in the presence of variable disk failures. When it comes to data reliability, PRCR uses a unique proactive replica checking technique to assure data dependability while retaining data with the smallest number of replicas possible. The assessment results have shown that PRCR is capable of managing a huge quantity of data while simultaneously reducing storage space usage by a substantial margin with minimal overhead.

6. Proposed options for a large data storage system

In Table 1, it is demonstrated that fault tolerance solutions offered to meet the difficulties of large data storage and processing systems may be divided into distinct solution groups based on the results of the research examined. The reliability trade-off,

multi-objective optimization, and erasure coding optimization are the three primary solution categories that may be used to handle the storage system issues. To study the link between storage system data dependability and the appropriate number of replicas for lowering the storage capacity overhead, reliability trade-off methods were presented. Following that, multi-objective optimization methods have been developed to

focus on improving a variety of parameters, including data availability, latency, and storage cost, that have an impact on the storage capacity overhead problem. Following that, erasure coding optimization methods based on a variety of algorithms were developed, to mitigate the problems associated with the high disk and I/O consumption in the storage system. Table 3 outlines the pros and disadvantages of each of the three solution groups in further detail.

By examining the link between the data reliability needs and the number of copies, reliability trade-off methods [19,56,57] have been found to minimize the amount of duplicated data. However, they have not much improved the situation when terabytes or petabytes of data must be replicated to ensure that data is always available. Furthermore, the studies have not taken into consideration other important aspects, such as data localization and access latency, which might negatively impact the overall performance of the storage system if the replicas are not put in the right locations. Instead, multi-objective optimization techniques [58, 59] deal with a variety of objectives, such as replica number and placement in a storage system, energy consumption, and storage costs, all of which conflict with the problem of storage capacity. They were able to obtain the optimal number of copies with the least amount of performance overhead when compared to the current replication techniques of big data storage systems, such as the Hadoop Distributed File System (HDFS). As a result of the replication-based solutions that have been presented, the amount of data redundancies in storage systems has been reduced to an absolute minimum. They are all capable of reducing storage capacity overhead while maintaining dependability, but none of them are perfect.

Erasure coding optimization methods [43, 52, and 60] were developed to improve the efficiency of erasure coding in popular storage

systems, such as HDFS and WAS, by modifying the erasure coding algorithm. Huang et al. [52] were able to minimize the real cost associated with code reconstruction by 50%. During the rebuilding process, Sathiamoorthy et al. [43] were able to minimize the amount of disk I/O and network traffic. The repair overhead associated with erasure coding, on the other hand, is about ten times larger than the replication overhead. In all of the research, the focus has solely been on permanent disk defects. However, there are transitory disk faults that can also result in data being unavailable for some time. It has not yet been possible to implement a hybrid fault tolerance approach for the storage system that is based on replication and erasure coding and can provide little storage overhead while maintaining high disk I/O speed.

To solve the fault tolerance issues in the processing system, the recommended solutions from the performed research are divided into four categories: fault prediction, pre-emption, dynamic resource scaling, speculative execution, and checkpointing. Presented in Table 2 are the predicted advantages and drawbacks of each of these solution groups.

To overcome the absence of fault detection in processing systems, fault prediction solutions seek to provide early fault prediction before the occurrence of a defect. In [24, 64–67], proposed methods have decreased the number of failures and avoided an expected performance violation from occurring by detecting problems before they happen. These methods are primarily focused on permanent faults since persistent faults result in significant levels of performance overhead and resource usage, which are undesirable. Virtual big data processing environments such as Hadoop clusters and Amazon EMR are used to assess the majority of failure prediction technologies. The workload execution time and compute resource consumption are the performance assessment

measures that are used to evaluate the performance of fault prediction systems in terms of fault prediction accuracy. However, even though fault prediction solutions provide early fault detection and improve system performance and resource consumption when compared to the default fault detection approach, they are still unable to predict every possible type of fault, which is especially important in large-scale environments where faults are unpredictable.

Table 1: The advantages and disadvantages of the fault tolerance methods for massive data storage systems

Categorization of Solutions	Advantages	Disadvantages
Trade-Off in Reliability	It lowers storage costs by reducing the number of copies maintained following the dependability requirement.	To achieve a balance between storage consumption and dependability, specific system settings must be specified.
Multi- Objective Optimization (MOO) is a type of optimization that considers many objectives.	It lowers storage costs by taking into account a variety of factors, including effective replica placement for the lowest latency and decreasing the number of replicas with reasonable dependability.	For a storage system that requires dynamic changes in its infrastructure, this is an inappropriate technology.
Optimization of Erasure	It provides efficient data	Especially if the degree of

Coding	redundancy as well as a high level of fault tolerance in a single system.	data dissemination is significant, it results in high disk I/O consumption and network bandwidth overhead, which can be costly.
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Table 2: The advantages and disadvantages of the fault tolerance methods for massive data processing systems

Categorization of Solutions	Advantages	Disadvantages
Prediction of Faults	It overcomes the difficulty of long detection latency by informing the user before a defect occurs.	A predictive model is used, which must be fed with different system metrics as well as faults that have been previously created.
Preemption	It makes adjustments to the task scheduler's decision by providing efficient fault recovery in terms of computation for tasks with a high level of priority.	To accomplish this, a task pre-emption strategy that takes into account task correlations, priority, execution time, and resource consumption is required.
Resource Scaling on a Dynamic Basis	It enables the system to dynamically scale up to	It is necessary to determine the computation time of the

	provide a healthy environment for re-performing a defective job in the future.	ongoing processes on each active node to offer an appropriate resource allocation.
The practice of Speculative Execution	It achieves a high level of fault tolerance while maintaining a decent level of performance by replicating the jobs that are already running.	It necessitates the use of more computing resources.
Checkpointing	Because it records the status of each active node or job and replicates it in another stable environment, it can provide a high level of fault tolerance for real-time data processing.	Because of the difficulty in maintaining consistency of the duplicated state as well as the high cost of CPU use

Conclusions:

Providing fault-tolerant data storage and processing services is critical to the ability of bigdata systems to deliver dependable data storage and processing services. Big data systems are housed in large-scale settings that are susceptible to a wide range of failures. Different

fault tolerance techniques have been implemented in big data systems to increase dependability and ensure that consistent data processing is maintained in the event of a failure. Fault tolerance in storage systems is achieved through the use of data redundancy techniques such as replication and erasure coding. Meanwhile, fault tolerance in the processing system necessitates the detection and recovery of errors throughout the processing process. Large-scale data systems, including the storage and processing layers, are described in detail in this work. These layers are particularly susceptible to errors and failures. Aside from that, this research offered an overview of fault tolerance ideas, covering typical fault types that occur in large-scale systems as well as fault tolerance techniques that are utilized to tolerate failures. This study also categorizes the main fault tolerance issues that have been encountered by prior studies that have offered fault-tolerant solutions for large-scale data systems. The storage capacity, disk I/O, and bandwidth use in the storage systems, as well as fault detection latency and fault recovery efficiency in the processing systems, are the problems that have been identified as classified. The techniques adopted by researchers to address each of the problems encountered in large data storage and processing systems are addressed and analyzed in greater depth. They may be used in large-scale systems such as big data systems or other similar systems to increase the efficiency of fault tolerance while also overcoming the problems that have been identified in this paper. The conclusions of this study may be used as a guide to further research into fault tolerance for big data systems in the future, which will help to expedite the advancement of future research.

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Smart Mirror Based on Raspberry Pi

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Abstract—The Smart Mirror dependent on conventional family reflect has a place with home mechanization framework to address purchasers' issues towards insightfullife. It furnishes tenants with a progression of wise encounters, for example, home machine control, data securing, natural checking, amusement and far off activity. The astute home control stage - The Smart Mirror is intended to take care of the issue of keen home correspondence and data coordination in the family. In light of the advancement of Raspberry Pie, unidirectional mirror and the infrared edge and other equipment gadgets, the savvy reflect, as a mirror show screen, offeres a sort of more secure, more agreeable, all the more helpfully, more quick and open smart, data based living space to family in the scholarly area.

Key Words—home automation system; Smart Mirror; Raspberry Pi; face recognition; speech interaction

level of combination between the savvy mirrors and the general keen home [4].

To take care of the above issues, the keen mirror dependent on Raspberry Pi was planned. Established on the standard of unidirectional mirror imaging, added the procedures like discourse acknowledgment and face acknowledgment, it understood correspondence and control through the Internet to make the astute life work out as expected.

The design is coordinated as follows: Section II portrays the general framework structure and capacities, including modules of this framework, strategies the savvy reflect utilized and a few capacities. Segment III presents the plan of brilliant mirror equipment, zeroing in on the imaging control, contact and wake-up module consequently. Area IV presents the framework programming configuration, zeroing in on the voice handling and collaboration and face acknowledgment program planning. At long last, Section V finishes up the paper and brings up the benefits of the savvy reflect dependent on Raspberry Pi and further work of brilliant mirror.

1. Introduction

With the nonstop advancement of the Internet of Things, different home devices have slowly become shrewd [1], yet the mirror, one of the most well-known things throughout everyday life, is as yet in a somewhat crude state. In 2012, a keen mirror dependent on Android showed up on the Japan Science and TechnologyExhibition. As well as showing day by day climate and weight data, it additionally can apperceive client's motion, which is ostensibly the "originator" of brilliant mirrors [2]; On August 2017, New York, United States group fostered a shrewd mirror Eve with a completely adjustable intelligent touch screen, has its own application store, you can use as a savvy home control place, to accomplish an assortment of home control capacities; Domestic close to a couple of years likewise seemed an assortment of capacities, application situations and an assortment of keen mirror [3]. Although research on keen mirrors has been going on , the infiltration pace of keen mirrors isn't high. The fundamental issues lie in the significant expense, the inadequate relevance of capacities and the low

2. The Overall Framework and Functions of the System

According to the sensible application, a sort of clever reflect designed on this paper that's appropriate for plenty styles of occasions, has the not unusualplace clever domestic feature and will increase the protection element thru the face popularity technology. It adopts Raspberry Pie because the manage processing middle to fulfill the multi- reason consciousness and sign processing. The clever reflect owns such a lot of modules, which incorporates Raspberry Pie outside imaging manage, wake-up touch, voice conversion, photograph seize module and integrated photos popularity processing, voice popularity and different interactive programs, as a way to recognise the feature of facts display, voice interaction, human perception, smart security, amusement and so on.

The typical framework and operating precept of this

device is shown in Fig.1.

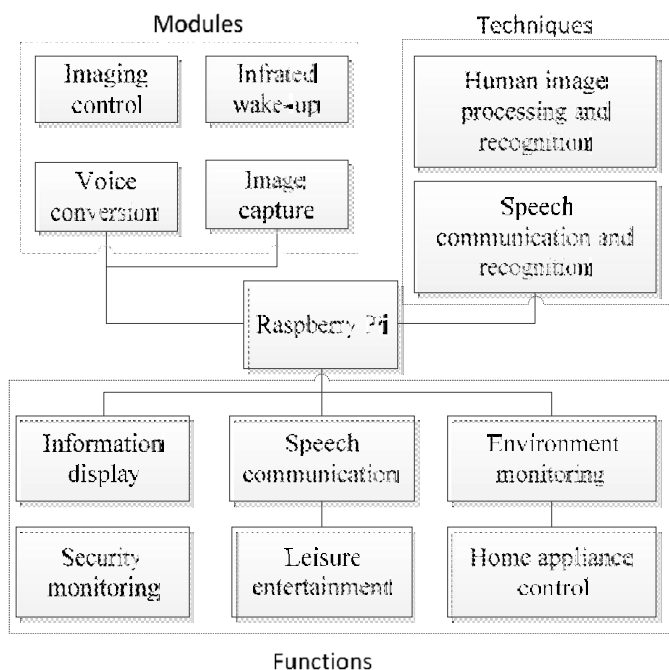


Fig. 1. functional diagram of the Smart Mirror

I. Hardware Design of the System

The hardware of device is consisted of single-sided mirror, infrared sensor box, show and motive force board, infrared sensor, raspberry improvement board, microphone, camera, relay and different components, which are as shown in Fig.2.

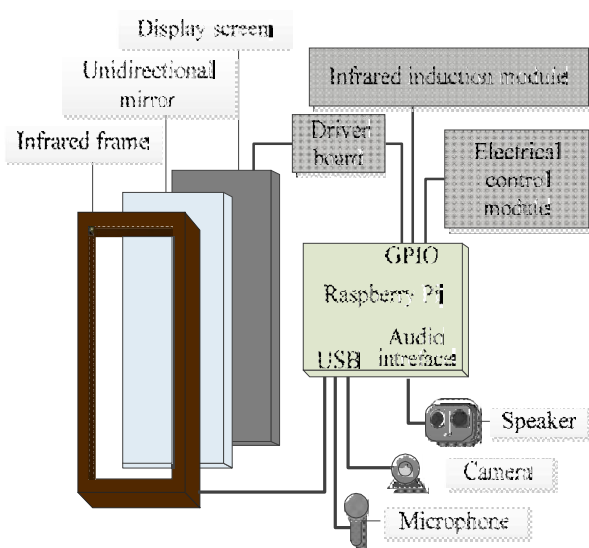


Fig. 2. hardware configuration diagram

A. Image Control Module

The imaging manage gadget of clever replicate is particularly consisted of one-manner replicate, driving force board, display, infrared field and so on.

Imaging manage gadget is the primary gadget of clever reflect show and human-pc interplay [5]. In preserving with the imaging homes of the reflect, it can also display the day by day statistics getting access to the Internet, inclusive of the weather, news, time and so on. The clever reflect can join the user's cellular telecellsmartphone via the WLAN community to synchronize memo, extradate the phrase board content, screen the reflect image, or maybe can direct contact interplay immediately into the community of clever home, take a selfie in the front of the reflect, browse the own circle of relatives integrated pictures and different functions. The imaging manage gadget in particular is based on show generation to offer the statistics and manage unit we urge to get on the house reflect

B. Touch Control Module

In order to remedy the maximum fundamental contact interplay hassle, this answer adopts the manner of including infrared body. Infrared body may be immediately linked to the Raspberry Pie via the USB port. Its essential paintings is to construct an infrared community in the infrared body, and to acquire the reason of contact interplay via way of means of the usage of a hint item to hinder a positive factor of the community to decide the predicted contact function [6]. The benefit of this answer is that the interplay hassle does now no longer require better necessities at the replicate. Instead, it most effective want to debug the applicable function after connecting the infrared body, which fees low improvement and is conducive to the improvement of the prevailing replicate with out the want to re-associated design. In the meantime, in comparison to the capacitive resistor, the contact panel of the infrared body has greater benefits due to the fact there isn't too excessive requirement for the contact terminal of the user. Any item, which isn't diagnosed via way of means of the capacitive resistance screen, which includes moist fingers, non-conductor contact bar, any skinny rod-fashioned items and different items, can contact the clever replicate.

C. Automatic Wake-up Module

The maximum essential requirement of clever domestic is strength saving. Smart replicate additionally have to broaden primarily based totally at the unique rate of the replicate and different advantages. The external

infrared automated wake-up module of clever replicate, most effective whilst the consumer approached the replicate will awaken the clever features. The relaxation of the time it's far an normal replicate, to keep the house energy costs.

II. Software Design of the System

A. Overall Design Process

The applicable preparatory paintings of improvement platform ought to be completed previous to the software program design. The precise paintings is as follows:

1. The answer makes use of a 2G above SD card, ideally high-velocity card, encouraged Class4 above the card, due to the fact the card's velocity at once impacts the Raspberry Pi operation velocity
2. Download the system image file of RaspberryPi.
3. Configure the SD card, connect the keyboard and mouse power cord, HDMI cable and other hardware devices [7].

In every day domestic life, because of the relative independence of every element withinside the clever domestic system, modular layout is carried out on this solution [8]. Software layout especially includes graphics processing and recognition, voice processing and interaction, community connection, peripheral control, statistics show module layout. The overall design process is shown in Fig.3.

B. Speech Processing and Interaction

At present, the improvement of cloud computing makes the interplay of many terminal gadgets efficaciously and correctly implemented [9]. In the voice interplay, the clever reflect completes the speech reputation of human voice with the aid of using the API (Application Programming Interface) of Baidu Speech Recognition. This mission is accomplished withinside the cloud and the voice processing element is regionally accomplished. The advantages of this method especially in 3 aspects:

1. The solution mode is fixed, every person can set their personal cellular telecellsmartphone or PC, clean for own circle of relatives individuals control;
2. Processing velocity is quicker than conventional speech reputation.
3. Make the relevant platform extra secure. Closed-supply voice processing makes Magic Mirror even extra superb in community security. Based on the conclusion of voice interaction, this paper programmed to obtain voice control. When it heard the voice command, such

as "flip on" or "flip off ", the automated whole the mild transfer operation. The clever replicate transfer operation is became on and stale with the aid of using controlling the electric strength supply, so the voice instructions also can be used to manipulate different numerous domestic appliances.

At the identical time, whilst paying attention to the voice command of "positioned song", the clever reflect robotically play track library song. Due to the usage of python application thread paintings mechanism, it can also understand the voice command at the same time as nonetheless singing, that have an green operation with out conflict [10].

In order to acquire the above purpose, the technical scheme subsequently used to write down the speech popularity application with the aid of using the python language, that's comprised the subsequent steps:

Step 1. Write the vital voice library, together with storing an array of strings for gambling voice content material, an array of strings storing track report names etc.

Step 2. Write the characteristic of 'audiorecord' to finish the user's recording work.

Step 3. Write the characteristic of voice popularity V2T, the recorded voice documents submitted via way of means of Baidu voice API to go back value, this is transformed to textual content effects. If the API returns dict [u'err_no '] is 0, the popularity is successful, go back dict [u'result '], in any other case the popularity isn't successful, go back 'bad'

Step 4. According to the again string effects key-word matching, the primary application for the corresponding operation to satisfy the situations of the voice command. When the key-word of voice command incorporates "Put track XXX", it'll robotically begin to seek the songs withinside the track library. If it unearths the track whose call is XXX, it'll open all of the manner to play the track, and the opposite manner will retain the voice popularity work. If the track isn't found, the desired voice set off maybe played. When the key-word of voice command incorporates the "flip on / off ", the device calls python's GPIO library to study and output the potentials to gain the switching relay operation. When the voice popularity result incorporates different key-word information, the device performs the desired voice content material in line with the key-word matching library

C. Face Recognition

With the fast improvement of clever home, we should take note of the problem of security [11]. For a few essential occasions, the clever reflect provides the characteristic of face popularity. The clever reflect completes the consumer's face popularity operation through calling the API of the notable determine face popularity. When there's no consumer in the front of the clever reflect, the reflect stays withinside the foremost interface. When a consumer

comes nearer in the front of the clever reflect, the clever reflect mechanically activates the face popularity service, and the contents of the reflect leap to the face popularity page

The device routinely submits the image of the photographed with the aid of using the digital digicam to the API of the amazing determine face recognition, after which the face identity web page shows the end result of the face recognition. The device compares the end result with the image withinside the photo gallery to decide the diploma of matching face. If the matching diploma is better than the set value, carry out a particular task, together with outputting the voice: "the proprietor is back" or switch on the essential door lock; if the matching diploma is decrease than the set value, carry out a particular task, together with controlling relay conduction excitation alarm. When the replicate towards the the front once more no one, the clever replicate to leap to the primary interface.

In order to reap this function, the technical answer writes face popularity web site the use of html language, realizes the web page soar and detects the character in the front of the clever replicate the use of python language, which incorporates the subsequent steps:

Step 1. Compile the face reputation pages the use of html language, together with face reputation domestic web page and consequences web page.

Step 2. Call the GPIO library with the aid of using python language, to acquire HC-SR501 infrared sensor manage of face reputation and web page soar manage. When a person is close to the the front of the clever reflect, the infrared sensor outputs a excessive level. At this time, the device simulates urgent the ctrl + tab key to finish the webpage switching and begins off evolved the Raspberry Pi unique digital digicam to finish the photographing of the user. The device uploads the taken photographs to the awesome face reputation API. The awesome face reputation API identifies the uploaded pictures and compares them with the pix withinside the pre-uploaded gallery with the aid of using the user. After acquiring the go back price of the face reputation, the consequences are displayed at the face reputation web page, which offers consequences approximately the character's age, gender, charisma, the character maximum just like the gallery, and the matching degree.

Step 3. According to the acquired matching degree, as compared to the pre-device to set the edge for comparison, the device will carry out a selected operation whether or not better or decrease than the settings. When it's far better than the set price, the clever reflect will make a valid to the user. When it's far decrease than the set price, the clever reflect manage relay can be on and the alarm can be activated.

Step 4. The infrared sensor continuously hit upon the reflect in the front of the situation. When the infrared sensor does now no longer understand the infrared records in a more in-depth distance, the device will press ctrl + tab key to leap to the clever reflect's major interface..

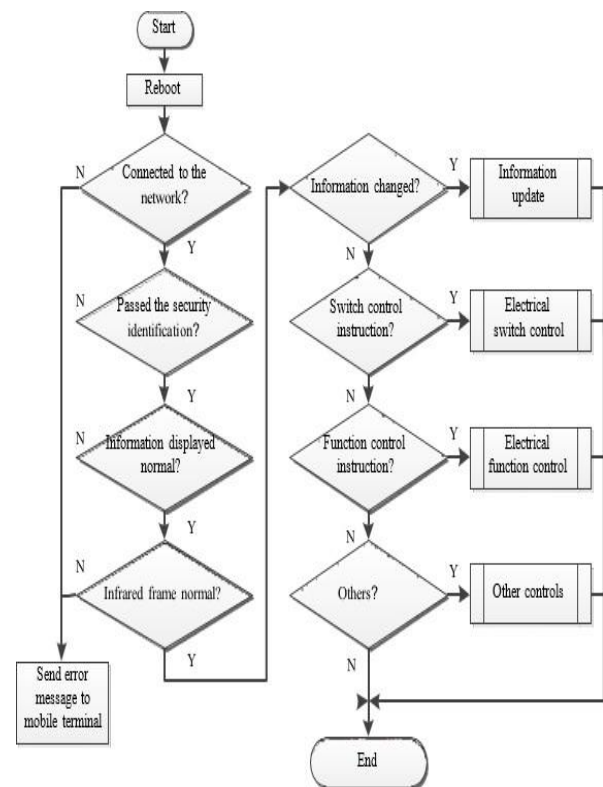


Fig. 3. system software design flow

III. Conclusions

The clever reflect, as a clever domestic manage platform, is equal to the consumer in phrases of operation and enjoy to offer a bodily terminal. Without extra furniture, it additionally presents customers with excessive best of lifestyles beneathneath the idea of green and intelligent [12]. As a answer, the clever reflect has many different extraordinary advantages, inclusive of fairly low cost. Because it does now no longer include the electromechanical gadget, so the improvement of outside manage gadget is simple. Overall, the clever reflect proposed on this paper presents a important platform answer for clever domestic in phrases of improvement and application. Based in this idea and layout ideas to reap the "clever reflect" works withinside the 2017 National College Students Intelligent Internet Innovation Competition gained the National Finals Smart Home Group "first prize". In the future, we will in addition discover and examine the velocity of speech sign processing and the accuracy of face recognition.

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TOPOLOGY & FLOW CONTROL TECHNIQUES IN MULTI-RADIO MULTI-CHANNEL WIRELESS MESH NETWORKS: A SURVEY

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Abstract—The Multi-Radio Multi-Channel Wireless Mesh Networks are dynamic in nature. Due to the dynamic traffic flow traffic varies very rapidly in the network. So it is the difficult task to measure the traffic flow on each link. Flow control plays an important role to provide the suitable link capacity among nodes. Flow control examines the required link capacity by calculating the traffic flow on each link. Due to the existence of co-channel interference in the network, capacity of each link has been reduced and links do not provide the required capacity to transfer the data. Co-channel interference and link capacity are inversely proportional to each other. Higher co-channel interference in the network minimizes the link capacity. The lower capacity links slow down the transmission speed and reduces the network performance. To attain efficient network performance, suitable link capacity should be provided in the network.

Topology Control is another important technique used in wireless mesh networks to logically control the topology of the network, representing the communication links between network nodes. The goal of topology control is to reduce energy consumption, radio interference and improving spectral efficiency while maintaining network connectivity. Interference is confined by lowering the transmit power. Besides reducing energy consumption, topology control has the positive effect of reducing contention when accessing the wireless channel.

During the last decade, researchers have developed various flow control and topology control algorithms to enhance the performance of MRMC-WMN. These algorithms evaluate the present load, available bandwidth on each link and evaluate the network structure then assigns suitable channel on each link. Due to the variation in traffic flow, it is difficult to fulfill the bandwidth requirement of each link. In this paper, several mechanisms proposed by numerous authors have been studied that focused on the flow and topology control techniques to provide the suitable link capacity between nodes.

Keywords—Multi-Radio Multi-Channel Wireless Mesh Networks, Flow Control, Link Capacity, Load, Co-Channel Interference, Topology Control.

I. INTRODUCTION

Wireless Mesh Network is emerging as a promising network standard to provide wireless services in flexible and self-configured manner. The ease of deployment of this network standard has resulted in its widespread usage in various applications. Wireless Mesh Network (WMN) recently attracted much more attention as it provides the fast and inexpensive network deployment by replacing the wired cables with wireless media [13]. It has rich interconnection among network nodes. WMN has various advantages over the traditional wireless network such as better network connectivity, extremely adaptable, expandable and better network performance. WMN consists of mesh routers, mesh gateways and mesh clients as shown in Fig. 1.

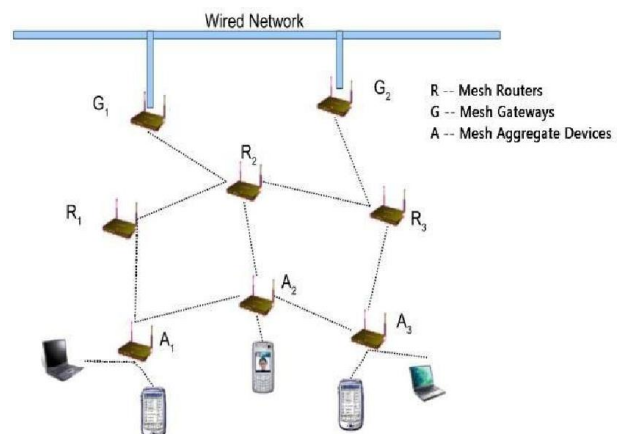


Fig. 1. Wireless Mesh Network Architecture

Mesh gateway nodes are connected to the outside network and provide wired backbone connectivity to the whole mesh network. Mesh gateway nodes act as intermediate nodes between wired network and mesh network and forward data in and out of mesh network [25]. Mesh routers communicate with mesh clients in a multi-hop manner. Each node in the network forwards data on the behalf of another node towards the destination node. Certain mesh routers have routing capability to forward the data towards neighbor nodes [11]. Mesh clients are connected with mesh routers through the wireless links to access the network services [4]. Mesh clients are mostly

mobile nodes, which typically run on batteries. Thus, the power usage of mesh clients should be minimum. This can be achieved by reducing the radio functions e.g. single wireless interface, low antenna gain and low computational complexity.

WMNs are characterized as self-forming, self-healing, reliable, fault-tolerant and multi-hop networks. Due to these features, WMN has the flexible network architecture [19]. Any new node can be added to the network without re-configuring the network. The new node configures itself according to the network configuration and detects the neighbor nodes in the network. After detecting the neighbor nodes, the new node establishes the possible network connection and starts accessing the network services [17]. Due to self-healing and fault-tolerant features, if any node has lost the configuration or any route has failed then node automatically repairs itself and establishes new links for data transfer. Failed node gathers the required information from neighbor nodes and start repairing itself [14].

The multi-hop feature allows to extend the coverage area of the network and increases the frequency reuse. With the support of this feature, data can be transmitted easily from node to node. Multi-hop mesh network is more robust as compared to single-hop networks because it is not dependent on one node for its operation [26]. Moreover robustness can be achieved by using multiple routes to deliver data.

II. FLOW CONTROL

Traffic flow is the dynamic property, which changes very rapidly in the network. It depends on the number of clients in the network and the amount of data transmitted by each client [27]. In a network, each link should have appropriate capacity so that traffic flow can be passed successfully. Flow Control is the process which makes sure that each node is getting the required link capacity. Due to the availability of co-channel interference capacity of each link has been reduced. If any node in the network is not getting sufficient link capacity it will slow down the transmission speed and hence reduces the network performance.

By controlling the flow of each link, WMN achieves the maximum network throughput, traffic demand of each link and maximize the end-to-end data rate [8]. Flow control continuously monitors the traffic flow in the network and ensures that each node receives required link capacity. With proper link capacity, each node can transfer at better rate and enhances the network performance.

III. TOPOLOGY CONTROL

Topology Control is an important technique used in wireless mesh networks to logically control the topology of the network, representing the communication links between network nodes [18]. The goal of topology control is to reduce energy consumption, radio interference and improving spectral efficiency while maintaining network connectivity. Interference is confined by lowering

the transmit power [9]. Besides reducing energy consumption, topology control has the positive effect of reducing contention when accessing the wireless channel. Network topology with and without topology control is shown in Fig 2 & 3.

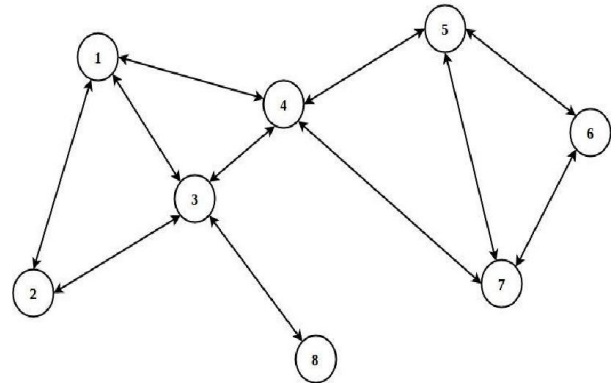


Fig. 2. Network topology without topology control

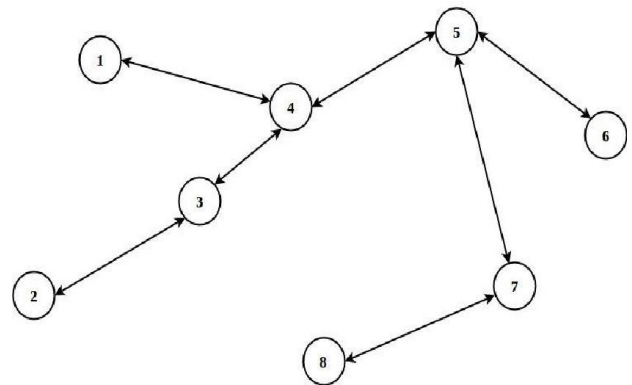


Fig. 3. Network topology with topology control

Transmit power is directly proportional to the distance between the nodes, so topology control replaces the long links with shorter links. When topology of the network is designed properly, it can help to improve the network operation such as connectivity among nodes, energy efficiency, mobility resilience, network capacity increase and interference reduction etc. Topology control is mutually dependent on power control, channel assignment and routing techniques which poses new design challenges on its design.

Topology control can be considered as an additional protocol layer placed between the routing and MAC layer in the protocol stack as shown in Fig. 4. Two-way interactions may happen between the routing protocol and topology control protocol [11]. The topology control protocol obtains the information about immediate neighbors of a node and initiates a route update when any node has changed its position. Hence, topology control leads to a faster response to topology changes and reduced packet-loss rate.

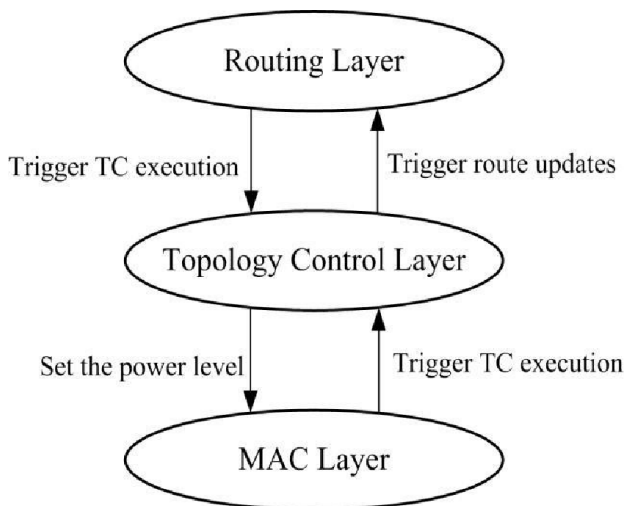


Fig. 4. Topology control with routing and MAC layers [11]

The routing layer initiates the re-execution of the topology control protocol when it detects route failure in the network. In case MAC layer found new neighbor nodes then it also initiates re-execution of the topology control protocol. The interactions between MAC and topology control ensures a quick response to changes in the network topology.

IV. CLASSIFICATIONS OF TOPOLOGY CONTROL

Topology control is classified into two approaches as centralized approach and distributed approach. These are explained below.

A. Centralized Approach:

The centralized topology control approach has the centralized control to periodically collect information about any change in the network topology [20]. Any change occurred in network topology is observed by a centralized server and notified to other concerned layers for necessary operations. This approach is less effective as compared to distributed approach because the centralized server is not able to collect and share complete information of the network topology. The additional cost of server and server maintenance cost makes this approach much expensive.

B. Distributed Approach:

In distributed topology control approach, each node participates to collect the topology information rather than the single server. Each node collects the topology information and shares with other nodes [28]. This approach is much more beneficial as compared to the centralized approach because in distributed approach, all nodes put the effort to collect the topology information rather than the single server. In distributed approach, exact position of nodes and the transmission range of each node should be known to control the topology dy-

namically. Information collection in distributed approach is fast and cost-effective. In this approach, emphasis is given on the quality of the topology control produced rather than the process of building the topology itself.

V. FLOW CONTROL TECHNIQUES

In [16] authors proposed Load Aware Channel Assignment algorithm that considers the traffic load on each link to assign the appropriate channel. The algorithm estimates the link load as well as the capacity of each link and assigns channel in such manner that bandwidth of link at least equal to the traffic load. In the next phase, the authors proposed routing algorithm to enhance the network performance. The proposed algorithms have been compared with Identical Channel Assignment algorithm and Neighbor Partitioning Channel Assignment algorithm. It is found that the proposed algorithm outperforms existing algorithms. A Multi-Channel WMN architecture is presented in [15] where each node is equipped with multiple interface cards. The paper presented a distributed algorithm for channel assignment and routing based on local traffic load information. The simulation study shows that by using two network interface cards on each node, network throughput can be enhanced from six to seven times as compared to single-channel ad hoc network architecture. Authors in [22] described that phenomenon of fading and interference between channels are two fundamental aspects of wireless communication that makes the problem challenging and interesting. Authors focused on point-to-point communication and multi input & multi output communications. To manage the interference among channels power control, multipath combining, interference averaging, time interleaving and soft handoff techniques are used. Authors also consider the concept of channel capacity as the basic performance measure. In [2] authors proposed an On-line On-demand Dynamic algorithm to satisfy the QoS constraints in the presence of random amount of traffic. This algorithm reassigns channels only when a demand from a node cannot be accepted by the current channel assignment algorithm and algorithm ensures the number of channel reassignments should be minimum. Results show that the proposed algorithm efficiently uses the available channels and performs better as compared to Optimal Static Channel Assignment algorithm.

In [7] authors formulated the joint channel assignment and flow allocation problem for MRMC WMNs as a Mixed Integer Linear Program. This formulation takes into consideration several important network parameters such as the transmission power, path loss information and the signal to interference plus noise ratio used in the data communication. Simulations results show that this formulation improves the use of the spectrum, by providing superior channel assignments and flow allocations. Authors proposed Distributed Flow-Radio Channel Assignment algorithm in [23] to improve the performance of MRMC WMNs. The proposed algorithm works in four different phases such as Flow Radio Assignment phase, Transmitter Announcement phase, Channel Selector

phase and Conflict Elimination phase. The proposed algorithm has been evaluated on large random topologies and it has been found that proposed algorithm performs better as compared to the existing algorithms. Authors in [24] introduced the load balancing technique to solve the multicast routing and channel assignment problem. A multicast weighted conflict graph is devised to model partially overlapped channels interference and it uses link weight to measure the degree of interference. Simulation results show that this technique achieves high performance, reduces the network interference and improves WMN service capability while dramatically reducing computational complexity as compared to existing techniques. In [10] authors proposed a routing metric that provides link quality information based on PHY and MAC characteristics. Authors introduced a method to estimate the available bandwidth of a link based on the conflict graph model and calculation of maximal cliques. Based on the routing metric, the authors proposed Link Availability based Routing Mechanism to enhance the quality of routing protocol. Simulation results show that the proposed algorithm has better ability to support the network scalability and has better routing capabilities. A novel method using Tabu Search Optimization for channel assignment and traffic scheduling algorithm have been proposed by authors in [19] for WMNs. Adaptive memory and responsive exploration are the main features of Tabu Search Optimization and used to make intelligent decisions. As compared to existing MMF method, proposed method shows better performance in terms of throughput and energy consumption.

VI. TOPOLOGY CONTROL TECHNIQUES

Authors in [18] illustrated that a better topology control technique can lead toward the lower interference and higher link capacity in the network. The author considered existing work of various authors in the field of topology control and survey state of art solutions to tackle the problems of energy consumption and interference. Various topology control techniques have been compared with each other and advantages and disadvantage of each technique are analyzed. Authors in [21] proposed Interference Aware Topology Control Channel Assignment algorithm and QoS Routing for MRMC WMNs. This algorithm assigns the channels for each node in such a manner that the network should have minimum interference among each node. Further the paper presented maximum bottleneck path heuristic to find the single path between the source and the destination node. Simulation results show that the proposed algorithm improves the network performance by 57% as compared to the Common Channel Assignment algorithm. In [1] authors introduced an enhanced version of Topology Controlled Interference Aware Channel Assignment algorithm to enhance the throughput and fairness ratio. This algorithm recognizes all least interference channels and uses the two-way interference edge coloring to solve interference problem during channel assignment. Simulation results show that the proposed algorithm performs better as compared to the existing algorithm in terms of

throughput ratio and fairness ratio.

A three step solution to tackle the topology control problem has been proposed in [12]. Firstly, routing tree is constructed to balance the traffic load among routers. Secondly, bind the radios of node to the links that needs to serve. Thirdly, antenna orientations have been adjusted and channels are assigned to links. Simulation results show that the proposed method improves the network capacity significantly by optimizing antenna orientations and channel assignment. In [6] authors presented a Topology Controlled Interference Aware Channel Assignment (TICA) algorithm for MRMC WMNs. This algorithm assigns channels based on power control and topology control algorithms to minimize the co-channel interference and to maximize network throughput. In this paper, authors further proposed e-TICA algorithm based on two way interference-range edge coloring and minimum spanning tree. NS-2 based simulation shows that the proposed algorithm performs better as compared to common channel assignment algorithms in terms of network throughput and fairness among traffic flows.

Authors in [5] proposed topology control and channel assignment algorithm for MRMC WMNs. The aim of this algorithm is to create a connectivity graph with a small node degree to minimize the co-channel interference. In the channel assignment algorithm, gateway assigns a channel to each link based on the computed rank. It starts assigning the channels to the 11 highest ranked links from the first channel. In [3] authors studied the relationship between k-connected logical topology and the maximum number of assigned channels. Based on shortest disjoint paths and minimum interference disjoint paths, the authors developed a k-connected logical topology design algorithm and based on minimum spanning tree a static channel assignment algorithm is proposed. Simulation results demonstrate that the proposed algorithm achieves higher performance in terms of throughput and end-to-end delay as compared to Fault Tolerant Topology Control algorithms.

VII. COCLUSION

The Multi-Radio Multi-Channel Wireless Mesh Networks are dynamic in nature. Due to the dynamic traffic flow traffic varies very rapidly in the network. So it is the difficult task to measure the traffic flow on each link. Flow control plays an important role to provide the suitable link capacity among nodes. Flow control examines the required link capacity by calculating the traffic flow on each link. Due to the existence of co-channel interference in the network, capacity of each link has been reduced and links do not provide the required capacity to transfer the data. Co-channel interference and link capacity are inversely proportional to each other. Higher co-channel interference in the network minimizes the link capacity. The lower capacity links slow down the transmission speed and reduces the network performance. To attain efficient network performance, suitable link capacity should be provided in the network.

Topology Control is another important technique used in wireless mesh networks to logically control the topology of the network, representing the communication links between network nodes. The goal of topology control is to reduce energy consumption, radio interference and improving spectral efficiency while maintaining network connectivity. Interference is confined by lowering the transmit power. Besides reducing energy consumption, topology control has the positive effect of reducing contention when accessing the wireless channel.

During the last decade, researchers have developed various flow control and topology control algorithms to enhance the performance of MRMC-WMN. These algorithms evaluate the present load, available bandwidth on each link and evaluate the network structure then assigns suitable channel on each link. Due to the variation in traffic flow, it is difficult to fulfill the bandwidth requirement of each link. In this paper, several mechanisms proposed by numerous authors have been studied that focused on the flow and topology control techniques to provide the suitable link capacity between nodes.

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DEVELOPMENT OF LOW COST AGRICULTURAL TYING HANDLER MACHINE(ATHM)

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Abstract: Designed to be agricultural purposes. The conceptual lightweight, fully portable and easy to use, ATHM (say Agricultural Tying Handler Machine) allow for high productivity application of a twist tie closure for applications where the product cannot be brought to a stationary machine but a machine needs to be brought to a product. In 3 inch (approx.. 76.2 mm) diameter, ATHM can tie anything without adjustment and light weight. ATHM is easy to use, compact with lightweight and fully portable, the product can be taken wherever needed and has a multitude of uses and applications but especially for use, compact with lightweight and fully portable, the product can be taken wherever needed and has a multitude of uses and application.work process and detailed design execution are to be studied and applied on modelling. The mechanical properties for the parts and sub-parts are to be studied and validated. The results of simulation and experiment are to be developed.

INTRODUCTION

ATHM (say Agricultural Tying Handler Machine) can tie anything without adjustment and lightweight. The machine has the capabilities of tie the betel plants with the support stem/stick which has a maximum space of 3 inch diameter.ATHM is easy to.

CONVENTIONAL PROCESS OF TYING

Betel plants do not grow erect above the ground surface. Stems are flexible in nature. It needs hosting plants or supportive sticks. For every 9" – 12", cross long sticks are placed one above the other. Betel plants are tied together with sticks manually, to avoid ground fall and protect from wind. The hosting stick provides the support to grow over on it for betel plants.

The closed system cultivation using rectangular structures (artificial) called barejas.

ADDITIVE MANUFACTURING

Additive manufacturing, is the construction of a three-dimensional object from a CAD model or a digital 3D model. The term "3D printing" can refer to a variety of processes in which material is deposited, joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused together), typically layer by layer. As of 2019, the precision, repeatability, and material range of 3D

TO is different from shape optimization and sizing optimization in the sense that the design can attain any shape within the design space, instead of dealing with predefined configurations. The design is optimized using either gradient-based mathematical programming techniques such as the optimality criteria algorithm and the method of moving asymptotes or non-gradient based algorithms such as genetic algorithms. Topology Optimization has a wide range of applications in aerospace, mechanical, biochemical and civil engineering. Currently, engineers mostly use TO at the concept level of a design process. Due to the free forms that naturally occur, the result is often difficult to manufacture. Adding constraints to the formulation in order to increase the manufacturability is an active field of research. In some cases results from TO can be directly manufactured using additive manufacturing; TO, thus a key printing have increased to the point that some 3D printing processes are considered viable as an industrial- production technology, whereby the term additive manufacturing can be used synonymously with 3D printing. One of the key advantages of 3D printing is the ability to produce very complex shapes or geometries that would be otherwise impossible to construct by hand, including hollow parts or parts with internal truss structures to reduce weight.

Topology optimization (TO) is a mathematical method that optimizes material layout within a given design space, for a given set of loads boundary conditions and constraints with the goal of maximizing the performance of the system

part of design for additive manufacturing.

FUSION DEPOSITION MODELLING (FDM)

Fused Filament Fabrication (FFF), also known under the trademarked term fused deposition modeling (FDM), sometimes also called filament freeform fabrication, a 3D printing process that uses a continuous filament of a thermoplastic material. Filament is fed from a large spool through a moving, heated printer extruder head, and is deposited on the growing work. The print head is moved under computer control to define the printed shape. Usually the head moves in two dimensions to deposit one horizontal plane, or layer, at a time; the work or the print head is then moved vertically by a small amount to begin a new layer. The speed of the extruder head may also be controlled to stop and start deposition and form an interrupted plane without stringing or dribbling between sections. "Fused filament fabrication" was coined by the members of the Rep-Rap project to give a phrase that would be legally unconstrained in its use, given trademarks covering "fused deposition modeling". Fused filament printing is now the most popular process (by large family of flowering plants. The group contains roughly 3,600 currently accepted species in 13 genera. The vast majority of peppers Members of the Piperaceae may be small trees, shrubs, or herbs. The distribution of this group is best described as pantropical. The best-known species, *Piper nigrum*, yields most peppercorns that are used as spices, including black pepper, although its relatives in the family include many other spices. The **betel** (*Piper betle*) is a vine of the family "Piperaceae", which includes pepper and kava. **Betel leaf** is mostly consumed in Asia, and elsewhere in the world by some Asian emigrants, as betel *quid* or in paan, with arecanut and/or tobacco. Plants are often rhizomatous, and can be terrestrial or epiphytic. The stems can be either simple or branched. Leaves are simple number of machines) for hobbyist-grade 3D-printing. Other techniques such as photo-polymerization and powder sintering may offer better results, but they are much more costly.

PIPERACEAE PLANT FAMILY

The **Piperaceae**, also known as the pepper family, are a can be found within the two main genera: *Piper* (2000 species) and *Peperomia* (1600 species). with entire margins, and are positioned at the base of the plant or along the stem, and can be alternate, opposite, or whorled in arrangement. Stipules are

usually present, as are petioles. The leaves are often noticeably aromatic when crushed. Inflorescences (in the form of spikes) are terminal, opposite the leaves, or located in the axils. Flowers are bisexual, with no perianth, each flower is subtended by a peltate bract. Stamens are 2-6, and hypogynous, with 2-locular anthers. There are usually 3-4 stigmas attached to a single pistil per flower, which is 1 or 3-4 carpellate. The ovary is 1locular, and superior. Fruits are drupelike, with a single seed per fruit.

2.3 OBJECTIVES

In betel plants cultivation, the foremost objective is to reduce the work effort of the agricultural workers and improvising time consumption. To develop the optimized design model of machine (product) for fabrication. To evaluate the load and dynamic condition with respect to speed and time. To analyze and investigate the experimental setup of the machine.

CONCEPT DESIGN MODEL OF ATHM

In concept layout, the machine should cover and tie the betel plant with the stick. So why, the rotating part like gear movement is needed and it must have the capability to hold the ribbon for tying the betel plants. Therefore, the holding gear wants to design in the work along with the conceptual design hook like appearance. There is a spur gear part known as Holding Gear (drags the fibre the fibre ribbon needs to twist together which is achieved by a propeller coupled with a motor. The propeller is coupled with a DC motor which is placed in the centre of the case. It twists by rotating the ribbon after completion of one cycle holding gear part. The holding gear is also connected with a pinion which rotates it by DC motor. The model view of rotational direction by holding gear is shown in fig.4.4.

The concept design is an early stage process for the product and so detailed design as followed then. The views of concept design model of Agricultural Tying Handler Machine are shown in Based on the above data, the number of teeth for gear and pinion had been calculated. From the obtained data, holding gear and pinion are designed and fabricated.

BRUSHED DC MOTOR & TYPES

Advantages of a brushed DC motor include low initial cost, high reliability, and simple control of motor speed. Brushes are usually made of graphite or carbon, sometimes with added dispersed ribbon from the roller) which is arrested with **Model view of top** inside of the bottom case. It satisfies the first **rotational direction by gear**. constraint (rotational displacement over the stem and stick). The Second constraint,

GEAR CALCULATION AND SELECTION

In Agricultural tying handler machine, the rotating gears such as holding gear, pinions, supportive bevel gear and motor pinion are used. The holding gear and pinion are engaged with one another and so the position of these parts are calculated. At first, the centre distance between the holding gear and pinion are fixed and made as constant one. The module of the gear and pinion is 1.5. Gear ratio and teeth number had been calculated. copper to improve conductivity. The drawing view of permanent magnet DC motor is shown in fig.4.9 [9].

ELECTRICAL COMPONENTS OF ATHM

The components used for the circuit in the Tying Handler Machine as follows

Arduino Uno R3, 3V 130 DC motors, Diode 1N4001, MOSFET IRFZ44N series, Jumper cables, 9V Battery – heavy duty.

The input signals represent machine or process conditions as a range of voltage or current values. These signals are sent to the microcontroller and evaluate the status of inputs, outputs, and other variables as it executes a stored program. The microcontroller sends signals to update the status of outputs. Output modules convert control signals into digital or analog values that can be used to control various output devices (motors).

CHARACTERISTICS OF ARDUINO UNO R3

The Arduino Uno R3 is a microcontroller board based on a removable, dual in-line package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded onto it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics [10]. The R3 is the third, and latest, revision of the Arduino Uno.

The circuit diagram electrical system of agricultural tying handler machine (ATHM) is shown in fig.4.12. Arduino Uno R3 contains ATMEGA 328P microcontroller which provides both digital and pulse with module signals. Due to requirement of intermittent output, PWM is used to start, run and stop the motors by applying value range and delay. Pulse with module signal has been fed into gating port of the MOSFET IRFZ44N series transistor. The source output of the transistor is connected to the motor and then the other end is grounded. The circuit connection for motor 1 & 2 and motor 3 is a) and b) respectively.

CODE DEVELOP IN ARDUINO TOOL

The Arduino board is connected to a computer via USB, where it connects with the Arduino development environment (IDE). The Arduino code in the specific delay time at a specific speed which are provided by the user has been written in the IDE, then uploads it to the microcontroller which executes the code, interacting

with inputs and outputs such as sensors, motors, and lights. Arduino code is written in C++ with an addition of special methods and functions, which we'll mention later on. C++ is a human-readable programming language. When the programming is created a 'sketch' (the name given to Arduino code files), it is processed and compiled to machine language. The Arduino programming code has developed for the output to the product as follows and also as shown in fig.4.14.

SIMULATION AND TEST RUN OF ATHM

Work process of Electrical system in ATHM.

The motors in ATHM are run and delayed by the input of PWM (Pulse Width Modulation) signal which is obtained from the microcontroller through Arduino Uno R3. Pulse width module signal can be controlled by applying range values which are given in the programming code. The values of PWM range from 0 to 255. Such that the specific range value had been provided based on the requirement of motor rotation speed. So, the speed of the motor depends on the pulse width module signal from the microcontroller which is given by the user. Then, the delay must be provided to the motor through the code in terms of milliseconds. Finally, the motor rotates

CONCLUSION

Agricultural Tying Handler Machine (ATHM), a new product to the Indian agricultural market, is making waves and transforming the way vineyards and nurseries secure their plants to support systems like stakes, wire, and trellises. It's simple lightweight design offers an easy - dare. Perhaps more importantly, ATHM is fast, significantly cutting the time spent on mundane tasks. Its versatility is impressive. It possesses adjustable settings that enable the operator to program the number of twists desired per tie. The ATHM tie ribbon runs seamlessly with the machine and it's very easy to load. The product can be taken wherever needed and has a multitude of uses with applications especially for agricultural purposes. The concept layout had been developed for agricultural tying handler machine to fabricate the Thus, the agricultural tying handler machine (ATHM) is one of the required parts and fixtures. These parts were undergone through the additive manufacturing process. The concept work process and Then, the Electrical system and fabricated parts are assembled. Finally, simulation and test run are executed for agricultural tying handler machine. The first drive motors rotate the holding gear that drags the ribbon which is fed from the roller to come around the plant with a support stick and the ribbon has been twisted on the number of times with the help of a propeller which is coupled with the last drive motor. Betel plants do not grow erect. The stem is flexible in nature. So, it planted along with the support stick to grow up forward. Till now, the tying process

is done manually. Nearly, it requires 15 – 20 people to complete one acre of betel plant cultivation in one day for tying with the support stick each. advanced time consuming machines in the agricultural field.

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DIABETES PREDICTION USING MACHINE LEARNING

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ABSTRACT

Diabetes is an illness caused because of high glucose level in a human body. Diabetes should not be ignored if it is untreated then Diabetes may cause some major issues in a person like: heart related problems, kidney problem, blood pressure, eye damage and it can also affects other organs of human body. Diabetes can be controlled if it is predicted earlier. To achieve this goal this project work we will do early prediction of Diabetes in a human body or a patient for a higher accuracy through applying, Various Machine Learning Techniques. Machine learning techniques Provide better result for prediction. Big data analytics plays a significant role in healthcare industries. Big data analytics can be used to discover knowledge from huge datasets, hidden information, hidden patterns and predict outcomes accordingly. The accuracy is different for every model when compared to other models. The Project work gives the accurate or higher accuracy model shows that the model is capable of predicting diabetes effectively. Our Result shows that Random Forest achieved higher accuracy compared to other machine learning techniques.

Keywords: Diabetes, Machine, Learning, Prediction, Dataset.

INTRODUCTION

Diabetes is noxious diseases in the world. Diabetes caused because of obesity or high blood glucose level, and so forth. It affects the hormone insulin, resulting in abnormal metabolism of carbs and improves level of sugar in the blood. Diabetes occurs when body does not make enough insulin. According to (WHO) World Health Organization about 422 million people suffering from diabetes particularly from low or idle income countries. And this could be increased to 490 billion up to the year of 2030. Diabetes mellitus is further divide into type 1 and type 2 diabetes.

The most common is type 2 diabetes affecting most of the people which cause insulin resistance. Type 2 diabetes is caused by lifestyle, age and passed down by parents. The symptoms include laziness, weight loss and fasting glucose levels. A technique called, Predictive Analysis, incorporates a variety of machine learning algorithms, data mining techniques and statistical methods that uses current and past data to find knowledge and predict future events. By applying predictive analysis on healthcare data, significant

decisions can be taken and predictions can be made. Predictive analytics can be done using machine learning and regression technique. Predictive analytics aims at diagnosing the disease with best possible accuracy, enhancing patient care, optimizing resources along with improving clinical outcomes.[1] Machine learning is considered to be one of the most important artificial intelligence features supports development of computer systems having the ability to acquire knowledge from past experiences with no need of programming for every case. Machine learning is considered to be a dire need of today's situation in order to eliminate human efforts by supporting automation with minimum flaws. Existing method for diabetes detection is uses lab tests such as fasting blood glucose and oral glucose tolerance. However, this method is time consuming. This paper focuses on building predictive model using machine learning algorithms and data mining techniques for diabetes prediction.

LITERATURE REVIEW

K.VijiyaKumar et al. [11] proposed random Forest algorithm for the Prediction of diabetes develop a system which can perform early prediction of diabetes for a patient with a higher accuracy by using Random Forest algorithm in machine learning technique. The proposed model gives the best results for diabetic prediction and the result showed that the prediction system is capable of predicting the diabetes disease effectively, efficiently and most importantly, instantly. Nonso Nnamoko et al. [13] presented predicting diabetes onset: an ensemble supervised learning approach they used five widely used classifiers are employed for the ensembles and a meta-classifier is used to aggregate their outputs. The results are presented and compared with similar studies that used the same dataset within the literature. It is shown that by using the proposed method, diabetes onset prediction can be done with higher accuracy. Tejas N. Joshi et al. [12] presented Diabetes Prediction Using Machine Learning Techniques aims to predict diabetes via three different supervised machine learning methods including: SVM, Logistic regression, ANN. This project proposes an effective technique for earlier detection of the diabetes disease. Deeraaj Shetty et al. [15] proposed diabetes disease prediction using data mining assemble Intelligent Diabetes Disease Prediction System that gives analysis of diabetes malady utilizing diabetes patient's database. In this system, they propose the use of algorithms like

Bayesian and KNN (K-Nearest Neighbor) to apply on diabetes patient's database and analyze them by taking various attributes of diabetes for prediction of diabetes disease. Muhammad Azeem Sarwar et al. [10] proposed study on prediction of diabetes using machine learning algorithms in healthcare they applied six different machine learning algorithms Performance and accuracy of the applied algorithms is discussed and compared. Comparison of the different machine learning techniques used in this study reveals which algorithm is best suited for prediction of diabetes. Diabetes Prediction is becoming the area of interest for researchers in order to train the program to identify the patient are diabetic or not by applying proper classifier on the dataset. Based on previous research work, it has been observed that the classification process is not much improved. Hence a system is required as Diabetes Prediction is important area in computers, to handle the issues identified based on previous research.

1. The supervised Learning/Predictive Models

Supervised learning algorithms are used to construct predictive models. A predictive model predicts missing value using other values present in the dataset. Supervised learning algorithm has a set of input data and also a set of output, and builds a model to make realistic predictions for the response to new dataset. Supervised learning includes Decision Tree, Bayesian Method, Artificial Neural Network, Instance based learning, Ensemble Method. These are booming techniques in Machine learning.

2. The Unsupervised Learning/Descriptive Models

Descriptive models are developed using unsupervised learning method. In this model we have known set of inputs but output is unknown. Unsupervised learning is mostly used on transactional data. This method includes clustering algorithms like k-Means clustering and k-Medians clustering.

3. Semi-Supervised Learning

Semi Supervised learning method uses both labeled and unlabeled data on training dataset. Classification, Regression techniques come under Semi Supervised Learning. Logistic Regression, Linear Regression are examples of regression techniques.

MOTIVATION

There has been drastic increase in rate of people suffering from diabetes since a decade. Current human lifestyle is the main reason behind growth in diabetes. In current medical diagnosis method, there can be three different types of errors. 1. The false-negative type in which a patient in reality is already a diabetic patient but test results tell that the person is not having diabetes. 2. The false-positive type. In this type, patient in reality is not a diabetic patient but test reports say

TABLE 1: PIMA Dataset.

No.	Name
1	Number of times pregnant
2	Plasma glucose concentration a two hours
3	Diastolic blood pressure
4	Triceps skin fold thickness
5	2-Hours Serum insulin
6	Body mass index
7	Diabetes pedigree function
8	Age

that he/she is a diabetic patient. 3. The third type is unclassifiable type in which a system cannot diagnose a given case. This happens due to insufficient knowledge extraction from past data, a given patient may get predicted in an unclassified type. However, in reality, the patient must predict either to be in diabetic category or non-diabetic category. Such errors in diagnosis may lead to unnecessary treatments or no treatments at all when required. In order to avoid or

reduce severity of such impact, there is a need to create a system using machine learning algorithm and data mining techniques which will provide accurate results and reduce human efforts.

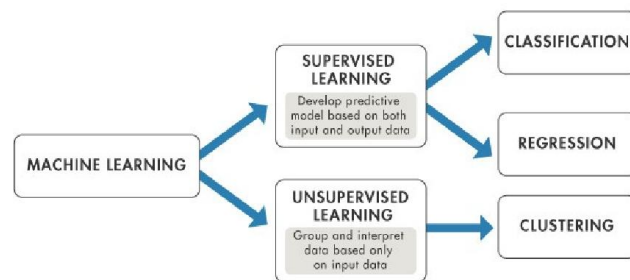
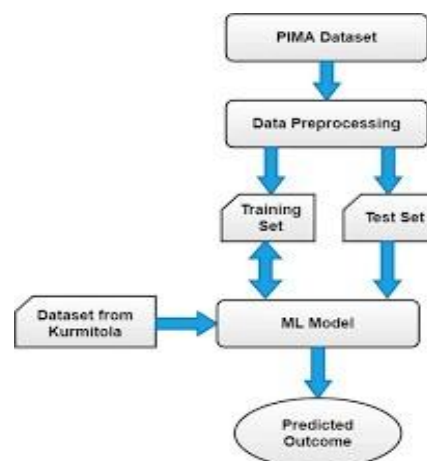


Figure 1. Classification of ML Algorithm Proposed Methodology

In the conducted research the purpose is to classify the data available into diabetic or non-diabetic using the supervised learning algorithms. The dataset will be divided into training and testing sets. In order to achieve more accuracy we must train more data. Then we will to a comparative analysis on the results achieved from the algorithms for early detection of diabetes. The models like Support vector machine, logistic regression prove to be most useful in detection of diabetes in a patient. The center objective of our model is to achieve a better accuracy and overall improvement in early diagnosis of diabetes.

Figure 2. Diabetes Prediction Model.



Datasets

PIMA Indian dataset (Dataset 1) is originally from the National Institute of Diabetes and Kidney diseases. The objective of the dataset is to diagnostically predict whether or not a patient has diabetes based on certain diagnostic measurements included in the dataset. Several constraints were placed on the selection of these instances from a larger database. The dataset consist of several medical predictor (independent) variables and one target (dependent) variable i.e. outcome. Independent variables include the number of pregnancies of the patient, their Body Mass Index (BMI), age and soon. In particular, all patients here are females at least 21 years old of PIMA Indian heritage. The different attributes of PIMA Indian database.

Collection of Datasets :

This module includes data collection and understanding the data to study the patterns and

trends which helps in prediction and evaluating the results.

Data Preprocessing :

This phase of model handles inconsistent data in order to get more accurate and precise results. This dataset contains missing values. So we imputed missing values for few selected attributes like Glucose level, Blood Pressure, Skin Thickness, BMI and Age because these attributes cannot have values zero. Then we scale the dataset to normalize all values.

Clustering:

In this phase, we have implemented K-means clustering on the dataset to classify each patient into either a diabetic or non-diabetic class. Before performing K-means clustering, highly correlated attributes were found which were, Glucose and Age. K-means clustering was performed on these two attributes. After implementation of this clustering we got class labels (0 or 1) for each of our record.

Apply Machine Learning

When data has been ready we apply Machine Learning Technique. We use different classification and ensemble techniques, to predict diabetes. The methods applied on Pima Indians diabetes dataset. Main objective to apply Machine Learning Techniques to analyze the performance of these methods and find accuracy of them, and also been able to figure out the responsible/important feature which play a major role in prediction.

Model Building

This is most important phase which includes model building for prediction of diabetes. In this we have implemented various machine learning algorithms for diabetes prediction. These algorithms include Support Vector Classifier, Random Forest Classifier, Decision Tree Classifier, Extra Tree Classifier, Ada Boost algorithm, Perceptron, Linear Discriminant Analysis algorithm, Logistic Regression, K-Nearest Neighbour, Gaussian Naïve Bayes, Bagging algorithm, GradientBoost Classifier.

Support Vector Machine

It is a type of supervised machine learning algorithm used for both regression and classification. In SVM, each data point is plotted on N-dimensional hyper plane (N- the number of attributes/features) that distinctly classifies the data points. To separate data points to two different classes, many possible hyper planes are there. We have to choose the one with maximum margin. Maximum margin is the distance between data points of two classes. Maximizing the distances between the nearest data points (either class) and hyper-plane will help us to decide the right hyper-plane. In the SVM classifier, it is easy to have a linear hyper-plane between these two classes. But, another burning question which arises is, should we need to add this feature manually to have a hyper-plane. No, the SVM

algorithm has a technique called the kernel trick. The SVM kernel is a function that takes low dimensional input space and transforms it to a higher dimensional space i.e. it converts not separable problem to separable problem. It is mostly useful in non-linear separation problem. Simply put, it does some extremely complex data transformations, then finds out the process to separate the data based on the labels or outputs you've defined. The training data is represented as form of n data points. $M = \{(x_1, y_1), (x_2, y_2), (x_n, y_n)\}$

SVM is most popular classification technique. SVM creates a hyperplane that separate two classes. It can create a hyperplane or set of hyperplane in high dimensional space. This hyper plane can be used for classification or regression also. SVM differentiates instances in specific classes and can also classify the entities which are not supported by data. Separation is done by through hyperplane performs the separation to the closest training point of any

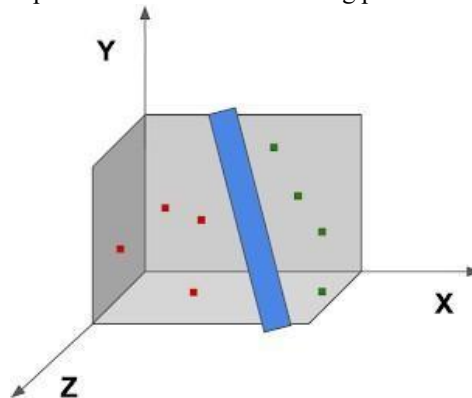


Figure 3. Support Vector Machine

Decision Tree

Decision tree is a basic classification method. It is supervised learning method. Decision tree used when response variable is categorical. Decision tree has tree like structure based model which describes classification process based on input feature. Input variables are any types like graph, text, discrete, continuous etc. Steps for Decision Tree.

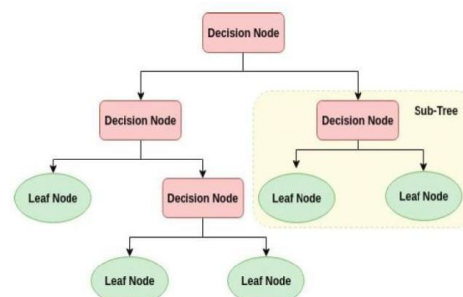


Figure 4. Decision Tree

Decision tree is another type of supervised learning algorithm which has tree like structure. Decision Trees usually mimic human thinking ability while making a decision, so it is easy to understand. The internal node represents attributes/features of the dataset and branches represent the decision rule and leaf node

represents the outcome or result. A decision tree makes decisions by splitting nodes into sub-nodes as shown in Figure 4. This process is performed multiple times during the training process until only homogenous nodes are left. It is the only reason why a decision tree can perform so well.

Logistic Regression

Logistic regression is also a supervised learning classification algorithm. It is used to estimate the probability of a binary response based on one or more predictors. They can be continuous or discrete. Logistic regression used when we want to classify or distinguish some data items into categories. It classifies the data in binary form means only in 0 and 1 which refer case to classify patient that is positive or negative for diabetes. Main aim of logistic regression is to best fit which is responsible for describing the relationship between target and predictor variable. Logistic regression is based on Linear regression model. Logistic regression model uses sigmoid function to predict probability of positive and negative class.

Ensembling

Ensembling is a machine learning technique. Ensemble means using multiple learning algorithms together for some task. It provides better prediction than any other individual model that's why it is used. The main cause of error is noise bias and variance, ensemble methods help to reduce or minimize these errors. There are two popular ensemble methods such as – Bagging, Boosting, ada-boosting, Gradient boosting, voting, averaging etc. Here in these work we have used Bagging (Random forest) and Gradient boosting ensemble methods for predicting diabetes.

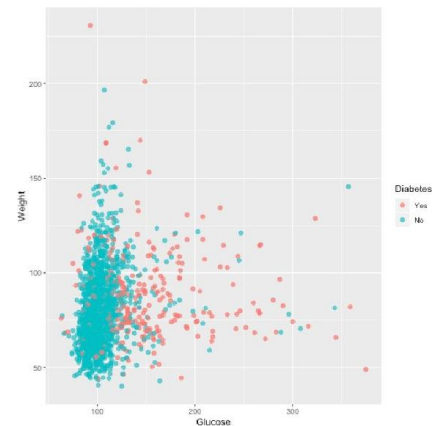
K-Nearest Neighbour

K-Nearest neighbor KNN is one of the simplest supervised machine learning technique. K-NN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories. K-NN algorithm stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a well suite category by using K- NN algorithm. It is also called a lazy learner algorithm because it does not learn from the training set immediately instead it stores the dataset and at the time of classification, it performs an action on the dataset. KNN algorithm at the training phase just stores the dataset and when it gets new data, and then it classifies that data into a category that is much similar to the new data. In the classification problem, algorithm will find the k-nearest neighbor of unseen data point and then it will assign the class to unseen data point by having the class which has the highest number of data points out of all classes of k neighbors as shown in Figure 5. For distance metrics, Euclidean metric is used.

Formula: $d(x, x') = \sqrt{(x_1 - x'_1)^2 + \dots + (x_n - x'_n)^2}$ KNN is lazy prediction technique. KNN assumes that similar things are near to each other. Many times data points which are similar are very near to each other. KNN helps to group new work based on similarity measure. KNN

algorithm record all the records and classify them according to their similarity measure. For finding the distance between the points uses tree like structure. To make a prediction for a new data point, the algorithm finds the closest data points in the training data set — it's nearest neighbors. Here K= Number of nearby neighbors, it's always a positive integer. Neighbor's value is chosen from set of class. Closeness is mainly defined in terms of Euclidean distance.

Figure 5. K-Nearest Neighbour



Random Forest

This is an algorithm for algorithm Regression and classification. Basically Random Forest contains decision tree classifiers. Random Forest resolves the issue of over fitting in training set that's why it is preferred over decision tree. In order to train each tree, we can randomly sample subset of training set and then a decision tree is built.

Gradient Boosting

Gradient boosting is a type of machine learning boosting. It relies on the intuition that the best possible next model, when combined with previous models, minimizes the overall prediction error. The key idea is to set the target outcomes for this next model in order to minimize the error.

Implementation of Model Building

Step1: Import required libraries, Import diabetes dataset.

Step2: Pre-process data to remove missing data.

Step3: Perform percentage split of 80% to divide dataset as Training set and 20% to Test set.

Step4: Select the machine learning algorithm i.e. K- Nearest Neighbor, Support Vector Machine, Decision Tree, Logistic regression, Random Forest and Gradient boosting algorithm.

Step5: Build the classifier model for the mentioned machine learning algorithm based on training set.

Step6: Test the Classifier model for the mentioned machine learning algorithm based on test set.

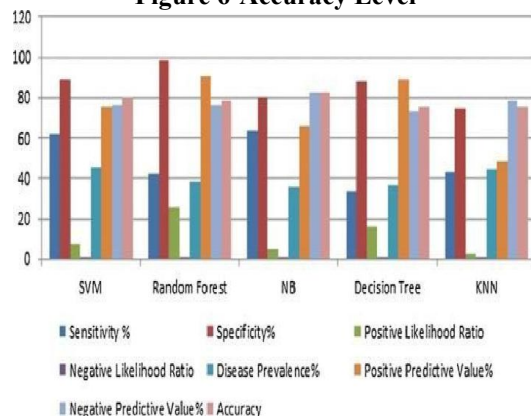
Step7: Perform Comparison Evaluation of the experimental performance results obtained for each classifier.

Step8: After analyzing based on various measures conclude the best performing algorithm.

Result

In this work different steps were taken. The proposed approach uses different classification and ensemble methods and implemented using python. These methods are standard Machine Learning methods used to obtain the best accuracy from data. In this work we see that random forest classifier achieves better compared to others. Overall we have used best Machine Learning techniques for prediction and to achieve high performance accuracy. Figure shows the result of these Machine Learning methods.

Figure 6-Accuracy Level



Conclusion

In this study, various machine learning algorithms are applied on the dataset and the classification has been done using various algorithms of which Logistic Regression gives highest accuracy of 96%. Application of pipeline gave Random Forest classifier as best model with accuracy of 89.8%. We have seen comparison of machine learning algorithm accuracies with two different datasets. It is clear that the model improves accuracy and precision of diabetes prediction with this dataset compared to existing dataset. Further this work can be extended to find how likely nondiabetic people can have diabetes in next few years. We implemented machine learning algorithms on the dataset and performed classification to signify the best machine learning algorithm for diabetes prediction on the bases of old data available. The higher accuracy the better prediction rate we will achieve. The random forest algorithm obtained the best accuracy and Roc. While on the other hand logistic regression had the lowest score.

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LOGO DETECTION USING DEEP LEARNING AND PYTHON

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ABSTRACT

In this paper the method for logo detection using deep learning algorithms and python programming is being proposed. Pictures present an incredible opportunity for brands, not only do they have the potential to convey much more than text, they get shared more widely, clicked on more often, and are more easily digestible than text. A logo recognition system can therefore help brands get more insights from user generated content, optimized digital marketing strategy, and even protect trademarks against misuse. Our recognition pipeline is composed of a logo region proposal followed by a Convolutional Neural Network (CNN) specifically trained for logo classification, even if they are not precisely localized. Experiments are carried out on the FlickrLogos-32 database, and we evaluate the effect on recognition performance of synthetic versus real data augmentation, and image pre-processing. Moreover, we systematically investigate the benefits of different training choices such as class-balancing, sample-weighting and explicit modeling the background class (i.e. no-logo regions). Experimental results confirm the feasibility of the proposed method, that outperforms the methods in the state of the art.

INTRODUCTION

Logo recognition in images and videos is the key problem in a wide range of applications, such as copyright infringement detection, contextual advertise placement, vehicle logo for intelligent control systems [1], automated computation of brand-related statistics on social media [2], augmented reality [3], etc. Traditionally, logo recognition has been addressed with key point based detectors and descriptors [4, 5, 6, 7]. For example Romberg and Lienhart [8] presented a scalable logo recognition technique based on feature bundling, where individual local features are aggregated with features from their spatial neighborhood into Bag of Words (BoW). Romberg et al. [9] exploited a method for encoding and indexing the relative spatial layout of local features detected in the logo images. Based on the analysis of the local features and the composition of basic spatial structures, such as edges and triangles, they derived a quantized representation of the regions in the logos. Revaud et al. [10] introduced a technique to down-weight the score of those noisy logo detections by learning a dedicated burstiness model for the input logo. Boia et al. [11, 12] proposed a smart method to perform both logo localization and recognition using homographic class graphs. Inverted secondary models to handle inverted colors instances. Recently some works investigating the use of deep learning for logo recognition appeared [13, 14, 15]. Bianco et al. [13] and Eggert et al. [14] investigated the use of pretrained Convolutional Neural Networks (CNN) and synthetically generated data for logo recognition, trying different techniques to deal with the limited amount of training data. Also Iandola et al. [15] investigated a similar approach, proposing and evaluating several network architectures. O exploited pretrained CNN models and used them as part of a Fast Region- Based Convolutional Networks recognition pipeline. Given the limited amount of training data available for the logo recognition task, all these methods work on networks pretrained on different tasks. In this paper we propose a method for logo recognition exploiting deep learning. The recognition pipeline is composed by a recall- oriented logo region proposal [17], followed by a Convolutional Neural Network (CNN) specifically trained for logo classification, even if they are not precisely localized. Within this pipeline, we investigate the benefit on the recognition performance of the application of different machine learning techniques in training, such as image pre- processing, class-balancing, sample weighting, and synthetic data augmentation. Further more we prove the benefit of adding as positive examples candidate regions coming from the object proposal to the ground truth logos, and the benefit of enlarging the size of the actual dataset with real data augmentation and the use of a background class (i.e. no-logo regions) in training.

PROPOSED METHOD

The proposed classification pipeline is illustrated in Fig any orientation and scale, and more logos can coexist in the same image, for each image we generate different object proposals, that are regions which are more likely to contain a logo. These proposal are then cropped to a common size to match the input dimensions of the neural network and are propagated through a CNN specifically trained for logo recognition. In order to have performance as high as possible within this pipeline, we use an object proposal that is highly recall-oriented. For this reason, the CNN classifier should be designed and trained to take into account that the logo regions proposed may contain many false positives or

only parts of actual logos. To address these problems we propose here a training framework and investigate the influence on the final They also exploited recognition performance of different implementation choices. In more detail, the training framework is reported in Figure 2. The training data preparation is composed by two main parts:

- Precise ground-truth logo annotations: Given a set of training images and associated ground-truth specifying logo position and class, we first crop logo regions and annotate them with the ground-truth class. These regions are rectangular crops that completely contain logos but, due to the perspective of the image or the logo particular shape, may also contain part of the background.
- Object-proposal logo annotations: Since we must automatically localize regions that may contain a logo, an object proposal algorithm is employed in the whole pipeline as shown in Figure 1. This algorithm is not applied only to the test images, but it is also run on the training images to extract regions that are more likely to contain a logo. Details about the particular algorithm used are given in the next subsection. Each object proposal in the training images is then labeled on the basis of its content: if it overlaps with a ground-truth logo region, it is annotated with the corresponding class and with the Intersection-over-Union (IoU) overlap ratio, otherwise it is labeled as background. Within our training framework we investigate both the use of the precise ground-truth logo annotations alone or coupled with the object- proposal logo annotations. All positive instances, i.e. labeled logos and eventually object proposals that overlap with them by a significant amount (i.e. IoU_ 0:5), are used to train a Convolutional Neural Network whose architecture is given below. Different training choices are investigated within our framework in Figure 2:
- Class balancing: The logo classes are balanced by replicating the examples of classes with lower cardinality. Two different strategies are implemented: epoch-balancing, where classes are balanced in each training epoch, and batch-balancing, where classes are balanced in each training batch. The hypothesis is that this should prevent a classification bias of the CNN.
- Data augmentation: Training examples are augmented in number by generating random shifts of logo regions. The hypothesis is that this should make the CNN more robust to inaccurate logo localization at test time.

- Contrast normalization: Images are contrast normalized by subtracting the mean and dividing by the standard deviation, which are extracted from the whole training set. The hypothesis is that this should make the CNN more robust to changes in the lighting and imaging conditions.

- Sample weighting: Positive instances are weighted on the basis of their overlap with ground-truth logo regions. The hypothesis is that this should make the CNN more confident on proposals highly overlapping

with the ground truth logos.

- Background class: A background class is considered together with the logo classes. Background examples are not randomly selected, but are composed by the candidate regions generated by the object proposal algorithm on training images and that do not overlap with any logo. The hypothesis is that this should make the CNN more precise in discriminating logos and background class.

The actual contribution to the performance of each training choice considered will be discussed in Section 4. After the CNN is trained, a threshold is learned on top of the CNN predictions. If the CNN prediction with the highest confidence is below this threshold, the candidate region is labeled as not being a logo, otherwise CNN prediction is left unchanged. The testing framework is reported in Figure 3. Given a test image, we extract the object proposals with the same algorithm used for training. We then perform contrast normalization over each proposal (if enabled at training time), and feed them to the CNN. The CNN predictions on the proposals are max-pooled and the class identified with highest confidence (eventually including the background class) is selected. If the CNN confidence for a logo class is above the threshold that has been learned in training, the corresponding logo class is assigned to the image, otherwise the image is labeled as not containing any logo.

OBJECT PROPOSAL

For object proposal we exploit a Selective Search algorithm originally introduced by van de Sande et al. [18, 19]. The goal of Selective Search is to provide a set of regions likely to contain an instance of the object of interest, i.e.

logos in our case. They can appear in any position and scale, and may have been acquired under different lighting conditions, and from slightly different point of views. The algorithm is designed to be highly recall-oriented; this implies that very few logos are not segmented, but also implies that a great number of false positive candidates are generated. The proposed regions will be disambiguated by the neural network that comes afterward.

NETWORK ARCHITECTURE

The architecture used for the experiments in the following sections is a tiny deep neural network. We opted for a tiny network because it is fast at test time and it can be trained on cheap GPUs in very short time. It also allows us to train the network without using any form of regularization like dropout [20], drop connect [21], etc. decreasing even more the time needed for training and validating the network.

The same network structure was used by Krizhevsky in [22] on the CIFAR-10 dataset, where it was proven to be an high-performance network for the task of object recognition on tiny RGB images. It has three convolutional layers interleaved by Relu nonlinearities and Pooling layers. All the pooling layers make the data dimensions halve after every Pooling block. The last part of the network (farthest from the input) consists in two Fully-connected layers with a Softmax classifier. The whole net structure is presented in Table 1. To give an idea of the network size, our network has 1:5

105 parameters whereas Alex Net (used in [14]) and Google Net (a similar structure is used in [15]) have respectively 6:107 and 1:3_107 parameters.

Therefore our

network is less likely to overfit, even when the size of the training set is not large.

LOGO DATASETS

FlickrLogos-32 Dataset

FlickrLogos-32 dataset [9] is a publicly- available collection of photos showing 32 different logo brands. It is meant for the evaluation of logo retrieval and multi-class logo detection/recognition systems on real-world images. All logos have an approximately planar or cylindrical surface. For each class, the dataset overs 10 training images, 30 validation images, and 30 test images. An example image for each of the 32 classes of the FlickrLogos-32 dataset is reported in Figure 4.

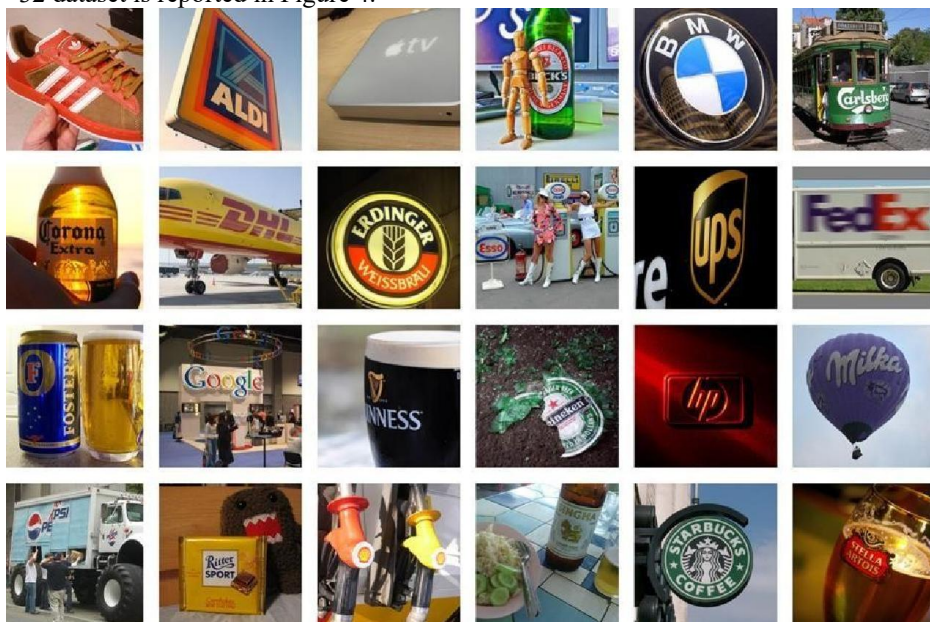


Figure 4: Example images for each of the 32 classes of the FlickrLogos-32 dataset.

Logos-32plus Dataset

Logos-32plus dataset is an expansion of the trainset of FlickrLogos-32. It has the same classes of objects as its counterpart but a larger cardinality (12312 instances). We collected this new dataset for three main reasons: first, since we want to test a deep learning approach, we needed a suitable dataset size. Second, we believe that Logos-32 dataset is not very representative of a data distribution for most real-world problems. Third, we hypothesize that synthetic data augmentation is not enough to model actual logo appearance variability. The Logos-32 dataset was collected with the aim to train key point-based approaches. Therefore the selection of images followed some implicit guidelines, such as: most of the images are on focus, no blurry or noisy images, and usually images with highly saturated colors. As a result, the variability of this dataset mainly resides on the amount of intraclass affine transformations which can be handled very well by key point based detection methods. We collected this new dataset with the aim of taking into account a larger set of real imaging conditions and transformations that may occur in uncontrolled acquisitions. We built the Logos-32plus dataset with images retrieved from both Flickr and Google image search. In particular, to increase the variability of data distribution we performed multiple queries for each logo. The dendrogram scheme in Figure 5 shows the tags used to compose the search queries used. To compose a single query we concatenate one leaf (a single logo) with a single tag of ancestor node. The whole set of queries for each logo can be obtained by concatenating the logo name (leaf) with each tag contained in all the ancestors nodes. For example, all the queries used to search for the 'Becks' logo are: 'logo Becks', 'merchandising Becks', 'events Becks', 'drink Becks', 'bottle Becks', 'can Becks', 'beer Becks', 'bier Becks' etc. The dataset contains on average 400 examples per class, with each image including one or multiple instances of the same class. The

detailed distribution of classes is shown in Figure 7 and a comparison between the FlickrLogos-32 and the Logos-32plus datasets is presented in Table 2. The dataset is made available for research purposes at <http://www.ivl.disco.unimib.it/activities/logorecognition>.

Duplicates Removal

To ensure a high variability of the new dataset and to avoid any overlap with the existing one, we performed a semi-automatic check for duplicate images within the Logos-32plus dataset itself and with the FlickrLogos-32 dataset. The process has been carried out in two steps. First, we automatically found and discarded image duplicates using the SSIM measure [23]: we checked for similarity every pair of images within the Logos-32plus dataset itself and with the FlickrLogos-32 dataset using the SSIM measure. Images with SSIM measure over 0.9 have been discarded.

As a second step, we removed near duplicates in a semi-automatic manner. We say that two images are near duplicates if they depict the same scene with small differences in appearance with a particular focus on the portion of the image containing the logo. Examples of near duplicates are different overlapping crops of the same photo or images of the same scene from a different point of view. An interesting example of near duplicates is shown in Figure 6. The two images depict the same gas station from a very similar point of view. The girls in the photo are in different poses but the appearance of the Esso logo in the two images is basically the same. In detail, to remove near duplicates we used the following procedure:

- we trained our CNN (structure in Table 1) from scratch on Logos-32plus dataset. To accomplish this task we fed the network with crops extracted from GT annotations and Object-proposals regions.

- We truncated the learned network leaving out the last two layers (softmax and last fully-connected). This network surgery operation let us use our network as a feature extractor exploiting the robust features learned by a deep neural network. We used this truncated network to extract features from every image crop that contains a tagged logo.

- We trained a k-NN classifier on top of the extracted features (using Logos-32plus as training set) and used it to retrieve from

Logos-32plus and FlickrLogos-32 the nearest five results.

- Finally we manually checked for near duplicates among the five nearest results retrieved by the classifier. All the near duplicates have been discarded from the final dataset.



Figure 6: Example of near duplicates. The two images depict the same scene from a similar point of view. The appearance of the Esso logo in the two images is basically the same. We removed one of the two images from our Logos-32plus dataset because the other one is included in the FlickrLogos-32 test set.

EXPERIMENTAL SETUP AND RESULTS

Experiments are performed considering the different training choices described in Section 2. These include class balancing, data augmentation, image contrast normalization, sample weighting, addition of a background class, and addition of positive examples actually generated by the object proposal algorithm. Each change to the training procedure is introduced one at a time, in order to assess its individual contribution, and the

corresponding value is underlined in Table 3 for better readability. All these configurations are trained using real data augmentation, i.e. with our extended Logos32plus dataset in addition to FlickrLogos-32 training and validation sets. Results are reported in Table 3 in terms of both F1-measure and Accuracy on FlickrLogos-32 test set. With reference to Figure 3, the threshold on CNN predictions is automatically chosen to maximize the accuracy on FlickrLogos-32 training and validation sets. The best configuration is then compared to other state of the art methods in Table 4. As further investigation we quantify the contribution given from real data augmentation, by training the same solution on the original FlickrLogos-32 training set only. Finally, we assess the impact of the object proposal algorithm to the overall performance. To do this we add all the ground truth locations to the test set, instead of relying on the object proposal only. From the results reported in Table 3 it is possible to see that with respect to a straightforward application of deep learning to the logo recognition task (i.e. Training Configuration I, TC-I), the different training choices consider able to give a large increase in performance:

- The first jump in performance is obtained by including the background (i.e. no-logo examples) as a new class in training. Results are identified as TC-II and show an improvement in F1-measure and accuracy of 31.8% and 52.4% with respect to TC-I.

- A second jump is obtained by including object proposals coming from Selective Search as additional training examples. This configuration is named TC-III and improves the F1-measure and

accuracy by 11.3% and 12.4% with respect to TC-II.

- A third jump in performance is obtained by augmenting the cardinality of object proposals coming from Selective Search by perturbing them with random translations (i.e. synthetic data augmentation). This configuration is named TC-IV and improves the F1-measure and accuracy by 11.7% and 20.9% with respect to TC-III.
- A further, smaller, improvement in performance is obtained by considering class balancing to account for different cardinalities, with \Epoch" balancing giving consistently better performance than the \Batch" counterpart (named TC-V and TC-VI respectively). In particular, TC-V improves the F1-measure and accuracy by 0.4% and 0.3% with respect to TC-IV.

Contrast normalization brings a further little but consistent improvement, with TC-VII improving the F1-measure and accuracy by 2.4% and 0.2% with respect to TC-V.

- Sample weighting instead (adopted in TC- VIII and TC-X), which consists in weighting training examples according to the degree of overlap between the object proposal and ground truth regions, results in lowering the final performance of the method.

The best configuration (i.e. TC-VII) trained on our extended training set is highlighted in bold in Table 3 and compared with the state of the art in Table 4. Performances of the other methods are taken from the respective papers and thus for some of them some performance measures are missing. From the results reported it is possible to see that the proposed solution is able to improve the F1-measure with respect to the best method in the state of the art by 3.8%, and the accuracy by 1.7%. It is worth to underline that the best results for the two metrics were obtained by different methods in the state of the art, i.e. by Romberg et. al [8] and BoW SIFT [8] respectively. As a further comparison, we report the results obtained by our solution using only FlickrLogos-32 for training and keeping all the other training choices unchanged. This results in a drop in F1-measure by 14.7% and by 4.8% in accuracy, giving an idea of the benefit of real data augmentation with respect to a purely synthetic one [14]. As a final analysis, to understand if the major source of error in our method is the Selective Search module that is unable to have a high recall or if it's the CNN itself that mispredicts the logo class, we perform an additional test by adding the actual logo ground truth region to the object proposals. This increases the F1-measure by 0.6% and the accuracy by 0.2% indicating that it's the major source of error in our method is the CNN itself. Some examples of wrongly labeled candidate logo regions are reported in Figure 8. Candidates are generated by the object proposal and they have a IOU larger than 0.5 with the corresponding ground truth. The first and the third row depict the wrongly recognized regions labeled with their actual class, while the second and fourth one depict the nearest example in the training set using as features the activations of the last network layer before the softmax. Images are reported with the same resolution used to feed the CNN, i.e. 32_32 pixels. Figure 8: Wrongly labeled logos ordered by confidence. Highest confidence prediction is top-left. Images resolution is 32x32 pixels, i.e. the same used to feed the CNN. The first and third rows are the wrong labeled logos, the second and the fourth rows represent the nearest example in the training set (using the last network layer activations before the softmax as feature vector).

Table

TIMINGS

Table 5 shows the timings for the whole recognition procedure at test time. Experiments are performed on the same computer (Intel i7 3.40 GHz - 16 GB RAM) averaging the timings of 100 runs on different images. Two different solutions are compared: the use of CPU or GPU (GeForce GTX 650) for the classification step. The proposals extraction step runs always on CPU. The preprocessing time include the resize of every patch to match the CNN input size, the contrast normalization (negligible processing time) and eventually the time to copy the data from CPU to GPU memory. In Table 5 it is possible to notice that the overhead caused by the CPU-GPU memory transfer makes the overall time of the GPU solution higher than that of the CPU solution. To this extent, in the future it might be interesting to evaluate a fully GPU-based pipeline, for example generating and pre-processing proposals according to [24].

CONCLUSION

Logo recognition is fundamental in many application domains. The problem is that logos may appear in any position, scale and under any point of view in an image. Moreover, the images may be corrupted by many image artifacts and distortions.

The traditional approaches to logo recognition involve key point-based detectors and descriptors, or the use of CNNs pretrained on different tasks. Our solution employs a CNN specifically trained for the task of logo classification, even if they are not perfectly localized. We designed a complete recognition pipeline including a recall-oriented candidate logo region proposal that feeds our CNN. Experiments are carried out on the FlickrLogos-

32 database and on its enlarged version, Logos-

32plus, collected by the authors. We systematically investigated the effect on recognition performance of synthetic versus real data augmentation, image pre-processing, and the benefits of different training choices such as class-balancing, sample-weighting and explicit modeling the background class (i.e. no-logo regions). Our best solution outperforms the methods in the state of the art and makes use of an explicit modeling of the background class, both precise and

actual object-proposal logo annotations during training, synthetic data augmentation, epoch-based class balancing, and image contrast normalization as pre-processing, while sample weighting is disabled. Both the newly collected Logos-32plus and the trained CNN are made available for research purposes.

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MONITORING AND CONTROLLING SOWING SYSTEMS USING INTERNET OF THINGS

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ABSTRACT

Smart agriculture is an emerging concept, because IOT sensors are capable of providing information about agriculture fields and then act upon based on the user input. In this Paper, it is proposed to develop a Smart agriculture System that uses advantages of cutting edge technologies such as Arduino, IOT and Wireless Sensor Network. The paper aims at making use of evolving technology i.e. IOT and smart agriculture using automation. Monitoring environmental conditions is the major factor to improve yield of the efficient crops. The feature of this paper includes development of a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors using Arduino board and in case of any discrepancy send a SMS notification as well as a notification on the application developed for the same to the farmer's smartphone using Wi-Fi/3G/4G. The system has a duplex communication link based on a cellular-Internet interface that allows for data inspection and irrigation scheduling to be programmed through an android application. Because of its energy autonomy and low cost, the system has the potential to be useful in water limited geographically isolated areas.

INTRODUCTION

The present project deals with smart farming system, which would allow farmers access to live data such as temperature, humidity, and soil moisture. The first chapter is a general knowledge about the IOT technology and the project's topic. The second chapter contains the steeple analysis, feasibility study, project's requirements, specifications, methodology used, project's design process, implementation, components and technologies used, developed algorithms, the future scope and conclusions.

IOT and Agriculture:

IoT contains a solid mainstay of several technologies that enable networks of wireless sensors such as, embedded systems, big data, cloud computing, web services, and

computer networking and protocols. In agriculture's fields Internet of Things have several benefits, encompassing: The various sensors designed for this specific field of farming that gives the opportunity to work remotely on many projects related to agriculture. The different used sensors help instantly to collect and store data easily in cloud computing services. These live data can be accessed promptly and from any intelligent smart device. As approved by experts, farmers can use the IoT systems to increase their productivity as well as the quality of their products. In fact, it increases profits/incomes and reduces significantly their costs. Having access promptly to exact accurate data helps in increasing the efficiency level in the use of water, pesticides, and fertilizers amounts managements

Agriculture in India

As per the 2014 FAO world agriculture statistics India is the world's largest producer of many fresh fruits like banana, mango, guava, papaya, lemon and vegetables like chickpea, okra and milk, major spices like chili pepper, ginger, fibrous crops such as jute, staples such as millets and castor oil seed. India is the second largest producer of wheat and rice, the world's major food staples. India is currently the world's second largest producer of several dry fruits, agriculture-based textile raw materials roots and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane and numerous vegetables. India is ranked under the world's five largest producers of over 80% of agricultural produce items, including many cash crops such as coffee and cotton, in 2010. India is one of the world's five largest producers of livestock and poultry meat, with one of the fastest growth rates, as of 2011. One report from 2008 claimed that India's population is growing faster than its ability to produce rice and wheat. While other recent studies claim that India can easily feed its growing population, plus produce wheat and rice for global exports, if it can reduce food staple spoilage/wastage, improve its infrastructure and raise its farm productivity like those achieved by other developing countries such as Brazil and China. In fiscal year ending

agriculture accomplished an all-time record production of 85.9 million tonnes of wheat, a 6.4% increase from a year earlier. Rice output in India hit a new record at 95.3 million tonnes, a 7% increase from the year earlier. Lentils and many other food staples production also increased year over year. Indian farmers, thus produced about 71 kilograms of wheat and 80 kilograms of rice for every member of Indian population in 2011. The per capita supply of rice every year in India is now higher than the per capita consumption of rice every year in Japan.

India exported \$39 billion worth of agricultural products in 2013, making it the seventh largest agricultural exporter worldwide, and the sixth largest net exporter. This represents explosive growth, as in 2004 net exports were about \$5 billion. India is the fastest growing exporter of agricultural products over a 10-year period, its

\$39 billion of net export is more than double the combined exports of the European Union (EU-28). It has become one of the world's largest supplier of rice, cotton, sugar and wheat. India exported around 2 million metric tonnes of wheat and 2.1 million metric tonnes of rice in 2011 to Africa, Nepal, Bangladesh and other regions around the world.

Aquaculture and catch fishery is amongst the fastest growing industries in India. Between 1990 and 2010, the Indian fish capture harvest doubled, while aquaculture harvest tripled. In 2008, India was the world's sixth largest producer of marine and freshwater capture fisheries and the second largest aquaculture farmed fish producer. India exported 600,000 metric tonnes of fish products to nearly half of the world's countries. Though the available nutritional standard is 100% of the requirement, India lags far behind in terms of quality protein intake at 20% which is to be tackled by making available protein rich food products such as eggs, meat, fish, chicken etc. at affordable prices

India has shown a steady average nationwide annual increase in the mass produced per hectare for some agricultural items, over the last 60 years. These gains have come mainly from India's green revolution, improving road and power generation infrastructure, knowledge of gains and reforms. Despite these recent accomplishments, agriculture has the potential for major productivity and total output gains, because crop yields in India are still just 30% to 60% of the best sustainable crop yields achievable in the farms of developed and other developing countries. Additionally, post harvest losses due to poor infrastructure and unorganised retail, caused India to experience some of the highest food losses in the world

Literature Review:

According to Andrew Moela, in the next decades, the farming industry is expected to become more important than any other time before. It is expected by the United

Nation that the world population of the world by 2050 would reach 9.7 billion, which would require a rise in the global agricultural goods production in agriculture to about 69%. To reach this vision goalfarming companies started to adopt the Internet of Things for accurate analysis and higher better production of agricultural goods. The IoT is a technology that came out to help in pushing agricultural fields into a higher level. Nowadays, smart farming is already adopted by a number of modern farmers and its use is increasing and becoming more and more common among the new generation of educated young farmers. In the modern agriculture the use of sensors, drones, and high-tech agriculture technologies is becoming quickly the new norm. The collection and the analysis of big data in agriculture will represent a very big deal in the future of modern farming, in preserving ecosystems and it would help the overall production growth of developing countries, such as Morocco. In fact, IoT technology offers more benefits in the real life. Researchers are doing more investigations into this technology toward a wider use and for a maximum of profits.

Steeple Analysis:

The steeple analysis is a process that helps to make the right decision by considering seven factors (Societal, Technology, Environment, Ethics, Political, Legal, and Economic). These variables show the benefits and disadvantages of the products or of the companies. This step is very important to discover the threats of your products and also to highlight their strengths and benefits. Therefore, in this project I will use this method to analyze some macro-environmental factors:

Social The agriculture field is nowadays one of the most important fields especially in Morocco, and farmers are all seeking new devices and technologies for better production.

Technology IoT technology simplifies the functionality of many systems, it is serving in the evolution of many fields. This advanced and new technology helps developing many projects used in real life and many of them in the agriculture field.

Environment The smart farming system encourages the use of renewable energies which make it environmentally friendly, and it helps in protecting the environment.

Ethics the smart farming project respects the code of ethics, It is totally safe and secure for farmers, also the data collected must be secure and protected.

Political the independence of countries in the agriculture field and Political goods trading when there is more production.

Legal In Moroccan, laws related to renewable energies discuss the use of low voltage. The smart agriculture system respects the Moroccan laws

Economic The use of IoT technology affects the economy because of lowering the cost of the product, this later will itself help in the increase of production and incomes.

MUSIC ANNOTATION BASED ON FACIAL EXPRESSION USING HAARCASCADE ALGORITHM

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Abstract: Facial expression is an successful method for humans to correspond since it contain serious and essential in sequence about human emotional well as in the fields of image processing, pattern recognition, machine learning, and human recognition. In this project, admin will implement the techniques to automatically detect facial parts using HAAR CASCADES algorithm and classify the emotions using Support Vector Machine algorithm. And there playlist of songs which is suitable for his current mood using k-Nearest neighbor classification algorithm. In testing side, would supply a test image whose expression it desires to recognize. This test image would be matched with facial file to play music based on recognized emotions. Finally provide emotion based music player with better credit rate states. It is a serious part of affective computing scheme that aim to know and therefore improved respond to human emotions. Routine identification of facial language can be an significant part in human-machine interfaces, human emotion analysis, and decision making. However, the task of repeatedly be familiar with a variety of facial language challenging. As a result, facial expression recognition has become a prominent research topic in human-computer interaction, as well as in the fields of image processing, pattern recognition, machine learning, and human recognition. In this project, admin will implement the techniques to automatically detect facial parts using HAAR CASCADES algorithm and classify the emotions using Support Vector Machine algorithm.

INTRODUCTION

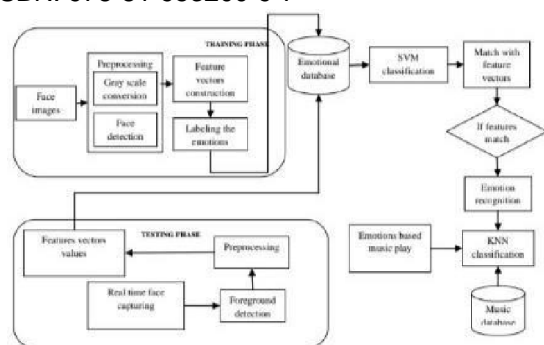
Song has been proven to be an essential part of everyone's life. It acts as a source for activity and also old for various health check needs as it is established to be a Stress Reliever. With the increasing advancements in the field of Multimedia in recent times, there are numerous high-end music players available with the latest features of handling the volume, modulation, pitch, sound, genre, etc. Though these features are very useful for the users but sometimes it becomes quite irritating and long to manually browse from side to side the playlist for the intended song which user wants to play based on

his/her mood and moving state. For the purpose of providing the users with the best probable and effortless fields For the purpose of providing the users with the best probable and

effortless delight of music, Facial Expression Recognition (FER) based scheme have been adopted as they provide more fast, accurate and efficient results with less effort. With the world moving towards fields like Artificial Intelligence (AI) and Machine Learning (ML), this project aim is to provide the- users a stage through which on their current mood, melody is played using Facial Expression Recognition. Emotion recognition is the process of point out human emotion. Using this technology to help blind people with emotion recognition is a relatively nascent research area. Different emotion methods are detected through the integration of information from facial expression, body movement and gestures, and speech.

II. PROBLEM DEFINITION

There are a variety of areas in person-processor communication that might successfully use the possible to be familiar with feeling. The problem of face discovery can be vision as a trouble of binary categorization of picture enclose as either hold or not containing a face. In order to be able to learn such a categorization model, admin first need to explain an picture in terms of features, which would be good indicators of face presence or absence on a given image. The existing approach is usually involves two tasks: The first is for extracting ASM motion based a pyramid ASM model appropriate technique and the second for the projected motion classification obtained by applying AdaBoost classifiers. After the sequence of face applicant, 68 quality points in each face are then take out using ASM correct method. The system the line up three extracted feature points, eyes and nose part, to the mean shape of ASM, and ignore the other portion of the ASM against the mean face shape of ASM to estimate the geometrical dislocation information between current and mean ASM points coordinates. Then, facial expressions recognition is the get based on this geometrical motion using AdaBoost classifier. And also extracting features using Viola Jones.



EXISTING SYSTEM

Active Shape Model: Extract the facial featurespoints.

Adaboost classifier: Classify the emotions basedon geometrical notations.

Viola jones: Using wavelet approach points toextract facial in synthetic database.

PROPOSED SYSTEM

In this scheme, a novel emotion credit scheme based on the giving out of physiological signals is accessible. These suggestions show an appreciation ratio much superior than option likelihood, when useful to physiological signal databases obtained from tens to hundreds of subjects. The scheme consists of characteristic face detection, feature extraction and pattern classification stages. Although the face detectionand feature extraction stages were designed suspiciously, there was a great amount of within- class variation of features and overlap amongst classes. In order to detect Emotion from an image used frontal view facial images. If computer can recognize more of human feeling, people can make better systems to reduce the gap of humancomputer interaction .To handle the emotion recognition problem from arbitrary view facial images. The facial region and others division of the body havebeen segmented from the multifaceted surroundings based on skin color model. Thus, in this project showed some differences between different color models that are used to implement the system and which color model can be used where. Another trait is to extort facial parts from the face. Which uses HAAR CASHCADES to detect the eye and lips region from a face and then by the help of SVM classification detected emotion from those skin. From the place of mouth and eyes, tried to detect emotion of a face. The future system attempt to provide an interactive way for the user to carry out the task of make a playlist. The working is based on KNN device moving out their function in a pre-defined order to get the desired output. The secret expression acts as an input and is second-hand to select an suitable playlist from the initially generated playlists and the songs from the playlists are played. The face regularity is

deliberate and the continuation of the dissimilar facial features is established foreach face applicant. Draw the bounding box and also calculate distance measurement from web cameras

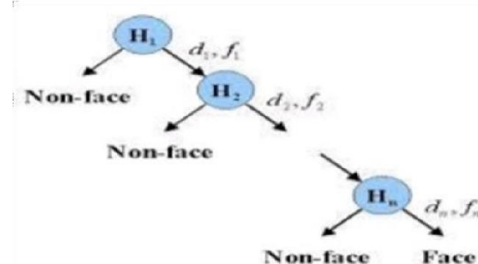
MOTIVATIONS

At the time of facial point's extraction, large number irrelevant features are extracted. So emotion classification can be become wrong. Each and every facial structure was trained for emotions recognition .Only match image to image for expression and not implement in real time based camera capturing.

III. MODULE DESCRIPTION

Using conservative song players, a user had to manually look through through his playlist and choose out songs that might ease his mood and emotional knowledge. In todays global, with ever growing improvement within the subjectof multimedia and era, diverse tune gamers have been developed with capabilities like speedy forward, opposite, variable playback pace (searching for & time compression),neighborhood

play back, streaming playback with multicast streams and consisting of quantity modulation, genre classification and so on. These functions fulfillthe consumers primary necessities, yet the userhas to stand the mission of manually surfing via the playlist of songs and choose songs based totally on his cutting-edge anger and behavior..



Automatic reputation of facial expressions can be an important issue in human-system interfaces, human emotion study, and choice making. Admin will put in force the techniques to robotically stumble on facial components using HAAR CASCADES set of rules and classify the emotions the use of Support Vector Machine set of rules. Andthere playlist of songs that's fitting for his current mood the use of K-Nearest Neighbor type set of rules. In checking out aspect, might distribute a check representation whose appearance it wants to catch.

Module

FACIAL IMAGE ACQUISITION

PREPROCESSING

FACIAL FEATURES EXTRACTION

EMOTION CLASSIFICATIONMUSICAL

CLASSIFICATION

1) Facial image acquisition

In this unit, capture the face picture or upload the datasets. The uploaded datasets contains 2D face imagery. In face registration can identify the faces which are captured by web camera.

Then web camera pictures known as 2D pictures. Admin can be train the face images with numerous feeling also train the music player based on words.

2) Pre processing

In this unit, do the pre processing steps such as gray scale change, invert, and border analysis, notice limits and region identification. The Grayscale images are also called monochromatic, denoting the attendance of only one (mono) color

(mono) color (chrome). The edge discovery is used to analyze the connected curves that indicate the limits of objects, the limits of surface markings as well as curve that write to discontinuities in surface orientation

3) Facial Features Extraction

In this module be relevant HAAR cascades which are an algorithm employed the computer skill that decide the locations and sizes of human faces in arbitrary (digital) images.

It detects facial features and ignores something else, such as construction, trees and organization. Face detection can be observed as an additional general case of face localization

In face localization, the task is to find out the locations and sizes of a known number of countenances.

4) Emotion Classification

In this unit analyze on the look recognition for difficult facial imagery. For a testing facial picture, first take out the facial features and then do the survey opinion, where SVM classifier is used for this purpose. Obtaining the question outcome, admin synthesize facial feature vectors based on testing facial feature vector and use them as the model predictors of the positive model. Finally, the model response corresponding to the expression class label vector is intended and the look group of the testing facial image can be obtain based on it.

5) Musical Classification

If the feeling is positive means, play happiest songs which are stored in database. Using KNN technique to categorize the music based on feeling classified by preceding modules. K-NN is a category of instance-based learning, or lazy learning, where the function is only approximated nearby and all multiplication is delayed until classification. The k-NN algorithm is amongst the simplest of every machine learning algorithms. Both for classification and regression, it can be efficient to allocate weight to the contributions of the neighbors, so that the earlier neighbors donate more to the normal than the more distant ones. For instance, a extensive weighting method consists in kind every neighbor a weight of $1/d$, where d is the distance to the nearest. The neighbors are taken from a position of objects for which the class or the object property value is

known. This can be consideration of as the research locates for the technique, though no explicit training stride is required. Based on neighborhood values, music are classified and played in moving database

SYSTEM ARCHITECTURE

CLASSIFICATION -CNN: FEATURE EXTRACTION:

In this part, the network will perform a series of convolutions and pooling operations during which the features are detected. If you had a picture of a zebra, this is the part where the network would recognize its stripes, two ears, and four legs.

CLASSIFICATION:

Here, the fully connected layers will serve as a classifier on top of these extracted features. They will assign a probability for the object on the image being what the algorithm predicts it is.

KNN CLASSIFIER

For all the unknown samples $Un\ Sample(i)$ for all the known samples $Sample(j)$ compute the distance between $Un\ samples(i)$ and $sample(j)$ end for find the k smallest distances locate the corresponding samples $sample(j_1), \dots, Sample(j_k)$ assign $Un\ sample(i)$ to the class which appears more frequently end for this scheme future support vector machine algorithm for emotion credit. Taking into account an expressive face as a superposition of a neutral face with expression part, admin proposed an algorithm to decay an expressive test face into its building components. For this point, first make grids for captured face using HAAR Cascade algorithm. Knowing that the face part of the test face has sparse image in the face database and the look part can be thinly stand for using the expression database; admin decay the test face into these feature vectors. The basics of the test face along with the vectors are then used for face and look credit. For this purpose, the separated components are sparsely decaying using vectors while the grouping structures of the vectors are enforced into the sparse decomposition. The experimental results on both databases showed that the proposed method achieves competitive recognition performance compared with the state of the art methods under same experimental settings and same facial feature. Based on their emotions, play the songs to recover from despair. In this project, admin can be implement the system to using image processing techniques to detect the faces from camera capturing. Then efficiently track the faces and to give bounding boxes on face images. Lastly set the reserve limits to identify whether the person is near to the system or not. And also intended the self steady seeing conditions

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VOICE BASED PRESCRIPTION GENERATION USING PYTHON

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ABSTRACT

Since prescriptions in hospitals are still written by hand, illegible handwriting may lead to major problems like taking the wrong drug or taking the wrong quantity of the drug by patient. This may cause the serious issue of health or death of the patient. To solve this issue voice-based prescription generation system came into the picture where the prescription is taken as input in voice format with help of Google speech recognition API to convert speech to text. This text transcript is obtained to conduct name entity recognition (NER) task to extract medical entities from text. In this way, the digital prescription will be generated. For performing the NER task Bi-LSTM and CRF networks are used. This system is built using MERN (MongoDB, Express JS, React JS, and Node JS) stack where React JS technology is used for the frontend along with this Node JS and Express JS is used with MongoDB database as backend. This independent platform web-based system will improve the procedure of generating prescriptions.

Key Words: Speech Recognition, Speech to text, Annotations, Natural language processing (NLP), Named entity recognition (NER), Electronic Health Record (EHR), MERN (MongoDB, Express JS, React JS, and Node JS).

INTRODUCTION

A prime problem today in India and abroad is most prescriptions are still written by hand. If a doctor has given some medicine, for example, "Vyvanse tablet" such medicine is only readable by pharmaceutical people like chemist due to illegible handwriting of doctor causes the non-medical background people to interpret the prescribed medicines erroneously. This causes a problem, a patient will not be able to read prescription correctly and also not able to verify medicine given by chemist is as per prescription or not. If medicine given by chemist is wrong by misunderstanding then these cause lots of damages or adverse drug reactions (ADRs) to patient [1]. Furthermore, the problem with all hospitals is not having any method like an electronic health record system to know the history of the patient and what types of tablets consumed in the past of a particular patient. Writing prescriptions by hand

takes time which leads to doctors attending only fewer patients in the scheduled time. Now, it is the time of the computer era where, everything is computerized, boosting the pace of human life. To make the prescription generation system computerized, the scenario of voice-based prescription generation system using AI comes into picture. A solution to the above-mentioned problems is to create an application that can be used to reduce the work of doctors. By using this system, the Doctor will be able to dictate his prescription to the patient and at

Drug	Duration	Strength	Route	form	Dosage	Frequency
Crosine	For 2 days	500mg	by mouth	tablet	1	Every 6 hours

Fig-1: Medication entities with example

Due to this world-changing solution, doctors will be able to handle more patients in a small amount of time. Now the chemist will be able to read the prescription rightly, also the patient will be able to verify prescription given by the the same time, this dictation is gets recorded by the system. This recorded prescription is converted to text and extracts medical entities from text like a drug, drug frequency, drug dosage, etc. Medication entities matching the above examples are demonstrated in Figure-1. In the end, a PDF prescription was generated with help of classified tokens. Additionally using this app, the Doctor should be able to edit the prescription, sign the prescription and also send it to the patient directly on his email ID. chemist is the same as written in the prescription. In Addition, a prescription is sent on a patient's email id the patient can show all previous prescriptions to the doctor. distinct hospital all prescriptions can be viewable by a doctor. This will also prevent the illegal use of patient prescription and provide security.

The objective of this project is to design a system which will generate voice-based prescription where Patient will get prescription in PDF format through the mail. So, there is no chance of wrapping, burning, and loss of prescription. If this solution is implemented in a real-time hospital system then it will lead to saving lots of time for doctors to write a prescription as well as patients to search previous prescriptions.

LITERATURE REVIEW

The Electronic prescription system [3] will generate prescriptions using speech recognition API and natural language processing techniques. They proposed an approach of using Speech Recognition technology to speed up the process of prescription generation. As we were known, speaking a sentence will consume less amount of time than writing it. And For speech-to-text conversion, Google's speech recognition API has been used. This is the best available API as it supports Indian English. NLP is used to extract prescription information from the transcript. MedLEE [4] is one of the earliest clinical information extraction (CIE) systems, built to extract, structure, and encoding clinical information within the raw text of patient reports. MedLEE application extracts medication information using hand-written rules.

The healthcare NER model solution [5] is used for extracting structured information from unstructured text such as EHR and medical records. This system required us to extract key entities such as prescribed drugs, dosage, etc mentioned in the EHRs. The extracted entities would be processed further downstream to find out relationships between entities like drug and dosage.

DATA

We have collected sample medical notes data from various publicly available websites. Using these datasets defined 8 types of entities: Drug, Duration of a drug, strength of a drug, route to take a drug, form of a drug, dosage of a drug, and frequency of a drug. We have collected sample medical transcripts from MT samples [7] and MT example [8]. These both provide open access to large big collected transcript medical reports for reference purposes. To perform annotation on data collected from these websites Doccano annotation tool [9] is used with its 8 predefined entities.

Along with these we have also used the N2C2 2018 shared task gold standard corpus [10] on adverse drug events and medication entities extraction in electronic health records. Table-1 shows N2C2 dataset details used in a project to train and test the model. This Dataset belongs to Harvard Medical School and consists of 404 Electronic Health Records and their annotations files.

No of tokens in dataset	Train set	Test set
# as a Drug	20,684	5797
# as a Strength	8507	2387
# as a Duration	741	231
# as a Route	6992	1978
# as a Form	8602	2399
# as a Dosage	5325	1530
# as a Reason	8034	2254

Table -1: N2C2 2018 dataset details

ARCHITECTURE OVERVIEW

The voice Prescription system architecture is shown in Figure-2. First of all, a doctor has to perform a login for authentication purposes. After successful login in the system, the

doctor can detect prescription to patient and prescription can be recorded by clicking the "START" button on a web page. This recorded voice is sent over Google speech recognition API. Google speech recognition API provides medical transcripts in text format. Along with Speech recognition, an alternative option is to upload a prescription written raw text File.

This text is in raw format to make this useful and to extract entities from this raw text, backend request is sent FastAPI consisting of Bi-LSTM and CRF model FastAPI [11] is one

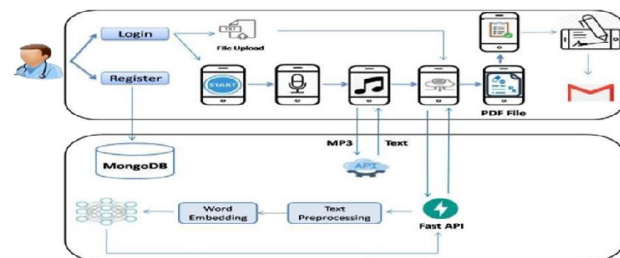


Fig-2: Voice Prescription System Architecture

of the fastest Python-based web frameworks. Before extracting predefined entities from text, text preprocessing is performed. Furthermore, Word embedding is performed. Word embedding is phrases or words in vocabulary that are mapped to vectors of real numbers. Word embedding is a term used for representing text in vector format. As we know computers cannot understand text format but they can understand numbers.

This processed text is given to the trained model to perform the NER task. The Bi-LSTM and CRF model gives output in

{token: entity} format. Here, a token is a piece of word from given input text and entity represents in which of predefined entity this word belongs. For example {"Crosine": "drug"}.

Furthermore, this model result is sent back to the app and by

the model result, a prescription is generated which is using editable by doctors. In prescription, a doctor is authorized to add a new medicine, delete existing medicine, and edit existing medicine.

Now, the most important step where a doctor has to verify the prescription (to correct if there is any transcription error) and perform a digital signature. After the verification process, the prescription in PDF format is sent to the patient's mail securely.

TEXT PREPROCESSING

EHR records are usually lengthy and it is not possible to perform NER tasks on such lengthy records. To solve this problem, a function is defined to divide a large chunk of data into small pieces. This process is known as tokenization. A function would split the EHR records based on a maximum sequence length parameter. The function tries to include maximum number of tokens, maintaining as much context as possible for every token.

The data is tokenized using a modified ScispaCy tokenizer for BiLSTM + CRF model which just removes the tokens with whitespace characters after ScispaCy tokenizes them. Each sequence of labels or tokens in the

data was represented using the IOB (Inside, Outside, Beginning) tagging scheme for BiLSTM models.

ALGORITHM FOR NER

To perform name entity recognition task on EHR **Bidirectional LSTM (Bi-LSTM)** coupled with a **conditional random field (CRF)** classifier algorithm. This model is very efficient for a variety of sequence tagging tasks.

Bi-LSTM : Just a Bi-LSTM network is enough to classify each token into various entities along with its class B and I (i.e. B: beginning of entity and I: inside of entity) for example as shown in Figure-4 “for three days” represent duration. But in result, word “for” will have entity B-Duration means beginning of duration and all further words will have entity I-Duration. And if token is not a part of any of the pre- defined entities we are

looking for then it is classified as O (i.e. O: outside) but we witnessed some common errors of misclassification. Because the outputs of Bi-LSTM of each word are the label scores, we can select the label which has the highest score for each word

CRF: with this Bi-LSTM scheme, we may end up with invalid outputs, for e.g.: I-Drug followed by I-Frequency or B-Drug followed by I-Frequency. Hence we are using CRF (**Conditional Random Field**) algorithm to calculate the loss of our Bi-LSTM network as it could add some constraints to

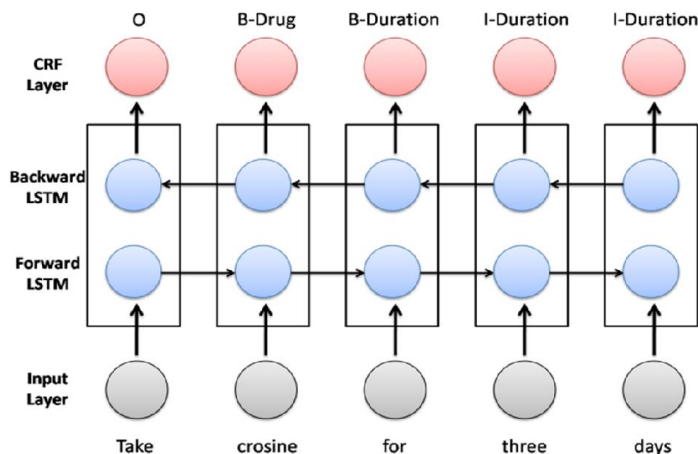


Fig-3: Output of Bi-LSTM model

final predicted labels to ensure they are valid. These constraints are learned by CRF automatically from the training dataset during the training process. CRFs considers the context as well rather than just predicting label for a single token without considering neighboring samples [12]. Figure-4 shows output of trained Bi-LSTM and CRF network where each word has assigned token. Figure-3 represents steps to train Bi-LSTM and CRF for NER task with N2C2 dataset.

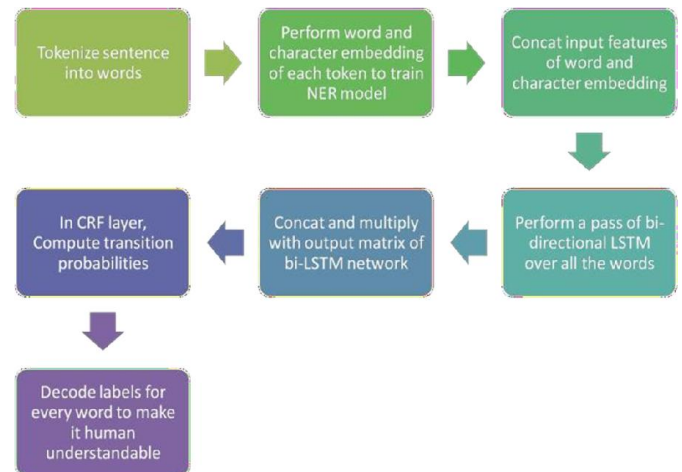


Fig-4: Training procedure of NER task using bidirectionalLSTM-CRF

React-JS WEB APPLICATION

The proposed system is a web-based application developed using MERN stack this makes system platform- independent. For web application frontend development React JS technology is used with Google cloud speech API for transcription. And for backend concerns, Node JS is used and for a database storing purpose, Mongo DB is used.

AUTHENTICATION

Authentication is the primary step that a doctor has to perform in the system. Security of patient is the first concern for that purpose authentication is a way to give authority to doctor to prescribe a prescription. Figure-5 shows the Login page of a system which consists of 2 Field email password. The doctor has to login into the system using Email-ID and password provided at the time of registration

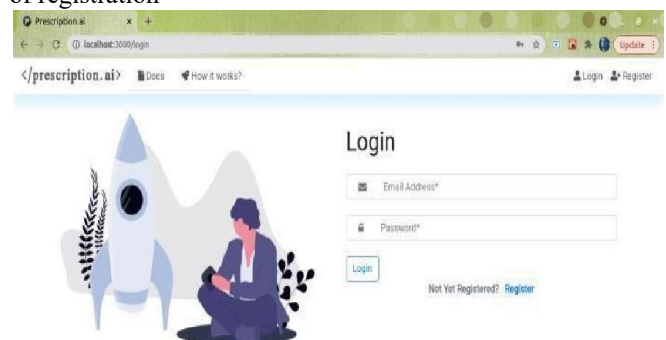


Fig -5: Login Page for authentication

GIVE VOICE INPUT FOR PRESCRIPTION

Once login is done doctor is ready to prescribe a prescription. There are two options available to provide input, first is voice input. Figure-6 shows the prescription input page. Here, to record voice prescription start button should click. After clicking the start button, it starts recording voice prescriptions. And the other Available option is text file

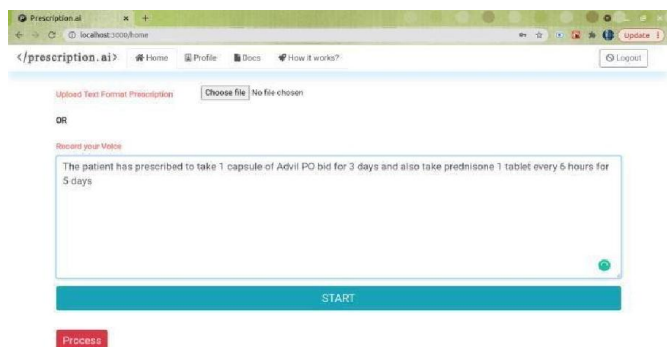


Fig -6: Prescription voice input pa

When Proceed button is clicked, a request is sent to the fastAPI framework to obtain entities for each input word. When the response is obtained from fastAPI, a page will show all tokens with their entites

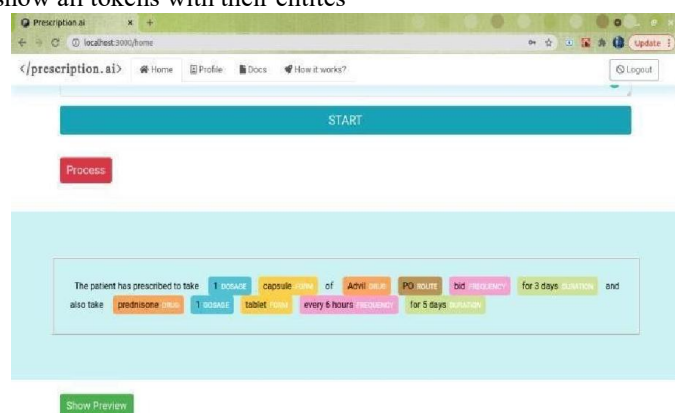


Fig -7: Visual representation of NER output

As shown in Figure-7 Advil is classified as a drug, for 3 days is classified as duration, etc. Visualization of data is one of the bestways to make it easy to understand so doctors can make quick reviews of classified entities.

PRESCRIPTIONS GENERATION AND SEND MAIL TO PATIENT

It shows generated prescription format. Prescription has three input fields Patient name, Patient email-ID, and patient ID. This information is used to send prescription to patients Email-ID. Also, it has seven columns to show prescription in readable form drug name, Duration, Strength, Route, form, dosage, and frequency. A digital signature is also part of a prescription. The need for a digital signature is to shows the authenticity of a document.

How often to take medicines

bid	Twice a day
q3h	Every 3 hours
Q4h	Every 4 hours
qd	Every day
qid	Four times a day

How to use your medicine

PO	By mouth
OU	Both eyes
OD	Right eye
OS	Left eye
AD	Right ear
AL	Left ear

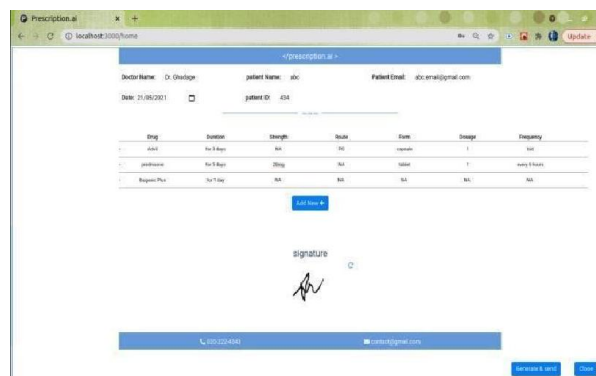


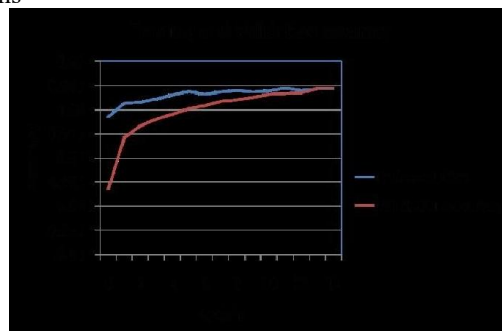
Fig-8: Generate Prescription



Fig -9: Mail sent successfully

RESULT

The Bi-LSTM and CRF model trained on 15 epochs with an F1 score of training is 89.82% also an F1 score of testing is 87.02%. Chart-1 shows a plot of the training accuracy VS validation accuracy over the number of epochs



The proposed system is a web based application that does not need any infrastructure to use it. The implemented system is associated with two major advantages over the existing healthcare system.

1) This System saves doctors time in writing prescriptions as well as paper

2) Make it easy to comprehend doctor's notes

The one major advantage associated with this system is that it performs NER task on both normal English medical phrase as well as doctors abbreviations.

Table-2 contains doctor abbreviations and its respective normal medical phrases for how often to take medicine and how to use or intake medicine. For example, a bid is an abbreviation used by a doctor to say that take medicine twice a day, PO is abbreviation used by doctor to say that take medicine by mouth, etc.

Table -2: Medical Abbreviations**FUTURE SCOPE**

In this work, we have used Google speech recognition API for speech recognition. Google speech recognition spells every word it recognizes correctly. Typically, it recognizes 5–10% of words incorrectly to overcome this we will build our speech recognition model.

Now our proposed system is only supported the Indian English language but in near future, it can also support multiple languages.

In the future, we intend to improve the performance of the system by including Unified models for both NER and Relation Extraction. This would also allow the doctors to easily find out relationships between drugs and ADE so that such drugs can be monitored carefully.

CONCLUSION

The voice prescription system will need a minimal change in the workflow of doctor's and it will also create a huge impact in developing a digital EHR system for patients and doctors. A Voice prescription system helps in managing electronic health records in real-time while maintaining the patient's privacy. This digital system will reduce the patient's record access time and maintain high security and privacy of patient data.

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CO-EXTRACTION OF PECTIN AND POLYPHENOL FROM MORUS NIGRA POMACE USING AN ECO-FRIENDLY TECHNIQUE

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Abstract - The Review on a simultaneous recovery of pectin and polyphenols from (*Morus nigra*) black mulberry pomace (BMP) using an eco-friendly extraction process. The microwave-assisted extraction variables were co-optimized pectin and polyphenols yields as responses. The physicochemical analysis indicated a highly esterified pectin and galacturonic acid (GalA). FTIR and NMR spectroscopies identified the presence of BMP pectin. An amorphous structure for the majority part of BMP pectin XRD analysis were given. Also, higher thermal stability for BMP pectin in comparison to commercial pectin shown by DSC. More over, the antiradical activity of BMP phenolic extract were close to butylated hydroxyanisole (BHA) and ascorbic acid. The review proved that the given procedure can be a promising solution for the management of BMP waste generated in juice, syrup, or liquor processing plants. Also, the obtained products shown that the products have the highest potential to be used as natural ingredients in varieties of the food and pharmaceutical materials.

Key words

Morus nigra (black mulberry pomace), pectin, phenolic compound.

I. INTRODUCTION

Every day , Huge amount of agro-food residues are generated in the form of peel, husk, seed, pomace, etc. in food processing sectors. The disposal of such a large volume of waste poses serious challenges such as environmental pollution problems, and the loss of valuable compounds [1]. To reduce these issues is to

treat them as a potential source of valuable compounds and reuse them in extraction and production of marketable value-added products. This process can also prevent the depletion of natural resources, enhance the agribusiness opportunities, and support the rural livelihoods [2].

Mulberry is a member of Moraceae family originating from temperate and tropical regions of Asia [3]. There are three most important mulberry species are white, red , and black , which in the meantime, black mulberry has a special place because of the extraordinary functional properties [4]. In addition to its unique nutritional properties, black mulberry also has antioxidant, anti-cancer, and anti-inflammatory properties due to the presence of phenolic compounds including phenolic acids, flavonols, and anthocyanins [5]. Polysaccharides is highly present in fruits such as pectin with good antioxidant, antitumor and antimicrobial properties [6]. Generally, black mulberry is consumed freshly, but a large quantity is used in food processing sectors to produce juice, syrup, and liquor which in these cases, the generation of a huge volume of pomace is inevitable. Regrettably , this usable source of phenolics [3–5] and pectin [6] is usually discarded as waste, when we extract these compounds from black mulberry pomace (BMP), not only can increase the economical benefits of production units but also can reduce the amount of BMP residues and its subsequent environmental issues [1]. Pectin is a plant polysaccharide with the main foundation of (1 → 4) galacturonic acid partly esterified in some carboxylic groups. This polysaccharide is mostly used in the

food and pharmaceutical industries as gelling, stabilizing, and thickening agents [1]. Phenolic compounds, as powerful antioxidants, are other secondary metabolites of plants majorly used in the food and drug industries [7]. The main phenolic compounds found in black mulberry are phenolic acids (such as chlorogenic, gallic, syringic, neochlorogenic, and caffeic acids), flavonols (such as rutin and quercetin), and anthocyanins (such as cyanidin-3-O-glucoside and cyanidin-3-O-rutinoside) [5].

As yet, several studies have looked into the polysaccharides (such as pectin and other cell wall polysaccharides) [6,8] and phenolics [3–5,8] of black mulberry or BMP which in all of them, the polysaccharides and/or phenolics were individually extracted and characterized. Thus, with enhancing the production of agricultural waste around the world, and developing the concept of sustainable waste valorization and maximum utilization of food waste. Several reviews have shown the co extraction process of pectin and phenolics from different agri-food waste such as eggplant peels [1], pomegranate peel [2], and mango peel [9] using a commercial extraction method with long processing time and high consumed energy. But no studies have been conducted on the coextraction of pectin and phenolics from BMP. Therefore, simultaneous extraction of pectin and phenolics from BMP using microwave-assisted extraction (MAE), as an green extraction process, was studied to enhance the use of residue for the production of the valuable compounds and minimize the amount of the remained BMP waste. The co-extraction process was improved using four MAE independent variables and two responses of pectin and phenolics. Then, the compounds extracted under optimum conditions were based on physicochemical, structural, and functional properties.

II. MATERIALS AND METHODS

A. Materials

The BMP waste was collected from a black mulberry syrup manufacturing unit. The pomace (with a moisture content of 76–82% w/w) was washed using

tap water 2 times cut into small pieces, then transferred into a stainless tray, and dried in an air-circulating oven (55 °C, 2 days). The dried pomace was powdered with a lab mill and then sieved using a sieve size of 400 µm. The obtained BMP powder (with a moisture content of 4–6% w/w) was stored in an airtight container at room temperature for the next step. Citric acid, hydrochloric acid, sodium hydroxide, gallic acid, galacturonic acid, Folin-Ciocalteu reagent, DPPH[•] (2,2-Diphenyl-1-Picrylhydrazyl), ABTS^{•+} reagent were obtained from Merck Chemical Co. (Darmstadt, Germany). The commercial citrus pectin (Galacturonic acid ≥74.0%, P9561), meta-hydroxydiphenyl reagent, ascorbic acid, and butylated hydroxyanisole (BHA) were purchased from SigmaAldrich Chemical Co. (St. Louis, MO, USA). Ethanol 96% and sulfuric acid were bought from Ghadir Co. (Tehran, Iran) and Dr. Mojallali chemical Co. (Tehran, Iran), respectively. The standard dextrans were purchased from Pharmacosmos (Holbaek, Denmark). All other chemicals and reagents were of analytical grade.

B. Extraction of pectin and phenolics

Microwave Assisted Extraction method, is one of the eco-friendly as well as green extraction process, was incorporated to the simultaneous extraction of pectin and phenolic compounds from BMP. The domestic microwave oven is used for the extraction process (Butane Co., Iran) with an adjustable power and time. Citric acid was used to adjust the pH of the solvent. Now, 5 grams of the dried BMP powder and acidified distilled water were mixed at different pH levels and different liquid/solid ratios. Then, the microwave oven were used where the sample was kept and the irradiation time at three levels: 60, 180, and 300 s and microwave power at three levels: 200, 500, and 800 W were set up using a digital control system. The pectin and phenolics production processes were clearly programed. As it is obvious, both products were extracted simultaneously using MAE process. After performing the extraction process and separating the residual BMP solids by centrifugation at 10000 ×g for 20 min, pectin and phenolics samples were isolated.

C. Pectin fraction

The liquid phase was precipitated by mixing ethanol (96%) at a ratio of 1:1 v/v, and kept at 4 °C for 24 h. Then, at 10000 ×g centrifugation, the samples were treated for 20 min, precipitates were collected and were dried at 50 °C for 12 h. The dried pectin was dissolved fully in distilled water and centrifuged (10,000 ×g, 20 min) to remove impurities and also to extract pure pectin were found. Then, it was treated with ethanol (1:1 v/v) and stored overnight (4 °C). The precipitates were gathered by centrifugation (10,000 ×g, 20 min) and dried in an oven (50 °C, 12 h). The purification process was repeated twice to reach a better quality for BMP pectin sample. The dried pectin were weighted and the extraction yield were determined and recorded as g of purified pectin per 100 g dry powder of BMP (based on dry matter).

D. Total phenolic compounds (TPC) fraction

After removal of pectin, the balance ethanolic solution was used for TPC measurement [2] [1]. The TPC measurements were performed spectrophotometrically using UV–Vis spectrophotometer [10]. According to the standard curve (R^2 of 0.9913) of gallic acid TPC of BMP phenolic extract samples was calculated. The TPC yields were detected by TPC measurement. The yields were defined as g of gallic acid equivalents per 100 g dry powder of BMP (based on dry matter).

III. STATISTICAL REVIEW

In the current study, a Box–Behnken design (BBD) with four variables in three levels was considered to optimize the effect of independent variables (microwave power, irradiation time, pH and liquid/solid ratio) on the extraction yield of pectin and phenolic compounds as responses are dependent variables. Also, all computations and graphics were made by Design-Expert software.

A. Physicochemical review of BMP pectin

Moisture, ash and protein content, total carbohydrates, galacturonic acid (GalA) content, degree of esterification (DE), and weight-average molecular weight (M_w) of the BMP pectin extracted under optimum condition (microwave power of 700

W, irradiation time of 300 s, pH of 1.42 and LSR of 20 mL/g) were determined in physicochemical analysis. Moisture and ash content was measured by the previously described method [11]. The presence of protein was identified by the Kjeldahl method ($N \times 6.25$) [12]. The total carbohydrates is measured by the phenol-sulfuric acid photometric method as studied by Dubois et al. [13]. The standard galacturonic acid (GalA) content was analyzed colorimetrically using 3,5-dimethylphenol reagent were used, and the curve of Dgalacturonic acid [14]. The degree of esterification (DE) were calculated by the titrimetric method [15]. The M_w was measured by a GPC device (Shimadzu LC-20A, Kyoto, Japan) equipped with an Ultrahydrogel 250™ column and a refractive index detector. The mobile phase of 0.1 M NaNO_3 was used at a flow rate of 1 mL/min, a temperature of 35 °C and an injection volume of 20–50 μL .

B. Chemical structure of BMP pectin

The pectin obtained under optimum extraction condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42 and LSR of 20 mL/g) was structurally compared by Fourier transform infrared (FTIR), nuclear magnetic resonance (NMR) and X-ray diffraction (XRD) spectroscopies with the pectin which used in commercial markets. FTIR spectra were obtained by a Bruker FT-IR Tensor 27 spectrometer (Billerica, Massachusetts, USA) at the wavenumber range and the resolution of 4000–500 and 4 cm^{-1} , the KBr method were used [15]. ^1H NMR spectra were obtained by a Varian Unity Inova 500 MHz spectrometer (Palo Alto, CA, United States) at the internal temperature, the relaxation delay, and the acquisition time of 24 °C, 1 s and 4 s, respectively [16]. XRD patterns were obtained by an X-ray diffractometer (PHILIPS, Amsterdam, Netherland) at the internal temperature, the relaxation delay, and the acquisition time of 24 °C, 1 s, and 4 s, respectively [17]. The BMP pectin isolated under optimum extraction condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42 and LSR of 20 mL/g) and the commercial pectin were analyzed thermally by a differential scanning calorimeter at the temperature range of 10 to 300 °C with a scanning rate of 10 °C/min.

C. Antioxidant analysis of BMP extract

The obtained BMP phenolic extract sample under optimum extraction condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42 and LSR of 20 mL/g) at concentrations of 2–125 µg GAE/mL were characterized using three methods including DPPH• scavenging activity, ABTS^{•+} scavenging activity, and reducing power assay. DPPH• scavenging activity was performed spectrophotometrically at 517 nm [1]. ABTS^{•+} scavenging activity, as one of the common tests for estimating the antioxidant ability of natural materials, was performed using a UV–Vis spectrophotometer with sample detection at 734 nm [18]. Reducing power assay was also done spectrophotometrically at 700 nm using the protocol.

IV. RESULTS AND DISCUSSION

A. Co-extraction and statistical reviews

In this review, a Box–Behnken experimental process with four inputs of microwave power, irradiation time, pH, LSR, and two outputs of pectin extraction yield and TPC extraction yield was applied to optimize the extraction conditions of pectin and TPC from BMP. The extraction yield of pectin and TPC ranged from 1.00 to 9.80% and 4.89 to 11.87%, respectively. Microwave power of 700 W, irradiation time of 300 s, pH of 1.42, and LSR of 20 mL/g. Under this condition, the mathematical model predicted a maximum extraction yield of 11.26% for pectin, and 12.49% for TPC, respectively. The obtained optimum yield was found to be higher than the optimum yield for pectin extracted using MAE process from several non-commercial sources such as pomelo peel (2.93%) [20], pumpkin biomass (7.4%) [21], dragon fruit peel (7.42%) [22], and banana peel (2.17%) [23]. However, it was lower than the optimum yield of commercial pectin sources such as sour orange peel (29.1%) [24], sweet lemon peel (25.31%) [17], and orange peel (18.59%) [25] extracted by MAE. In the case of TPC yield, the optimum yield was found to be higher than the yield of the extract obtained from pomegranate peels (10.6–11.8%) [2]; and lower than TPC yield found for

phenolic extract sample obtained from eggplant peel (20.2%) [1], and sour cherry pomace (14.36%) [26].

B. The role of extraction variables on the yield of pectin and TPC

The effect of extraction variables on the pectin and TPC yield. The yields were microwave power-dependent and by increasing the power up to 700 W both yields (pectin and polyphenols) were increased. This observation could be due to the fact that with an increase in the microwave power and thus the electromagnetic energy transferred on extraction solvent molecules, the temperature and thereby the mass transfer of the products were increased. The acidified water, as a polar solvent, efficiently absorbs the microwave energy, increases the temperature and leads to efficient heating. Then, the increase in temperature, caused by the thermal effects of microwave energy, improves the cell disruption in BMP powder (which are in contact with solvent), then accelerates the release rate of functional compounds (pectin and polyphenols) from the plant cells. However, beyond that power (700 W) the yields were decreased, probably due to the excessive microwave power and energy, and the thermal degradation [10,27,28]. Irradiation time was another effective factor and the obtained results showed that this parameter also had a direct relationship with the responses. Several reviews have been reported similar results and suggested that increasing the extraction time during the microwave-assisted extraction process leads to creating enough time for the extraction and the transfer of compounds from plant fractions into the surrounding medium and therefore an increase in extraction yield [11,28,29]. pH value had a reverse relationship with extraction yields and the responses were increased by decreasing this factor, which is probably due to the fact that the high concentration of acid in extraction medium can increase the damage to the plant tissue and thereby can improve the release of the products [30,31]. The effect of LSR on the extraction yields. The extraction yield of pectin and TPC was decreased, when LSR was increased from 22 to 40 mL/g. One possible reason for the decline is that a high volume of extraction solvent can absorb the more microwave

energy and thus can lead to a decrease in the energy available for cell wall destruction [25,32]. However, a key point in the mentioned figures is that when using harsh conditions consisting of very high microwave power and irradiation time and also very low pH and LSR, the extraction yield is decreased which is probably related to the degradation of the target compounds by overheating [10,29]. Microwave power was the most effective factor in pectin yield. Moreover, the process was performed in a short processing time (300 s), low energy requirement, and free of hazardous chemical usage.

C. The physicochemical viewpoint of the BMP pectin

The different physicochemical properties of BMP pectin extracted under optimum extraction condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42, and LSR of 20 mL/g) were identified. As can be seen, moisture, ash and protein content of BMP pectin was found to be 7.64, 4.87, and 1.81%, respectively. Also, the total carbohydrates of pectin in the mentioned conditions were found to be 82.37%. Different values of the mentioned properties were reported for the pectin of various sources, for example: the ash, protein, and total carbohydrates of the produced pectin from sour cherry pomace using MAE process were about 3.73, 1.41 and 26.43%, respectively [26]. In another study, Kazemi et al. [33] reported a significantly different values for the ash and protein content of pectin obtained from eggplant calyx (5.21 and 7.68%, respectively) and eggplant peel (9.03 and 9.13%, respectively) using a similar MAE condition (microwave power: 700 W, irradiation time: 120 s, pH: 1.5, LSR: 20 mL/g). Different values were also found for the carbohydrate and protein content of pectin extracted from orange peel using the conventional method (77.2% and 7.1% respectively), MAE method (80.2% and 7.0% respectively), and combined surfactant and MAE method (84.2% and 5.8% respectively) [34]. Probably, the used source, the extraction method, and the process conditions are the main reasons for these differences [11]. The determination of GalA content is an integral test of pectin because this parameter is another definition for pectin purity. The HMP pectin can form gels at a low pH and in the presence of a high concentration of sugar. Therefore, it is suitable to be applied in the non-diet products such as all kinds of jams and jellies.

According to the BMP pectin extracted under optimum condition had an M_w of 620.489 kDa which was higher than those of pectin extracted by MAE process from various commercial and noncommercial sources such as orange peel ($M_w = 144.8$ kDa) [34], sweet lemon peel (615.836 kDa) [17], and sour cherry extracted by MAE ($M_w = 472.977$ kDa) [26]. Previously, it has been recommended that pectin with high average molecular weight is more suitable to be used as a gelling agent, while pectin with lower M_w can offer higher antioxidant properties [35]. Probably, the plant source is one of the major reason for the differences found in M_w of pectin samples. The high value of M_w/M_n was attributed to the presence of smaller chains in the pectin fraction due to the high microwave power and low pH used in the extraction process [17].

D. The structural properties of BMP pectin

The structural properties (FTIR, ^1H NMR, and XRD spectroscopies) of BMP pectin extracted under optimum extraction conditions were evaluated and compared with the commercial citrus pectin.

It should also be stated that the signals of methyl and acetyl groups are attributed to the DE of pectin and their sharpness are directly related to this parameter [1]. Therefore, it can be concluded that the ^1H NMR spectrum also confirmed the reported data for the titrimetric determination of DE.

E. The thermal analysis of the BMP pectin

The DSC was used to determine the thermal properties of the BMP pectin obtained under optimum condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42, and LSR of 20 mL/g) and the commercial pectin. The endothermic peak for BMP pectin and the commercial pectin was found at 115.82 and 111.36 °C, approximately. The endothermic peak can be depicted due to the existence of moisture and hydrogen bonding among GalA units. It also represents the ability of pectin.

F. Antioxidant potential of BMP extract

The antioxidant potential of the BMP phenolic extract obtained under optimum extraction condition

and the standard antioxidants were measured by three widely used methods including DPPH[•], ABTS^{•+}, and reducing power assay, since choosing only one method for estimation may compromise the effectiveness of obtained results [1,9]. Revealed that DPPH[•] scavenging activity of samples had a concentration-dependent behavior, thus, the IC₅₀ value was established for samples to provide a reliable comparison with each other [1]. The IC₅₀ value for ascorbic acid, BHA, and BMP phenolic extract were 30.96, 41.42, and 63.76 µg/mL, respectively. Therefore, it could be concluded that the strongest sample was ascorbic acid, followed by BHA, and then BMP phenolic extract. However, as can be seen, the inhibition percentage of BMP.

CONCLUSION

In this review, from BMP using the microwave assisted extraction process, BBD was applied to co-

enhance the simultaneous extraction of pectin and phenolics. The Co-extraction reveals that the highest pectin and TPC yields were achieved under MAE optimum condition (microwave power of 700 W, irradiation time of 300 s, pH of 1.42 and LSR of 20 mL/g). Pectin was rich in high-methylated GalA obtained under optimum condition and had an M_w value of 620.489 kDa with a wide molecular weight distribution (M_w/M_n = 3.66). The structural properties of BMP pectin were examined using varieties of methods and the obtained results confirms the predominant presence of GalA units with high DE value, and an amorphous structure with a good thermal capability. At a concentration of 128 µg/mL, the antioxidant capacity of BMP extract sample was close to those of standard samples. The results showed that the simultaneous production of pectin and polyphenol from BMP waste not only produces two marketable products but also offers lower overall production cost and allows the sustainable valorization of BMP. Therefore, it is confirmed that the MAE process for the valorization of BMP were completely reasonable economy.

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DESIGN OF COMPOSTER AND ANALYSIS OF COMPOST MATERIALS

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Abstract -Waste management is one of the major problems faced by different cities all over the world. The problem is particularly due to urbanization, industrialization, poor urban planning, and lack of adequate resources which contribute to the enormous amount of waste propagation. According to the Central Pollution Control Board (CPCB) survey, the quantity of waste generated by 23 cities in the country in order of 30,058 tons/day. For instance, in INDIA the annual production of food waste has reached up to 45% (19000 crores), annual production of vegetable wastes has reached up to 24% (4000 crores), and average rate of food and vegetable wastes produced by every individual is 450 g per day. The above data witnessing clearly that waste production is remaining as an outstanding challenge for our country and the environment and creates a need for technology for handling and disposing of these collected wastes without harming the environment and atmosphere. The studies show that the development of an equipment to compost the household wastes like vegetable wastes, fruit wastes and leaves of trees. The study also focuses to reduce the time of composting by the addition of additives. It is eco-friendly, cost effective and can be operated easily.

Keywords - Environment, Waste generation, Composting, organic materials

I. INTRODUCTION

Waste has always been generated by humans. It will cause environmental impact in both lower and higher population areas. A waste collection and resources recovery system were established around the 'dust-yards'. The first and foremost constituent of municipal waste was coal ash (dust) which had a market value for brickmaking and soil improvement.^[8]

The techniques for waste management are recycling, Incineration and landfills. These are

referring to the transformation of waste to materials of lower quality. The initially with organic pollutants undergoes separate waste material that are used as substitute fuels must be crushed in advance and set at a constant calorific value. The waste that are deposited in landfills are compliant with the legal requirements.^[11]

Waste to energy process generate electricity to produce a substitute fuel such of methane, methanol. In many developed and developing countries are undergoing this process to increase the efficiency of existing waste to energy technologies. The composting process recycles organic materials regarded as waste products and it is used in soil fertility in gardens, horticulture, agriculture and organic farming.^[22]

II. LITERATURE REVIEW

A composting reactor of volume 110L and height of 80 cm is designed using the Stainless Steel (SS) metal. The reactor was insulated with rock wool. A helical ribbon agitator is fixed at the Centre of the composter which is used as a masher. In the outlet gas line, the air was drawn into reactor by an induced fan. The oxygen and CO₂ were monitored at a regular interval. The composting process is carried out with 6kgs of wet vegetable having moisture content between 92% and 94%^[21]. The collected feedstock was dried in sunlight and shredded into small pieces with a width of 3–5 mm.^[20]

The biochar was used as an additive. The biochar was produced at two different temperatures 350°C and 450°C. Biochar amended compost mixtures achieved the thermophilic temperature, increased the OM degradation by 14.4 -15.3%, concentration of NH₄ by 37.8 - 45.6% and NO₃ by 50 - 62%. The most

important effects in term of achieving rapid thermophilic temperature and a higher concentration of NH_4 and NO_3 were observed at 15% (w/w) Biochar. The compost results in 50 to 60 days. Therefore, Biochar at 350°C will be suitable for the process.^[29]

A Pilot scale composting plant of 132 m^2 was setup to treat Food Wastes of 6 tons/ day. The setup is designed by stainless steel in cylindrical shape. The dimensions of the plant are 5m in length and 1.6m in diameter. FW leachate is used to regulate the moisture. It is ventilated for 20min every 2h with a rate of 160L/min. The composting reactor was rotated two times every day.^[28]

Three samples were randomly collected from different depths (20–60cm, 60–100cm and 100–140cm) which were fed to the reactor^[39]. The problems in the composting process include the presence of impurities: emissions of greenhouse gases and odor. Materials such as glass or plastic present with the food wastes and it will affect PH, Carbon to Nitrogen ratio, Moisture content, and aeration rate^[1]

There are three phases in composting process namely the Mesophilic or moderate temperature phase (couple days), the thermophilic or high temperature phase (few days to several months) and the cooling and maturation phase (several months). Parameters such as temperature, carbon to nitrogen ratio, pH, moisture content, oxygen concentration and other nutrients of the compost pile are integral in achieving optimum conditions for the process. Microbial decomposition occurs most rapidly in the thin liquid films found on the surfaces of organic particles. The moisture content of compost affects its temperature changes. The optimal moisture content for the composting process is 50–60%. Moisture contents less than 30% inhibit bacterial activity while values above 65% result in low decomposition, odor production and nutrient leaching.^[19]

The reduction in the time taken for composting can be achieved through mechanical turning or forced negative or positive aeration. Carbon and nitrogen are the most important elements for microbial decomposition. Carbon is the energy source and making 50% of the mass of microbial cells. For cell growth and function Nitrogen is the crucial component for nucleic acids and proteins. The carbon to nitrogen ratio for the composting process is 30:1^[5]

The key factors influencing the speed of composting process are type of food, air, moisture, temperature, and particle size. Below 40% water content Bacterial activity slows down and makes the process dull. Above 60% water level excess water force the air out of the pile and suffocate the microbes however anaerobic reactions take over to form compost, but both the product and process will release odor^[19]. The presence of a wide range of functional groups on its surface adsorbs various essential cations

and anions produced during the process. The microporous structure absorbs common solvent such as moisture^[3]. The reactor has a dimensions height 63.5, diameter 68.6 cm and thickness 10 mm. The vessel was protected with aluminum foil and Styrofoam to prevent heat losses. The reactor was filled with mixed and ground feedstock up to 70%, whereas 30% of the area was kept as a head space. The method of a erating the compost materials is through turning and mixing^[4]. Shredding of the compost mixture was carried out mechanically through an agitator for achieving uniform mixing and oxygen (O_2) supply throughout the experiment.^[2]

III. MATERIALS AND METHODS

A. Materials Used

The materials used for the fabrication of reactor (composter) are listed below.

- Sheet metal
- Hollow cylindrical pipe
- MS semi-spherical cup
- Bearing with casing
- Hollow square pipe
- Door keels
- Bolts and Nut

The supply of moisture and oxygen is provided regularly to maintain the anaerobic conditions inside the reactor. If there is poor supply of moisture leads to the death of anaerobic microbes and the process turned into anaerobic. The anaerobic condition takes much more time to complete the composting process.

After feed into the composting chamber, the process initiated with room temperature, 36°C and it start to increase gradually. At Day 14, the temperature reaches near to 40°C and which indicates the completion of Mesophilic phase (1st phase of composting process) and entering to the second phase of process called thermophilic phase. This phase lasts for nearly 10 days and at Day 25, the temperature falls back to below 40°C and enters curing phase (3rd phase of composting process). The temperature varies slightly up to 30th day and after that it maintains the room temperature. This condition indicates the completion of curing phase and the occurrence of cooling phase (the last phase of process). At Day 36, the final compost ready to use is collected from the chamber and stored.

a) Sheet Metal

For designing the composter, the MILD STEEL (MS) of gauge 1.20 mm thickness is used. The dimensions of this sheet are 500 mm in length and 320 mm in diameter which is used as the Centre part of the composter. MS is very light in weight and capable of holding more weight and can be able to transport

easily. Due to this uniqueness of Mild Steel, we have used this to design the composting reactor.

To avoid the corrosion in Mild Steel, the sheet metal will be coated with Zinc and thereby avoiding rusting and gives polished surface look for the metal sheet. The sheet metal has the melting point temperature less than 1500°C.

b) Hollow cylindrical shaft

The hollow cylindrical iron shaft is used in this reactor. The dimensions of this hollow cylindrical shaft are 65 cm in length and 1.2 cm in diameter.

The shaft is end-to-end welded with the composter and then the shaft is connected to the bearings at both the ends. At one of the ends, the shaft is attached to the key (shaft key). So, with the help of shaft key, the entire setup can be rotated 360 degree with the help of this shaft.

c) Hollow cylindrical pipe (masher)

As per our design requirements, there is need of 10 mashers with the dimensions of 30 cm in length and 1 cm in diameter respectively. For 10 mashers, the hollow cylindrical pipe with the dimensions of 300 cm in length and 1 cm in diameter is purchased. The mashers are used to mix/rotate the feed present inside the composter to upside down while the composter can rotate. It is done to increase the reaction rate and thereby the overall processing time can be reduced.

d) Bearing with casing

The bearing support is provided to allow the free rotation to the shaft. The bearing used for the shaft is UCP-208 which has 40 mm inner diameter and the balls of bearing is made of stainless steel(SS), the rollers are made of high carbon chromium steel and the casing is made of cast iron(CI).

Here, the bearing with casing is used to reduce the expensed for fabricating U-Clamp and inverted U-Clamp. Despite U-Clamp and inverted U-Clamp, the casing will provide the support to bearing base. The balls in the bearing have the point contact to the surface while the roller bearing (another type of bearing) has the line contact to the surface.

The bearing can able to reduce the friction of that moving part. This bearing can able to tolerate the load up to 200 kg. It should be applied with grease (or) lubricating oil to reduce the friction between the shaft and bearing.

e) Hollow square pipe

These square hollow pipes are used to provide the supporting frame (stand) to the loaded part which gives the required support to seat the reactor over it. These square hollow pipes are made of mild steel

material (MS). The pipe dimension is 40mm*40mm with 18 gauge (1.20mm).

f) Door Keels

The door keels are used to open and close the door of the reactor, which is located at the center side of the reactor. These door keels can move around 180° it is utilized for the movement of the door. It can be closed with the help of screw provisions thereby it can close to avoid the dropout of the feed from the reactor.

g) Bolt and Nut

The bolt and nut are temporary joints, which can be able to join and removed easily with the help of required tools. The bolt and nut are made of mild steel material (MS). Here M14 kind of bolt and nut with washer is used to mount the bearing to the flat plate.

B. Testing and Analysis

After the completion of curing phase (which is the last phase in composting), the final compost is tested for its nutrient value. The final compost is tested for its NPK content and nitrification value. These data are compared and studied with the data of existing compost fertilizers. This compost is mixed to the pre-tested soil (the collected soil is tested for the nutrient content). The collected compost is mixed to this soil and then the soil is again allowed to nutrient test to find the efficiency of compost by comparing the results. Once compost is ready for use, it should be stored in a clean, dry area until use. Since the compost had already matured, it will not break down further or emit odors. The compost can be used as a, Organic fertilizer, Soil stabilizer, Promoter of crop growth.^[41]

IV.RESULT AND DISCUSSION

The data explains the pH, Dry bulb and wet bulb temperature observed daily during our process of composting. The composting of neem leaves along with additives like orange peel, biochar and soil took 36 days and the daily observed parameters of all the 36 days is tabulated and shown graphically.

Days	pH	Days	pH	Days	pH
1	7.9	13	7.6	25	7.8
2	8.1	14	7.7	26	7.7
3	8.0	15	7.8	27	7.6
4	7.9	16	7.9	28	7.7
5	7.8	17	7.8	29	7.5
6	7.0	18	7.9	30	7.5
7	6.9	19	8.0	31	7.5
8	7.1	20	7.9	32	7.3
9	7.4	21	7.9	33	7.4
10	7.6	22	8.0	34	7.3
11	7.9	23	7.9	35	7.4
12	7.7	24	7.7	36	7.3

1.1 .Days Vs pH

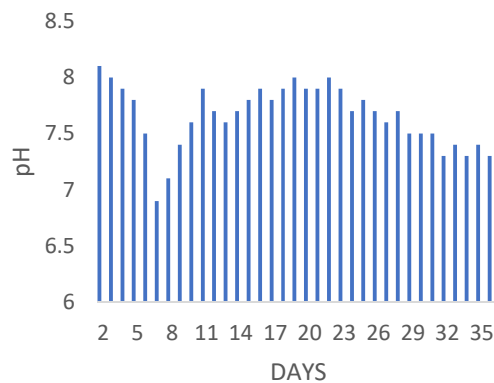


Fig 1.1 Days Vs pH

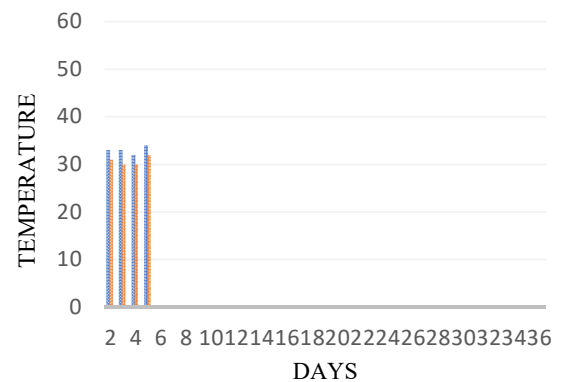
From the figure 1.1, initially after drying the collected leaves, it was loaded to the composting chamber and the pH was noted as 7.9 on Day 1. At all the phases of the process, the pH was maintained between 7 to 8 which was the optimum level. The graph clearly shows that the pH is maintained optimum throughout the process. The pH of final compost obtained is 7.3 which are close to the neutral value.

Days	DBT (°C)	WBT (°C)	Days	DBT (°C)	WBT (°C)
1	36	32	19	46	42.5
2	33	31	20	45.5	42
3	33	30	21	48	43
4	32	30	22	47.5	42.5
5	34	32	23	42	40.5
6	36.5	34	24	40.5	39
7	36	33.5	25	40	38.5
8	35	34	26	38.5	37
9	37	35.5	27	37	36
10	36.5	34	28	36	34
11	36	34.5	29	35.5	34
12	38	36	30	35	33
13	39.5	37	31	34.5	32.5
14	41	38.5	32	34	32.5
15	41.5	38.5	33	33.5	32
16	43	39.5	34	33	32
17	45	42	35	33.5	32
18	45.5	42.5	36	33	32.5

1.2 Days Vs Temperature

After feed into the composting chamber, the process initiated with room temperature, 36°C and it start to increase gradually.

Fig.: 1.2Days Vs Temperature



From the figure 1.2, At Day 14, the temperature reaches near to 40°C and which indicates the completion of Mesophilic phase (1st phase of composting process) and entering to the second phase of process called Thermophilic phase. This phase lasts for nearly 10 days and at Day 25, the temperature falls back to below 40°C and enters curing phase (3rd phase of composting process). The temperature varies slightly up to 30th day and after that it maintains the room temperature. This condition indicates the completion of curing phase and the occurrence of cooling phase (the last phase of process). At Day 36, the final compost ready to use is collected from the chamber and stored.

V. CONCLUSION

From this project, composting could be an option of waste management operation that is cheap, environmentally friendly, wealth creating and sustainable. In bioremediation of polluted soils and sites this technique has been used extensively, and composting requires proper handling and appropriate technology for its sustainability. Many experts across the world are recommending that composting of organic wastes should be encouraged in all the developing nations of the world by the appropriate waste management authorities. This will lead to waste reduction at landfill, job creation and production of organically produced food crops. Organic agriculture has continued to gain more profit all over the world for its sustainability and safety of the farm produce. In organic agriculture the crops produced are expensive, but the price of organic food by the encouragement of compost fertilizer at high rate and low price to the farmers, could drop drastically.^[33]

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DYE-SENSITIZED BLACKBERRY SOLAR CELL (DSSC)

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Abstract - Generally, plants contain pigments like chlorophylls, carotenoids, flavonoids, betalains. The blackberry is an edible fruit produced by many species in the genus *Rubus* in the family *Rosaceae*. This fruit particularly contains anthocyanin pigment which can be used as the sensitizing pigments for photoelectrochemical cells. Blackberry is used to prepare the anthocyanin pigment. The fresh fruit is crushed into a liquid-type sample. Then the sample is treated with methanol. The presence of pigment can be analysed by UV and FTIR analysis. Anthocyanin pigment obtained according to the present invention is highly pure (>99.9% by HPLC). The electrolyte solutions are potassium iodide and Iodine. It works under the principle of photosynthesis and the photovoltaic method. The diode connected between the cells and battery to avoid the reverse current.

Keywords

Blackberry, Anthocyanin, Photoelectrochemical cell, Potassium iodide and iodine, UV and FTIR Analysis.

1. INTRODUCTION

The energy crisis is one of the major issues due to the rapid consumption of fossil fuel source¹. In recent days worldwide demand for energy keeps increasing due to population growth, technological development of Industries². However, oil production is gradually decreased which deems to give enormous challenge to growing needs. So nowadays we are mainly focusing on carbon-free energy source development which can able to meet societal needs. Renewable energy sources (RES) are one of the important energy supplies which are directly produced from sunlight like photovoltaic, photochemical, solar thermal, and other natural mechanisms. Most of the plants

contain chlorophylls, carotenoids, flavonoids, betalains. Blackberry contains a wide range of flavonoids particularly anthocyanin which is used as sensitizing pigment coating for a solar panel. Among various types of solar cells in today's generation, dye-sensitized solar cells had attraction due to huge potential alternative solar PV generation. But the major challenging task is to enhance the stability of DSSC for the long term. In this research, the dye was extracted from blackberry which contains an enormous amount of anthocyanin, it has more potential to absorb visible light in the spectrum. Also, this work is a completely green method as well eco-friendly technique.

II. CATEGORIES OF COMMON DYES IN DSSC

An important role in the absorption and conversion of visible light into electric energy is done by dyes. Dyes are classified into two types i.e., Natural dyes and Synthetic dyes¹. Anthocyanin, Betalain, Carotenoids, Chlorophylls, Curcumin, Flavonoids, Indigo are comes under natural dyes. Now the synthetic dyes are further classified into Metal-organic complex dyes and metal-free organic dyes.

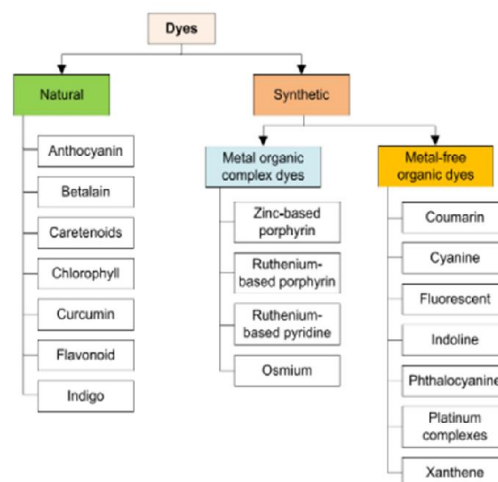


Fig:1 Categories of common dyes in DSSC

some examples of metal-organic complex dyes are Zinc based on porphyrin, Ruthenium-based porphyrin, Ruthenium-based pyridine, and Osmium. Coumarin, Cyanine, Fluorescent, Indoline, Phthalocyanine, Platinum complexes, and Xanthene are some examples of Metal-free organic dyes.

III. ANTHOCYANIN DYE

Anthocyanins, belonging to the flavonoid class, are natural pigments used mainly as natural colorants. The genetic and environmental factors influence the concentration as well as the composition of anthocyanin pigments found in fruits and vegetables. For the different visible colors, the pigments are the dominant responsible including shiny orange, pink, red, violet, and blue colors in different parts of plants and fruits, which explains their name, in Greek, anthos means flower and kyanose means blue. The anthocyanidins are the basic structures of the anthocyanins³. As anthocyanidins (or aglycons) are composed of an aromatic ring (A) bonded to a heterocyclic ring (C) that contains oxygen, and the second aromatic ring (B) is bonded by a C-C bond. Anthocyanidins are anthocyanins when they are identified in their glycoside form. Initially, the color is displayed by anthocyanin which is determined by Pauling, the resonant structure of the flavylum ion which is responsible for color intensity³. It is estimated that there are more than 500 different anthocyanins and only six are widely used in vascular plants are pelargonidin, peonidin, cyanidin, malvidin, petunidin, and delphinidin. Mostly the anthocyanins present in nature are the glycoside derivatives of cyanidin, delphinidin, and pelargonidin. Anthocyanins are replaced by betalain pigment. Anthocyanin pigments are assembled in plants from two different streams of chemical raw materials in the cell: both from the photosynthesis-derived C2 unit acetate (or acetic acid). One of these stream includes the pathway is produce phenylalanine amino acid from shikimic acid. The another stream (the pathway of acetic acid) generates three molecules of malonyl-coenzyme A, a C3 unit. The enzyme chalcone synthase (CHS), which forms an intermediate and is coupled together. Therefore, synthesizing these pigments requires more than five enzymes, each working in concert.

IV. PREPARATION OF ANTHOCYANINS EXTRACT

Preparation of anthocyanin extraction is a very essential step in isolating, identifying by using plant pigments such as anthocyanin compounds and some standard extraction method is there. Fruits, vegetables, flowers, and leaves may be ground, dried, or lyophilized, and some fresh plants may be soaked to extract phenolic compounds with subsequent extraction of solvent⁴. These

methodologies of extraction result in the co-extraction of non-phenolic substances such as sugars, organic acids, and proteins, requiring subsequent purification processes such as the extraction of a solid phase⁵. To determine the best ANC's extraction protocol, different solvent solutions (70% methanol, 70% ethanol with or without 2% HCl or H₂O, with or without 2% HCl) were tested. Blueberry whole fruits, 5 g of fresh weight (f.w.), were homogenized in 30 mL of solvent, sonicated in an ultrasonic water bath (frequency 28 KHz, power 400 Watt) for 15 min, and then centrifuged at $4500 \times g$ for 15 min to remove any solid material. At last, the extracts were stored at -20°C in darkness until further analysis.

V. PURIFICATION OF ANTHOCYANINS EXTRACT

Purification of Anthocyanin extract is extensive and normally found in a mixture of pigments and impurities due to the co-extraction of non-phenolic substances such as sugars, organic acids, and proteins (R). The purification is one of the essential stages in the recovery of highly pure anthocyanins after the extraction process³. A wide range of techniques have been analyzed, ranging from solid phase (SPE) and liquid-liquid (LLE) extractions to the use of sophisticated chromatographic techniques such as countercurrent chromatography, medium-pressure liquid chromatography (MPLC), and HPLC.

VI. METHODOLOGY

It is known that it is possible to convert solar energy into electric energy. Several attempts to use natural dyes or pigments in the photoelectrochemical solar cells to produce electric energy have been undertaken in the past. The dye-sensitized nanocrystalline photoelectrochemical solar cells, also known as Dye-Sensitized Solar Cells (DSSC) have been invented about 20 years ago and are composed of a negative electrode, named photoanode, which comprises a matrix, made of glass or other material that is transparent to solar radiation, having a spectral range comprised between the visible and the near-infrared, and made electrically conductive through a thin layer of Indium oxide and tin oxide (ITO), or of fluorine-doped Tin dioxide (FTO).

Titanium or Zinc oxide semiconductor nanocrystals are deposited upon this support, having a thickness of about 10-20 μm , thus forming a matrix to which a sensitizing dye is adsorbed. This, indeed, sensitizes the matrix that houses it by extending its absorption properties in the visible region, and in some cases also in the infrared one. An electrolytic solution containing an electron mediator is also adsorbed by capillarity on the thus-prepared electrode. This last one has the function of transferring electrons from the counter electrode (cathode) to the dye,

regenerating the fundamental state (reduction process) in the sensitizer. Once this phase has been completed, the operation is ended by coupling the cathode to the photoanode. This can be made of the same conductive glass used for the photoanode, or with metallic support, or after making them conductive, with plastic supports; a catalyst, generally based on platinum, carbon, or gold is deposited on the conductive part to the electron mediator selected.

VII. WORKING PRINCIPLE

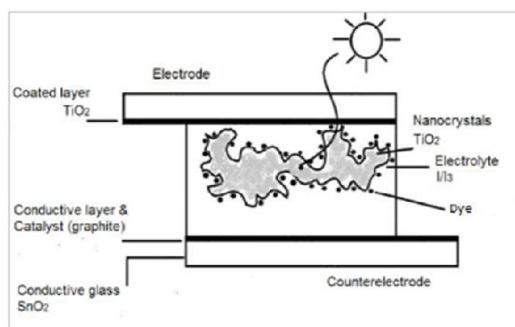


Fig:2 Photovoltaic and photoelectrochemical cell

In principle, the photophysical and photochemical properties of some dyes are exploited, which have the property of absorbing energy, when they are hit by the solar electromagnetic radiation, above all, when their characteristic absorption spectrum falls within that covered by the spectral distribution of the radiation source⁶. The thus-absorbed energy brings the dye molecule to a higher energetic state, referred to as the excited state, from which the electrons are promoted to the semiconductor conduction band, i.e., the Titanium or Zinc oxide, on which the dye molecule has been previously bonded. The dyes used in the photoelectrochemical solar cells can be artificial or natural. The artificial ones can be either of organic or inorganic nature; these have the characteristic of exhibiting sufficiently high yields, but they have several drawbacks, such as, for example, the high production costs and certain toxicity, which also involves the waste products deriving from their preparation and the scarce eco-sustainability, as they are neither recyclable nor biodegradable. Furthermore, for the application in the photoelectrochemical cells, only the inorganic dyes ensure functioning stability proximal to some tens of years, while the artificial organic ones do not result to be as stable and efficient.

VIII. DSSC FABRICATION

FTO conductive glass substrates were first off wiped clean in labosol solution for 30 min observed with the aid of using rinsing in the water-ethanol solution of NaOH for another 30 min⁷. TiO₂ interference was obtained with the aid of using 2.4 ml Ti{OCH(CH₃)₂}₄ to 34 ml of C₃H₈O into a plastic bottle with stirring. Then, 0.8 ml of 2M hydrochloric acid was added drop by drop, and the solution was left under stirring for one day. The coating solution was spread on the surface by using a spin coater (1000 rpm for 10 s followed by 3000 rpm for 60 s). The layer which has made was sintered at 120°C for 2 hours⁸.

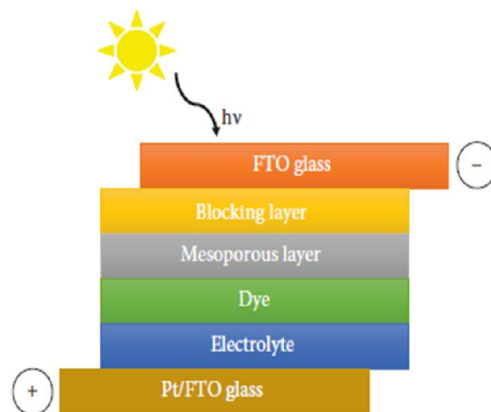


Fig 3: Schematic Structure of DSSC fabrication

TiO₂ mesoporous layers were made with the help of adding 1.5gm of titanium with 6 ml of terpineol-ethyl cellulose mixture. 0.25 ml of acetic acid were added slowly to the mixture with simultaneous grinding for 15 min. Then, 6 ml of isopropanol were added with grinding for 15 min until it reaches a homogenous state. The paste was sedimented on the FTO conductive glass by doctor-blading technique to get a TiO₂ mesoporous layer with a thickness of 15×10^{-6} m and an area of 1 cm². The layer was pretreated at 120°C for 1 hour and 30 mins, then sintered at 460°C for 15 min. After cooling to 80°C, the TiO₂ electrode was immersed in dye solutions for one day. The iodide/tri-iodide (I⁻/I₃⁻) was used as the electrolyte solution. DSSC was arranged by filling the electrolyte in between a TiO₂ electrode as an anode and a conductive glass substrate plated with Platinum as a cathode.

IX. RESULT

To make a comparative analysis of anthocyanin present in blackberry they were constructed and sensitized solar cells were made with natural dyes of blackberry. Thus voltage measurements were made on each and evaluating them concerning the temperature under a natural source. The capacity of the dyes to provide its efficiency levels. As it can be seen, efficiency shows high in the cell construction with blackberry dye indicating that the anthocyanin present in this fruit has better behavior to

absorb visible light energy compared with anthocyanin present in hibiscus, spinach, and grass. Due to the decrement of the efficiency and increment of temperature, the period of tests was very short and due to temperatures above 65 °C. The typical behavior of the voltage concerning the cell temperature and irradiance was examined. The electrical behavior of the solar cell is observed in non-controlled conditions. Thus, the preliminary results about the behavior in this kind of device it is important to point out that by monitoring the variables can be controlled and observed better the solar cells and to improve them or even optimize the device. Nowadays it has been attempting to improvement in energy conversion efficiency by designing the structures in dye-sensitized solar cell devices and achieving satisfactory results as is reported in the literature.

CONCLUSION

In this paper, a detailed analysis of the photovoltaic and electron transport properties of DSSC based natural dyes was conducted. The extraction, preparation, and photovoltaic behavior of DSSCs based on natural sensitizers were enhanced⁸. Natural dyes can be very easily and safely prepared by simple and eco-friendly techniques. The dye extracted from blackberry was used for the fabrication of DSSCs. The pigment and chemical structures of the dyes play an important role in improving the electron injection and power conversion efficiency of DSSC¹. From the consolidated results, the anthocyanin pigments extracted from the blackberry exhibit the highest efficiency of 2.905%. As such, the most important criteria for the DSSCs were highlighted including the ability of the dye to withstand the higher redox process, absorbing all the sunlight below 920 nm, and has good chemical bonding with TiO₂ surface by having functional groups of carboxyl(-COOH), carbonyl(-C=O) and hydroxyl(-OH). Therefore, one of the major aspects required for the DSSCs commercialization has been enquired. It was observed that efficiency and stability are the most important factors that influence the possibility of commercializing DSSC. Thus, more intensive research needs to be conducted to improve the performance including enhancing the nanoporous photoanode film, electrolyte, and catalyst of the counter electrode. The UV-visible absorption and fluorescence properties of the prepared dyes were analyzed. Among the dyes extracted, anthocyanin has

the changes in the properties of the dyes and the anthocyanin on them, decomposing it. However, some factors identified chemical anthocyanin stability during processing and storage, when it is subjected to given long-term stability and the highest possible efficiency. The DSSCs prepared with a photoelectrode thin film of 12% TiO₂ showed the highest photoelectric conversion efficiency of 2.905%. The DSSC based on anthocyanin dye showed the highest performance among the natural extracted dyes with a power conversion efficiency of 0.2%¹.

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ELECTRO CHEMICAL TREATMENT FOR TEXTILE DYE EFFLUENT

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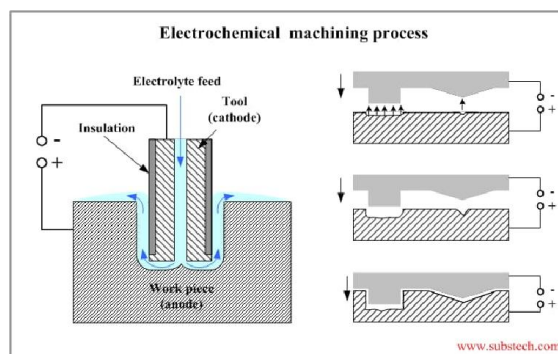
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Abstract— Textile mills are one of the major industries generating huge quantity of waste water. It requires substantial volume of water and synthetic chemicals including dyes, but the fabrics do not absorb all the dyes because 50% of the dyes are hydrolysed which generates large quantity of effluents. These effluents contain untreated and hydrolysed dyes which form complex liquid effluents. In this context an attempt has been made to develop an electro chemical based treatment technique for this effluent. Depending on the nature of the effluents, Electro Oxidation Process was chosen. This treatment involves oxidation at the anode and reduction at the cathode. The effluents were treated by galvanostatic process at different flow rates varying from 10 lph to 50 lph at various current densities (2.5 A/dm², 5.0 A/dm², 7.5 A/dm² and 10.0 A/dm²). COD were recorded for these flow rates and current densities. Encouraging results were observed at low lph (10 lph) and high current density of 10 A/dm² where the COD recorded was the lowest.

I.INTRODUCTION

Production of one kg of textile fabric requires around 200 liters of water. Depending on the raw material, the discharged effluent contains different dyes and chemicals. Out of the total effluent from the textile industry 40-45% accounts for pretreatment process, 50-55% for dyeing or printing process and remaining for the finishing process. Dyes used in these industries have more pollution load due to their non-degradability which turned out as an effluent and it contains high values of suspended solids (SS), total dissolved solids (TDS), chemical oxygen demand (COD).

Although, conventional methods like adsorption, coagulation and biological oxidation processes have advantages for treating these effluents but need more time for treatment, lacking in their effectiveness and also generate secondary effluent.



Hence, a new electro chemical technique has been adopted for treating these effluents effectively. The electrochemical treatment involves oxidation at anode, reduction at cathode, deposition of the metals at the cathode, migration of ions through a semi permeable membrane under the influence of electric field.

Materials and Methods:

II.MATERIALS

Potassium dichromate (K₂Cr₂O₇) and ferrous ammonium sulphate (FAS) reagents and ferroin indicator were prepared. A mixture of silver nitrate (AgNO₃) and sulphuric acid (H₂SO₄) needed for titration were also prepared. An Electrolytic cell of capacity 4.5 litres consisting of an anode made-up of Ruthenium (IV) oxide (RuO₂) coated on titanium (Ti) mesh and cathode made up of stainless steel. The diameter and height of anode was 5 cm and 100 cm and cathode was 7.5 cm and 110 cm respectively and were arranged as concentric cylinders

Anode/ Cathode	composition	diameter	height
Anode	Ruthenium (IV) oxide (RuO ₂) coated on titanium (Ti) mesh	5 cm	100 cm
Cathode	stainless steel	7.5 cm	110

III. EXPERIMENTAL SETUP

The experimental setup (fig.1) consists of concentric cylinders of cathode and anode. These electrodes were connected to the electric power supply regulated by a variac to get various current densities (2.5, 5.0, 7.5 and 10.0 A/dm²). The effluent was stored in a sump and was pumped into the reactor cell from the bottom using a centrifugal pump of 0.5 hp capacity at various flow rates (10, 20, 30, 40, 50 lph.) measured by a rotameter. This effluent was rising up into the reactor and treated effluent came out from the top of the reactor and was collected in the collection tank.

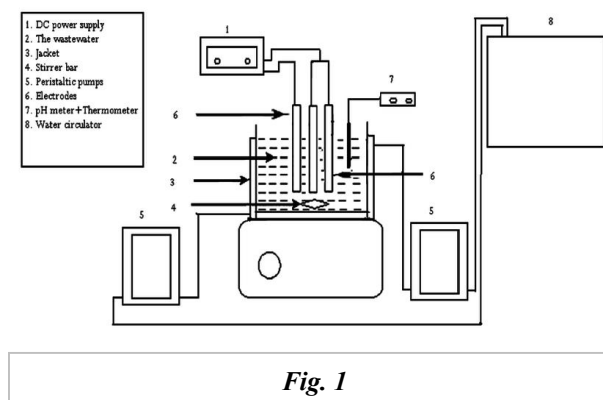
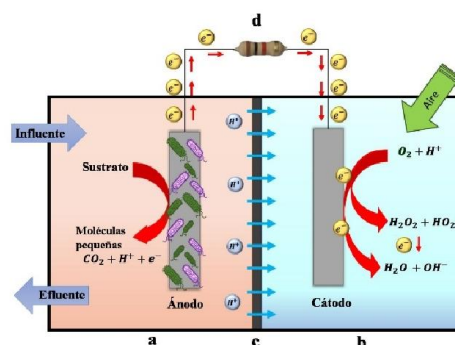


Fig. 1

IV. ANALYTICAL PROCESS

Samples for analysis of COD were taken from the collection tank for each flow rate, retention time (5, 10, 15, 20, 30 min) and current density. pH were also recorded for each of the above samples. 20 ml of the sample from collection tank was taken in the refluxing flask. To this sample, 10 ml of standard K₂Cr₂O₇ solution and 30 ml mixture of AgNO₃ and H₂SO₄ solution were added slowly into the flask and simultaneously cooling it using the condenser connected vertically to the refluxing flask. The mixture is refluxed for 2 hours at temperature of 47°C and cooled at room temperature for an hour. The mixture is then diluted to 150 ml and titrated against standard FAS solution using ferroin as indicator. The end point was the colour change from bluish green to wine red. The chemical reaction occurred was



V. RESULTS AND DISCUSSION

Based on the above analysis for various current densities, flow rates and retention time, it was observed that at the flow rate of 10 lph, which is the lowest flow rate and at the highest retention time and current density of 30 min and 10.0 A/dm² respectively,

COD can be calculated by the following correlation.

$$\text{COD} = \frac{(a-b) \times N \times 8000}{V} \times 5$$

Where, a = Volume of FAS for blank, b = Volume of FAS for sample, N = Normality of FAS and V = Volume of sample taken, 8000 = milli equivalent weight of Oxygen (8)*1000 mL/L, 5 = Dilution factor

Results and Discussion:

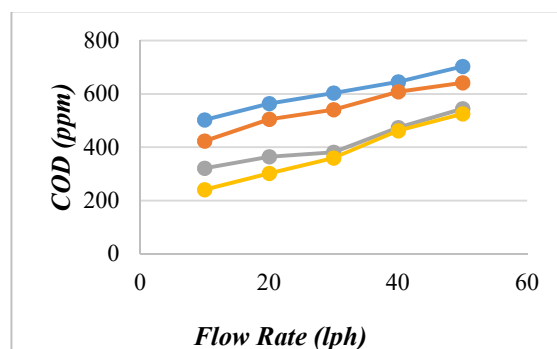


Fig. 2: Flow rate Vs COD (ppm)

The COD of treated effluent recorded was the lowest i.e. 240 ppm. This is depicted in fig.2.

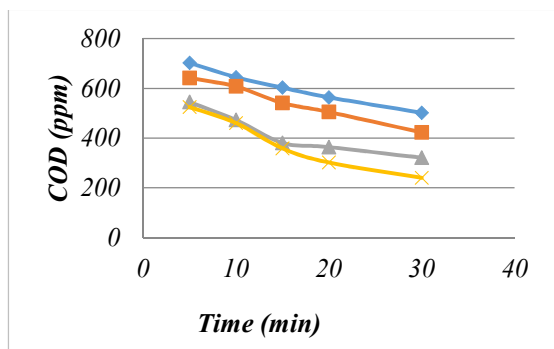


Fig. 3: Time (min) Vs COD (ppm)

The variation of COD with respect to time is shown in fig. 3

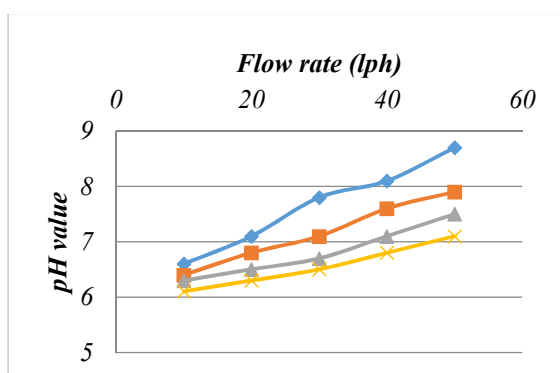


Fig. 4: Flow rate (lph) Vs pH

The flow rate Vs pH is shown in fig. 4

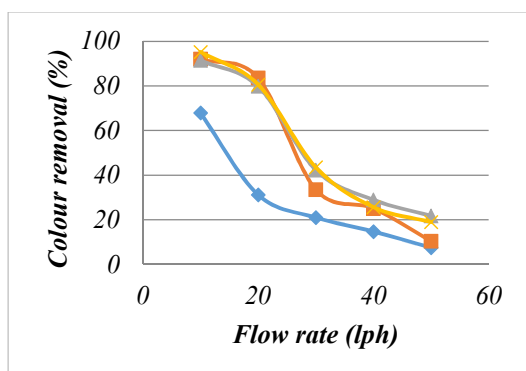


Fig. 5: Flow rate Vs Colour removal

Colour removal (95%) was the maximum for the lowest flow rate of 10 lph as shown in fig. 5

V. CONCLUSION

COD reduction was optimum (from initial 800 ppm reduced to 240 ppm) at the lowest flow rate of 10 lph and highest current density and retention time of 10 A/dm² and 30 minutes respectively. Also, colour removal was the

maximum (95%) at 10 lph. Secondary treatment can be carried out for further reduction of COD and to improve the pH value.

The Electrochemical Techniques have been proved by the efficient oxidation or reduction methods of the textile process. Where the applications are available in both natural and synthetic fibres. They constitute a less harmful alternative than the traditional process. The electrochemical techniques have been proved to be efficient in different oxidation or reduction steps of the textile processes such as: bleaching denim fabrics or reduction of sulfur and vat dyes, where their applications are available in both natural and synthetic fibers. They constitute a less harmful alternative than the traditional processes. They also have been studied in new textile fields, such as in the production of conductive polymers used as fibers which are applied in smart textiles to produce fabrics with new functions.

In addition, the electrochemical treatments have been extensively applied to the decontamination of wastewaters from the textile processes. They have been mainly used in the removal of residual reactive dyes, but also in the discoloration of acid and disperse dyes effluents. Taking into account the considerable amount of salt contained in the reactive dyes residual dye bath, the best method for the treatment of these effluents is the indirect oxidation with chlorine, because of the following:

- (i) The degradation takes place in the same bath.
- (ii) The addition of chemical reagents is not required (the residual salts act as electrolyte).
- (iii) The modification of the pH is not necessary.
- (iv) No solid waste is generated.

The possibility of reusing dyeing effluents treated by electrochemical methods is particularly interesting and it implies an important saving of water and salt. This kind of studies are especially important in Mediterranean countries where the river flow rates are low and their salinity in nowadays an increasing environmental problem. The bases of electrochemistry are simple but, as showed in this review, it is possible to find the application of these techniques in a wide range of textile processes.

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INVESTIGATION AND ANALYSIS OF MOSQUITO REPELLENT EXTRACTION FROM NATURAL WASTES

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Abstract—This study reports the development of safe and efficient herbal mosquito repellent obtained from orange and lemon peel extract. Mosquito is a commonly distributed insect around the world. It carries various types of diseases like malaria, dengue fever [1], chikungunya and filarial [2]. We use sprays and lotions to protect ourselves from mosquito. The chemical compounds present in these sprays and lotions possess harmful effects against human skin and internal organs. Those compounds are pyrethrin and diethyl toluimide i.e. DEET. These chemicals could cause breathing difficulty, respiratory problems, dizziness, stomach irritation, nausea, vomiting, skin infections and so on [1]. Plants like orange, neem seed and lemon contain compound that can prevent from the mosquito. Natural compounds are safe to human when compared to synthetic compounds. Limonene is the main component that present in these citrus fruits peel. Limonene affects mosquito on contact effectively suffocating them by damaging their respiratory system. The repellent produced from these materials are biodegradable. So it is an eco-friendly method to avoid the mosquitoes. Plant origin repellents have been used for generations in traditional practice. The ingredients used for this extraction are generally waste materials. So it is an inexpensive method. The current study is mainly carried out for the development of mosquito repellent using orange and lemon peel extracts.

Keywords— Mosquito repellent, Orange peel, Lemon peel, Limonene.

I. INTRODUCTION

Natural waste has always been generated by humans. Orange and lemon are being consumed by humans in our daily lives as direct fruit and in the forms of juices, jam, flavour, etc. After consuming the inner flesh, the peels are generally thrown away or used as fertilizers for farms in the degraded form [5]. So the availability of the ingredient is huge compared to ingredients used for the synthetic processes. While a mosquito bites an animal, it injects saliva and ant-coagulants into the blood which could contain disease-causing viruses or other parasites. By killing mosquitoes, while people are infectious, isolating them from all mosquitoes or vaccinating the current population, we could interrupt this cycle. The mosquito repellents can be used in the forms of spray, lotions and mosquito nets. Also there are methods like mosquito swatter, mosquito coil and so on. The objective of this study is to extract mosquito repellent compound by applying the extracts of citrus peels

namely *Citrus sinensis* (sweet orange), *Citrus aurantifolia* (lime), *Ocimum sanctum* (tulsi) and *Azadirachta indica* (crushed neem seeds) [3]. This is an extensive search to find eco-friendly natural materials for the controlling of insect pests. The chemical compounds extracted from the plant recourses can be used as repellent, larvicidal, insect growth regulators and having deterrent activities observed by many researchers [7]. The products produced from plants have been used traditionally to repel or kill the mosquitoes in many parts of the world. The availability of plants on the earth surface has led to an increasing interest in the discovery of different extracts extracted from the traditional plants as potential resources of new mosquito repellent agent. Most of the plants compounds that they use in prevention of attack from mosquitoes like *Anopheles*, *Culex*, *Aedes* and vectors [8],[20]. Mosquitoes transmit diseases to more than 700 million people and 1 million deaths are reported yearly around the globe. These chemicals are categorized into repellents, feeding deterrents, toxins and growth regulators. These plant origin repellents do not pose any harm or toxicity to human and animals. When comparing natural and synthetic compounds, natural products are safer than the synthetic. The need for the investigation of phytochemicals is the natural repellent production for the mosquito control [9].

II. MATERIALS

A. Selection of material

Orange peel, crushed neem seeds, tulsi leaves and lemon peels are selected as a mosquito repellent agent. They are peeled from their fruits. The neem seeds are crushed in the purpose of making the extraction easy. They weighted before the extraction. Weighting helps us in calculating the amount of limonene oil extracted from certain amount of peel [6]. This data could be useful in making the extraction process efficient. Advantages of these natural finishes are non-toxic, biodegradable and cost effective.

B. Apparatus and Chemicals

The required equipments and chemicals are Bunsen burner, 110° C thermometer, measuring cylinder, distillation apparatus, 250 cm³ round bottomed flask, orange and lemon

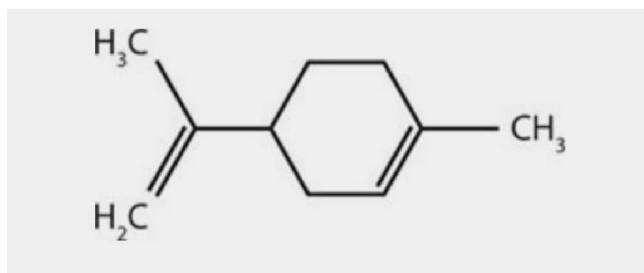
peel, distilled water, diethyl ether, dichloromethane, anti-bumping granules and condenser.

III. METHODOLOGY

The steam distillation process was separately performed for orange and lemon peels, neem seeds and tulsi leaves. Orange and lemon peels are reduced to small pieces and add to 100 cm³ of distilled water in the 250 cm³ round bottom flask. The tulsi leaves were cut into small pieces. The neem seeds were crushed into small pieces for extraction. In the purpose of making the boiling smoothly, anti-bumping granules are added to the round bottom flask. As shown in the figure the distillation apparatus is set up. The condenser and receiving Florentine flask are connected. The flow of steam is allowed through condenser. Florentine flask is recommendable separating funnel to enable the continuous collection of condensate essential oil and water. Heat is provided to the round bottom flask by the Bunsen burner. During boiling, along with the steam volatile oil was also carried into the graduated distillate receiving tube and excess water vapor returned to the flask. Boiling temperature of the liquid in the flask is controlled through the thermometer to avoid the burn of peels. As the time passes, the limonene is vaporized and passed through the condenser ^[11]. During the travel time inside the condenser tube, the distillate is condensed from vapor to liquid phase. Liquid phase distillate is collected in the measuring cylinder tube. The distillate has two layers which are oil and water. The oil contains limonene which is required for our product, mosquito repellent. 50 cm³ of distillate is collected in the measuring cylinder ^[13]. A mixture of diethyl ether and dichloromethane was added to the distillation arm. In the solvent, mixture, the essential oil was dissolved which was in the distillate receiving. The oil layer is in the top and the aqueous layer is in the bottom. It is separated by dropping pipette carefully. The amount of oil extracted by this method varies considerably with the season, variety and storage of the orange and lemon. With selected mosquito repellent sources which are orange peel, neem seed, tulsi leaves and lemon peel, final extract was prepared ^[12].

A. Limonene

The compound extracted through this procedure is exactly known as limonene. At room temperature, it is a colorless liquid oil with a strong smell of orange. Limonene belongs to the chemical family of cycloalkene called terpenes ^[15].



This compound extracted from both orange and lemon peels by steam distillation. It is generally applied directly on the skin. During the contact between this compound and mosquito, it suffocates the respiratory system of the mosquito. This action will prevent the mosquitoes, biting the skin of human or animal. The time of heat provided for distillation was 5 hours. After distillation the distillate is allowed to cool ^[14].

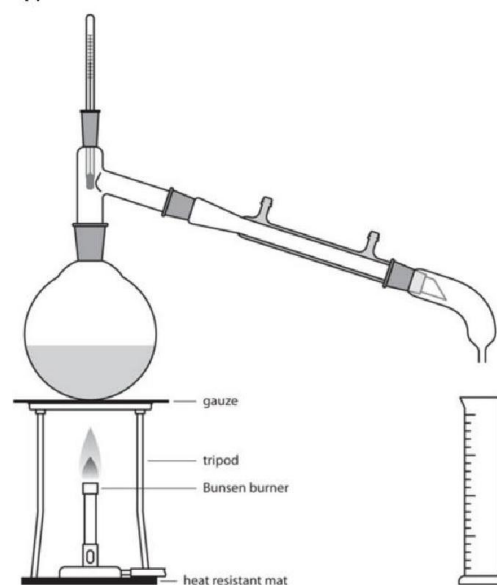


Fig.1: Steam distillation

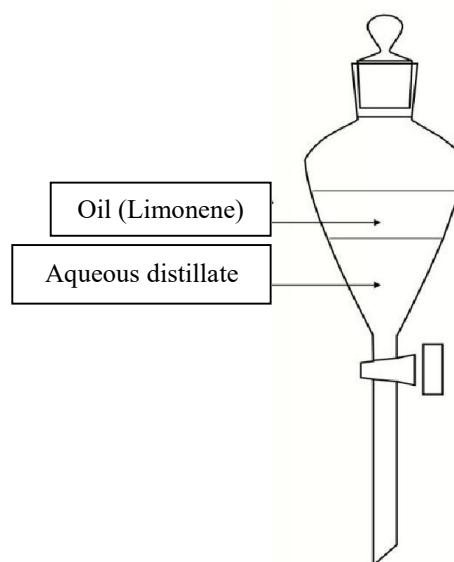
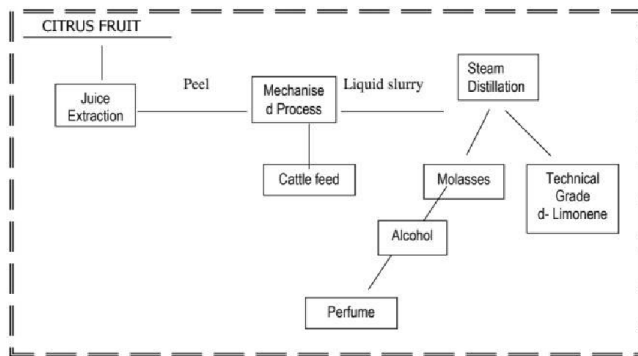


Fig.2: Separation of essential oil and aqueous distillate



IV. TESTING

Using a net the mosquitoes used for this experiment were caught during the time between 1 pm and 10 pm. The test was conducted during 7- 10 pm, since the mosquito bites typically at night. The mosquitoes were placed in a cage for 24 hours which will lead them to the starving of mosquitoes. A volunteer's forehead is cleaned and placed inside the cage where the mosquitoes were trapped. After cleaning 1 ml of the test solution was rubbed. For every 3 minutes the arm was recorded. This experiment was also conducted in outdoor field where the density of mosquitoes was high^[6].

V. RESULT

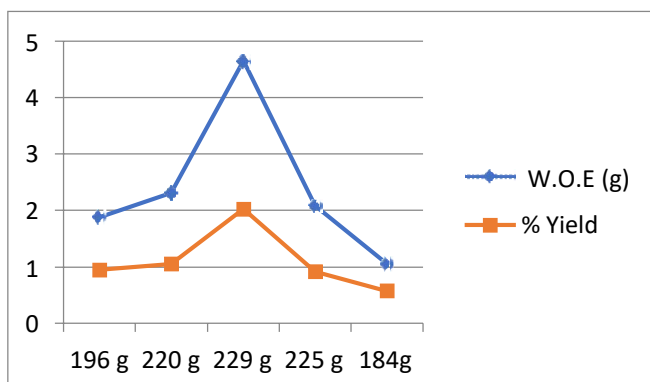
As reported, using steam distillation the extraction of limonene from orange and lemon peel was carried out. The formula below used to calculate the percentage of yield^[16].

$$\% \text{ oil yield} = (\text{weight of oil} / \text{weight of peel}) \times 100$$

Table 1: Yields of the extracts and the essential oil of orange

S.No	Weight of Peel (g)	Weight of Oil Extracted (g)	% Oil Yield
1	196	1.88	0.95
2	220	2.31	1.05
3	229	4.65	2.03
4	225	2.08	0.92
5	184	1.05	0.57

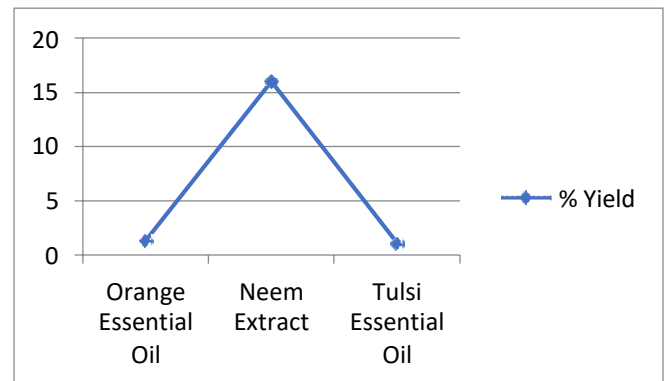
Chart 1:



In the below table, the percentage yields of the extracts and the essential oils are shown.

Table 2: Yields of the extracts and the essential oil

Essential Oil and Extract	Weight of Plant Material (g)	Weight of Essential Oil (g)	% Yield
Orange essential oil	1114.66	14.85	1.33
Neem extract	948.21	151.73	16.00
Tulsi essential oil	732.09	8.1	1.10



The percentage of the mosquito repellency for plant extract/essential oil

Percentage mosquito repellency = $[(C-N)/C] \times 100$
 C = Number of mosquitoes aligned without the extract or essential oil used
 N = Number of mosquitoes aligned with the extract or essential oil used

Table.3: Mosquito repellency percentage of of plant extract/essential oil

Plant Extract/Essential Oil	Calculated Mean Value of Mosquitoes Aligned	Mosquito Repellency %
Orange essential oil 10% (v/v%)	1.00	93.75
Neem extract 10% (v/v%)	3.00	81.25
Tuisi essential oil 10% (v/v%)	0.33	97.94

VI. DISCUSSION

Throughout the testing, the extract or essential oil extracted from the selected natural ingredients showed the repellency against the mosquitoes. The oil extracted from the orange and lemon peels got large repellency against the mosquitoes^[17]. The limonene component in their extracted oil acted against the mosquitoes. The nimbonene compound in the neem extract repelled the mosquitoes by the scent it produced^[10]. Nowadays, orange and lemon are being used in medicine. It has been experimented that orange and lemon peel extract fragrance kept in working places such as offices, Hotels and banking premises help the waiting customers to relax and keeps the worker at alert. Orange and

lemon peel extract physical and chemical properties such as appearance that is greenish yellow with a strong orange aroma may be employed in modern therapy to keep people alert and reduce their anxiety. The limonene extract has a boiling point and melting point of 740C and -740C respectively^[18].

The percentage yield of limonene is very insignificant using distillation apparatus. It have been described that tying of lemon rind in a night on the corn, that is, small area of hardened skin on the foot, particularly on a toe relieves the pain and corn itself. This could be characterized that the presence of limonene in the rind. Other parameter were also looked into, like the weight of orange, the weight of peel, number of seeds per orange, the weight of skin and shaft, and lastly the juice content per orange^[19].

VII. CONCLUSION

Compared to plant extracts, plant essential oils showed higher mosquito repellent activities. The mosquito repellent gel and the mosquito repellent spray produced from the plant extract or essential oil showed 100% repellency for indoor and outdoor field. These trials were carried out for two days with six hours per day. Also no rashes and irritation were seen on the area of the arm where the extract or essential oils were applied. This proves that this natural repellent is 100% safe to the human skin compared to the synthetic products which could cause diseases^[21]. A slight hot sensation was felt at the arms of the volunteers. It could be due to the Clove bud essential oil. For the further development of the two mosquito repellent formulations could be done by leveling the clove bud essential oil to the level at which place no hot sensation is felt. In the current world situation the aromatherapy is growing enormously. The limonene extracted from lemon is well researched with adaptive method of extraction to increase the yield and the herbal extract of this is promising remedy for many infections and diseases. Moreover, the work exposed the physiochemical properties of limonene such as odour, appearance, melting point and boiling point which are greenish yellow color and strong orange fragrance. In the same time, yield of limonene per orange, orange weight, peel, the number of seeds, skin and shaft and juice content are studied. Mainly, all parts of lemon fruits which are the juice, the peels, the seeds and the essential oil are used externally^[22].

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PREPARATION OF GINGER OIL FOR OSTEOARTHRITIS PAIN RELIEF

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Abstract—The herbal treatment solutions help to increase blood flow and lymphatic circulation and help improve the ability synthesize collagen and proteoglycans necessary to restore damaged articular cartilage matrix, eliminate joint pain and improve its functionality. The herbal treatments solutions help reverse the bone-on-bone conditions [1]. It was believed that a knee osteoarthritis, that utilized this approach would decrease treatment time and improve the patient response rate (pain reduction, joint mobility, lasting results), thereby improving the overall patient outcome. We use ginger has served as a folk medicine for centuries. Ginger contains anti-inflammatory, antioxidant, and anticancer properties. For this reason, it is believed to increase overall immunity. Ginger has anti-inflammatory compounds that function in the same way as COX-2 inhibitors. COX-2 inhibitor is a drug used to treat pain and inflammation. The most common form of arthritis, it affects millions of people around the world. It occurs when the protective cartilage that cushions the ends of bones wears down over time. The most common joint disorder and a major cause of disability in the adult population is Osteoarthritis[2]. The pathophysiology of the disease is characterized by the progressive loss of articular cartilage, cartilage calcification, osteophyte formation, and mild to moderate inflammation.

I. INTRODUCTION

Osteoarthritis is the second most common rheumatic problem and the most common joint disease with a prevalence of 22% to 39% in India. Osteoarthritis is more common in women than in men. Almost 45% of women over 65 have symptoms while 70% of those over 65 have radiological signs of osteoarthritis. In this experiment we are using high-quality ginger as raw material, after washing, slicing and drying, making it into dried ginger, which is refined by steam distillation, separation, and purification after crushing. Osteoarthritis (OA) is the most common chronic (longlasting) joint disease. A joint is a place where two bones come together.

The end of the bones are covered with a protective tissue called cartilage [3]. With osteoarthritis, this cartilage breaks down, causing the bones in the joint to rub together. It can cause pain, stiffness, and other symptoms in the body. Osteoarthritis occurs most often in older people, and also it can occur in adults of any age. Osteoarthritis is also called degenerative joint disease, degenerative arthritis, and arthritis due to wear and tear. A leading cause of disability affects more than 30 million men and women in the United States. Here's everything you need to know about OA, from treatment prevention and more. Causes of Osteoarthritis, it is caused by joint damage. This damage can build up over time, which is why age is a major cause of joint damage leading to osteoarthritis. The older you are, the more repetitive stress you've have on your joints. Other causes of joint damage include past injury, such as Torn cartilage, Dis-located joints, Ligament injuries. They also include joint deformities, obesity, and poor posture [2]. Certain risk factors, such as family history and gender, increase the risk of osteoarthritis.

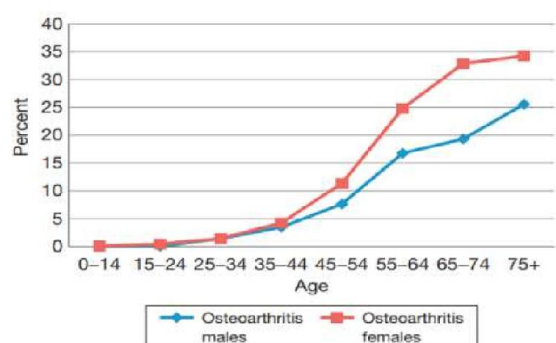


Figure 1

II. OBJECTIVE

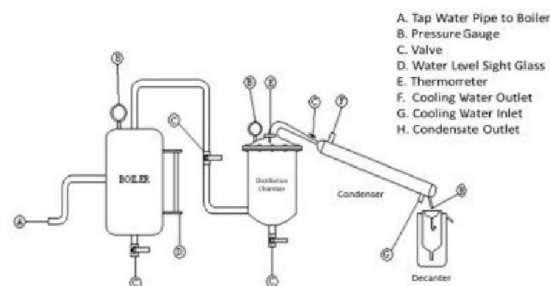
According to the report, ginger extract is able to improve osteoarthritis in knee relief when the ginger extract is applied three times a day for 12 weeks. The research presented shows that ginger can help prevent, combat, or cure: 1. Extraction of ginger extract, 2. Collection and purification of ginger extract, 3. Characterization of ginger extract, 4. Anti-inflammatory testing.

III. MATERIALS AND METHODS

Selection and analysis of raw materials, Selection of Ginger for Essential Oil Extraction: To produce ginger oil, the technological feasibility of both fresh and dry ginger was investigated. For the experiment, both fresh and dried ginger were used. The ginger utilised in this study was bought at a local market. Fresh ginger was used, grind into powder. Extraction of ginger oil and its physicochemical properties: Soxhlet extraction, ultrasound aided extraction, and autoclave agitator, among other methods, were used to extract ginger oil under optimal operating conditions[3]. Optimal sample, temperature, extraction duration, and ginger-to-solvent ratio are among the operational conditions. Temperature: The operating temperature for experiments carried out was varied from 70°C to 80°C. Extraction time: The term extraction time is used for the duration of time it took for experiment to run. In this research, in this research, experiments were carried out from 1 to 1.30 hours of extraction time [4]. Ratio of ginger to solvent: experiments in progress with the equipment set up. The ratio of ginger to solvent was 50 g. a sample of ginger was used for 200 ml of solvent. Solvents used: Methanol, n hexane, Acetone, Water, Ethanol [5]. Solvents used for the lab are of AR grade and taken from Vit Pune chemical department laboratory. Ginger oil yield is calculated as follows: $(100 \text{ percent } Y \text{ (ginger oil) (percent)} = C \text{ (extraction) (g)/W (sample) (g) Where The yield ratio of ginger oil by the Soxhlet technique is } Y \text{ (ginger oil) (percent). The capacity of ginger oil by the Soxhlet technique is } C \text{ (extraction) (g). The weight of fresh ginger is } W \text{ (sample).}$

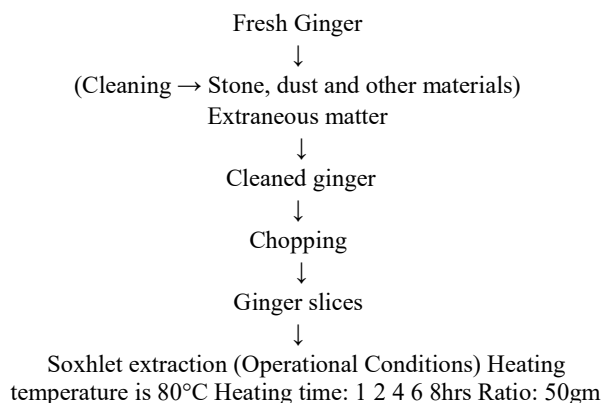
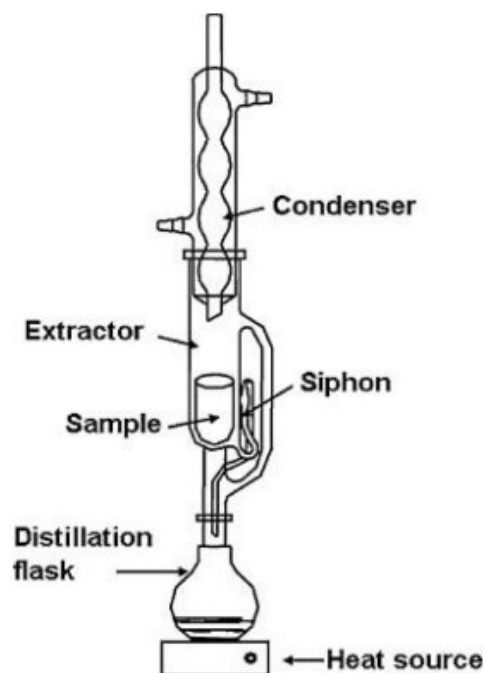
IV. STEAM DISTILLATION PROCESS

In a custom-sized distillation equipment with an electrical steam boiler, the steam distillation process was carried out. The electrical steam boiler had a voltage of 220 volts, a current of 16 amps, and a maximum pressure of 20 bars at 214°C. To separate the oil from the condensate, the distillation unit had a custom-sized condenser and a glass decanter [6]. Figure 2 is a diagram of the device. The distillation chamber had a volume of 16.5 Litre and a diameter of 256 mm, and was made of stainless steel with a thickness of 2 mm. A steam distributor was mounted 700 mm from the bottom of the distillation chamber, as well as a grating mounted 300 mm from the steam distributor as a location to lay ginger rhizome [5]. About 500 grams of pre-treatment rhizomes were placed on the grating inside the distillation chamber, and 1.5 bar steam was utilized as the variable, with flow rates of 0.35; 0.55; 0.76; and 1.16 ml/s. The capacity of the equipment determined these process conditions. The oil was measured every hour during the distillation process, which lasted for 8 hours [11]. This was done twice more.

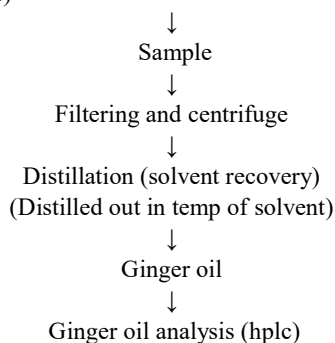


V. HPLC ANALYSIS OF GINGER FOR RELATED COMPOUNDS

The compounds were analysed in an HPLC system. The stationary phase was C18, particle size 5 μm , preconditioned in a 250 \times 4.6 mm I.D. column. The mobile phase used was acetonitrile with in a flow rate of 1 ml min. the pump carried acetonitrile [13]. An injector with a 10 μl loop was used to inject the sample. The analyses were carried out at a room temperature. A 282 nm diode array detector was used for the analysis.

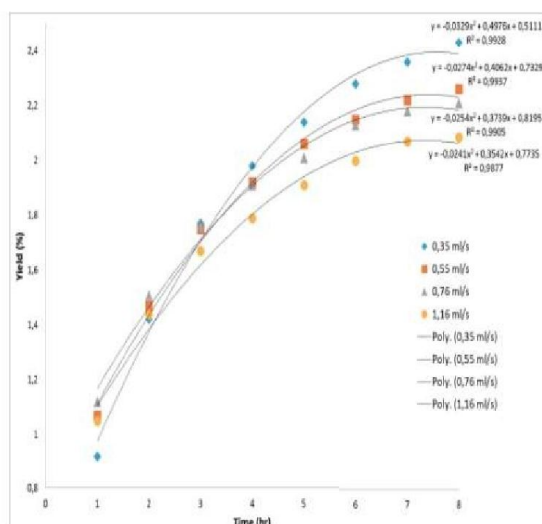


of ginger and 200ml of solvent (Methanol ethanol acetone n hexane water)



RESULT

Steam flow rate (ml/s)	Ginger Oil (ml)	Yield (%)
0.36	12.16	2.44
0.57	11.31	2.27
0.76	11.06	2.22
1.17	10.44	2.10



RHAM KANADEA, & D. S. BHATKHANDEB were used different method to extract the Ginger Oil

Methods	Solvent	Ginger oil collected
Soxhlet extraction	Acetone	28.5ml
Ultrasonic bath tub	Acetone	7ml
Agitated autoclave	Acetone	16ml

Mixing agitator with ice and salt cooling without colling	Acetone	13ml 5ml
Ultrasound assisted extraction	Acetone	27ml

RHAM KANADEA, & D. S. BHATKHANDEB were different temperature to extract the Ginger Oil

Temp(Degree Celsius)	Pressure (Psi)	Solvent	Ginger oil Collected
56	14.69	Acetone	16ml
76	29.39	Acetone	11ml
85	45.19	Acetone	7ml

CONCLUSION

Type of Gingers	Time	Ginger oil Collected
Fresh Ginger	1 hr	28.5 ml
Dry Ginger	1 hr	23 ml

Comparing to fresh and dry, fresh ginger is collected more. Different solvents such as acetone, methanol, ethanol, water, and n-hexane were used to extract ginger oil utilizing a soxhlet extractor, ultrasonic assisted extraction, and autoclave agitator. According to the findings, acetone yields more than other solvents. With increasing temperature extraction quantity reduces due to changes in pressure and temperature. During the next two hours, the majority of the ginger oil distilled away [17]. By extending the extraction time, the ginger oil collected will maintain a steady value. As a result, 4 hours of extraction is sufficient to achieve the lowest possible energy use. The temperature of extraction from the experimental work was best at 80°C. For acetone as a solvent, the highest yield produced by soxhlet extraction was 57 percent [18]. The comparison of fresh and dried ginger yields that fresh ginger has a higher yield.

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SYNTHESIS OF ACETYLATED STARCH NANOPARTICLES FOR FOOD PACKAGING APPLICATION

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Abstract— The aim of this study is to prepare acetylated starch nanoparticles and to evaluate its potential to be used as a filler for food packaging mediums. Corn starch was selected as the raw material and subjected to chemical modification by acetylation process. Parameters such as mass, stirring time were varied and their effects on degree of substitution (DS) were studied. The swelling power of the acetylated starch was determined. Spectrophotometric analysis was carried out to confirm the attachment of acetyl moiety. Nanoparticles were synthesized from acetylated starch by solvent displacement method and their morphology and thermal properties were analysed. Film was casted using polyvinyl alcohol and glycerol was used as the plasticizer and the modified starch was used as the filler. Properties such as thermal, mechanical, barrier were analysed. The biodegradability of the film was also studied.

Keywords— Food packaging, corn starch, Acetylated starch, Nanoparticles, Degree of substitution, polyvinyl alcohol

I. INTRODUCTION

Food packaging is an integrated system of preparing food for storage, transport, distribution, retailing and end-use to satisfy the necessity of customers. It is an essential part of the modern society; commercially processed food could not be handled and distributed safely without packaging (Shin and Selke, 2014). In early times traditional materials such as leaves, vegetables, fibres were used for domestic storage and local sales of food. Since these materials possessed poor barrier properties, the usage of non-biopolymeric films came into existence. These films have higher strength, puncture resistance and are resistant to chemicals. However none of the non-biopolymeric films offer complete resistance to the atmospheric gases, water vapour. Another big drawback of these films is that they do not meet increasing demands in society for sustainability and environmental safety (Development The Schumacher Centre for Technology &, 2011). To meet the above requirements films are prepared using biopolymeric materials. PVA is one of the most popular synthetic biopolymers used for food packaging due to its good compatibility, biodegradability and acceptable mechanical and thermal properties. It is non-toxic, odourless and also possess good chemical resistance. There is presence of many hydroxyl groups on the PVA surface which makes it one of the most hydrophilic polymers with high moisture sensitivity, and hence its resulting blends and composite materials became popular for packaging application (Waheed et al., 2017).

Starch is one of the most abundant biopolymer in nature and major ingredient in food and pharmaceutical industries. The main drawback of starch is their water absorption ability

so modification is required to change starch to hydrophobic. Chemical modification of starch involves the reaction of hydroxyl groups on Anhydro Glucose Unit (AGU) based on oxidation, acetylation, hydroxy propylation, carboxylation, cross-linking. AGU is monomer of starch which is having three hydroxyl groups. Therefore DS always lies in between 0 to 3. Degree of substitution (DS) is the average number of substituent per Anhydro Glucose Unit (AGU) (Sagar et al., 2012). The introduction of polymer nanotechnology in food packaging aims to improve the principal features of traditional packaging systems i.e., containment (ease of transportation and handling), convenience (being consumer friendly), protection and preservation (avoids leakage or break-up and protects against microbial contaminants, (offering longer shelf life), (Sharma et al., 2017). Increasing interest towards nanoparticles prepared from biopolymers led to generate nanoparticles from biopolymers such as starch (Uzun and Kokini, 2014). Starch is often used as filler in biodegradable matrices such as PVA, PHA, PLA, PCL and aliphatic polyesters with the aim of reducing cost at acceptable property thresholds (Boufi et al., 2018). Starch nanoparticles can improve not only the mechanical and physical properties but also the biodegradability of the host polymer matrix. The properties of starch nanoparticles could also depend on the botanical origin of the starch. This is due to the fact that important characteristics of starch such as granule morphology and the relative proportion of amylose and amylopectin are believed to depend on the botanic origin of starch (Torres et al., 2015).

II. MATERIALS AND METHODS

Corn starch was purchased from Sisco Research Laboratories Pvt.Ltd. Acetylated starch was prepared by acetylation process, the degree of substitution was improved by varying the parameters, such as the quantity of acetic acid, quantity of acetic anhydride and stirring time. Acetylated starch nanoparticles were synthesised by Solvent displacement process. PVA was purchased from Thermo Fischer Pvt ltd.

III. PREPARATION OF ACETYLATED STARCH

One of the derivatives of acetylation process is Acetylated starch. The acetylation process was carried out when 7.5 g of corn starch was added to the mixture of 13.5 ml acetic acid and 13.8 ml acetic anhydride. Then the mixture was magnetically stirred (400 rpm) at 40°C for 1 hour and then it was cooled down to 0 °C. A solution of concentrated sulphuric acid (0.105 ml) and acetic acid (1.245 ml) is added to the mixture and stirred for 10 minutes. The

mixture was heated to 60°C while magnetic stirring for 2 hours. The reaction was quenched by adding the mixture to cold distilled water (400 ml). It was then washed with distilled water and filtered. The precipitate formed was dried at 60°C for 24 hours. Parameters such as concentration of acetic acid, acetic anhydride, weight of corn starch and stirring time were varied to achieve high degree of substitution.

IV. FTIR ANALYSIS

The changes in the chemical structure of the starch samples are characterized by using FTIR spectrophotometer. In this analysis KBr is the commonest alkali halide used in the pellets. It is transparent from the near ultra violet region to long wave infrared wavelengths. It is widely used as infrared optical windows and components for spectroscopy because of its wide spectral range. KBr is optically transparent and so no interference in absorbance would occur. The dry sample is mixed with KBr and the mixture is pressed to form pellet and then the spectrum is analysed in an interval of resolution of 400 - 4000 cm⁻¹.

V. DEGREE OF SUBSTITUTION

Corn starch 1 g and 50 ml aqueous ethanol was placed in 250 ml flask. The flask was agitated, warmed to 50°C for 30 minutes and cooled. Then 40 ml of 0.5 M KOH was added. The excess or redundant alkali was back-titrated with 0.5 M HCL using phenolphthalein as an indicator. The solution was left to stand for 2 hours and then the alkali leached from the sample was titrated. A blank titration was carried out for the native starch.

$$\% \text{ of Acetylation} = \frac{(\text{Blank} - \text{Sample}) \times \text{Molarity of HCl} \times 43 \times 10^{-3} \times 100}{\text{Sample Weight}}$$

$$\text{Degree of Substitution} = \frac{a \times \% \text{ of acetylation}}{4300 - ((b - c) \times \% \text{ of acetylation})}$$

Where,

- a = 162 - Molar mass of Anhydro glucose Unit
- b = 43 - Molar mass of acetyl group
- c = 1 - Molar mass of hydrogen

VI. SWELLING POWER

The swelling power of starch was determined by following . 0.2 g corn starch was dispersed in 20 ml distilled water. The suspension was heated to 85°C in a water bath for 30 minutes with vigorous shaking for every 5 minutes. The starch gel was also centrifuged at 2,200 rpm for 15 minutes. The weight of sediment was taken. The dissolved starch in supernatant was dried and weighed.

$$\text{Swelling power} = \frac{\text{Weight of sediment}}{\text{Weight of dry starch} - \text{Weight of dissolved starch}}$$

VII. PREPARATION OF ACETYLATED STARCH NANOPARTICLE

Nanoparticle preparation was carried out using solvent displacement method. 100 mg of starch acetate was dispersed in 20mL of acetone. Distilled water (50 ml) was added drop

wise to the polymeric solution. The resulting nanoparticles suspension was stirred at room temperature until the acetone was completely vaporized from the aqueous suspension. The suspension was centrifuged (8000 rpm, 20min) and the supernatant was collected and reserved for further analysis. The obtained precipitates were dried in oven at 50°C for 24 hours (Oliveira et al., 2017).

VIII. FILM PREPARATION BY CASTING TECHNIQUE

PVA powder was added to 100 ml distilled water and left to hydrate overnight. Next day, the dispersions were heated in water bath at 80-90°C for 30-60 minutes. Starch particles are added to the PVA solution and the heating was continued. When the particles got completely dispersed glycerol of 1ml was added to the solution and stirred well. The solutions were left to stand until trapped air bubbles are removed and then cooled at ambient temperature. The PVA solutions are poured to petri dish and dried at 50°C for 24 hours

IX. MECHANICAL PROPERTIES

The tensile property and percentage elongation of the film casted were studied using Universal Tensile Testing Machine. ASTM D882 was followed for testing the film sample. The thickness of film was measured using ball end micrometer.

$$\text{Tensile strength} = \frac{\text{Load at break}}{\text{width} \times \text{thickness}}$$

$$\text{percent elongation} = \frac{(\text{Final length} - \text{initial gage length}) \times 100}{\text{Initial gage length}}$$

X. DETERMINATION OF WATER VAPOUR TRANSMISSION USING GRAVIMETRIC METHOD

ASTM E96 was followed to determine water vapour transmission rate. CaCl₂ was added to the impermeable cup and the cup was sealed with PVA film of 4cm diameter. A saturated solution of NaCl with and RH of 75% was prepared and placed inside the desiccator. Then the impermeable cup was placed inside the desiccator at ambient temperature. The cup was weighed for every 24 hours till it attained equilibrium.

$$WVT = \frac{G}{tA}$$

Where,

WVT - Rate of water vapour transmission

G - Weight change (g)

T - Time (h)

A-Test area (m²)

XI. DETERMINATION OF OXYGEN TRANSMISSION RATE

The oxygen permeability of the developed film was studied using the ASTM D3985.

XII. DETERMINATION OF LIGHT TRANSMISSION RATE

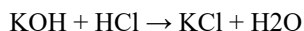
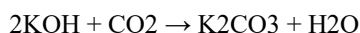
The % of transmission of light through the films was studied using UV Visible spectrophotometer.

XIII. THERMOGRAVIMETRIC ANALYSIS

The thermal stability of the acetylated starch particle and PVA film was studied using TGA. Thermo gravimetric analyses was carried out for native starch and Modified Starch nanoparticle. The weight of each sample taken was 5 mg. Measurements are conducted by heating the sample from room temperature to 700°C.

XIV. DETERMINATION OF BIODEGRADABILITY OF FILMS BY SOIL BURIAL TEST

ASTM D5988-03 was followed for determining the biodegradability of the films. 200 g of compostable soil was taken and pH (6-8) of soil is tested. Moisture was adjusted by adding necessary distilled water. Film sample of 500-1000 mg was mixed with the soil taken in a glass jar. 100 ml beaker containing 50 ml of distilled water and 50 ml beaker containing 20 ml of 0.5N KOH was placed in the glass jar. A lid was placed on the jar and an air tight seal was ensured. Once in 3-4 days the beaker containing KOH was taken out and to the KOH a drop of phenolphthalein was added as an indicator and titrated against HCL.



Titration Reaction,



CO₂ evolved is determined by following equation,

$$\begin{aligned} m \text{ moles of CO}_2 &= (0.5 \text{ N} \times \text{mL HCl}) \\ \text{carbon dioxide evolved} &= 0.5 \text{ N} \times \text{HCl titration (mL)} \times 44 \end{aligned}$$

XV. RESULT AND DISCUSSIONS

A. FTIR Analysis

FTIR Analysis confirms the changes of chemical structure of the native starch molecule resulting from acetylation. It is an important method used to find any changes occurred in the starch molecules (Miaomiao et al., 2019) FTIR spectroscopy showed that the absorption intensities of acetylated starch increase with the increase in DS (H. Chi et al, 2008). In both the spectrum of native starch and acetylated starch the peaks at 3000 – 3600 cm⁻¹ correspond to OH and CH stretching (Kumar et al., 2013). Acetylated starch shows a strong absorption band which attributed to stretching of the C=O group and intensity of the broad peak was found to decrease due to hydrogen bond – OH which confirmed the acetylation of starch.

B. Degree of Substitution

Acetylated starch was synthesized when starch react with acetic anhydride and acetic acid. Different DS of acetylated starches were prepared by varying the temperature and high DS was determined (Matti et al., 2004). On varying

the concentration of starch, acetic anhydride, acetic acid it was found that decrease in quantity of corn starch increased the percentage of acetylation which in turn increased the degree of substitution at a lesser reaction time.

C. Swelling Power

It was observed that the swelling power was higher for the native starch. When starch undergoes acetylation the hydroxyl groups which are responsible for the gelatinization are replaced by acetyl groups. When compared with native starch, modified starches have lower swelling power.

Variation in degree of substitution has severe effect on the swelling power. Acetylated starch with low DS showed an increased in swelling power, while at higher DS values a reduction of swelling power was observed (Trela, V.D. et al, 2020)

D. SEM Analysis

The morphology of native starch, acetylated starch was observed. The native starch presented in the form of grains and were of polygonal shape with edges on the surfaces. After modification process the granular structure of starch is destroyed and depressions and deformations are exhibited (Miaomiao et al., 2019). The formation of nanoparticles occurred when water is added drop wise to the polymer solution. The gradual increase of water to the medium precipitates to the slower precipitation of modified starch leading to the formation of low DS starch and high DS starch nanoparticles (Oliveira et al., 2017)

E. Thermogravimetric Analysis

Thermogravimetric analysis (TGA) was employed to determine the thermal stability of the materials. TGA analyses was carried out for pure PVA films and PVA films with acetylated starch nanoparticles. The degradation of pure PVA which was similar to its melting temperature, needs to use plasticizers which helps to control the relevant melting temperature and thermal stability especially during the process like screw extrusion and injection moulding process widely used for packaging applications (Waheed et al., 2017).

The starch degradation occurs as the result of inter and intra molecular dehydration reactions of starch molecules. Also, higher thermal stability of acetylated starch is due to the smaller the number of remaining hydroxyl groups. Hence starch acetates with smaller DS have lower thermal stability than native starches, and starch acetates with higher DS exhibit greater stability than native ones (Zhang et al, 2008).

F. Mechanical Properties

It was observed that the pure PVA film possessed higher tensile strength than other films. The addition of modified starch fillers which are amorphous in nature increased the brittleness of the film and lead to the lower tensile strength of the film. As the quantity of acetylated starch nanoparticles increased, the tensile strength got decreased whereas the elongation got increased. The decrease in tensile strength after the addition of starch was due to the filler-polymer matrix interaction. The addition of glycerol improved the elongation of the film which is attributed due to the

penetration of plasticizers molecules between blend components and the existence of hydrogen bonding to weaken the interaction between PVA and starch.

G. Barrier Properties

Barrier properties are an important issue in product quality maintenance and estimate package shelf life. The permeability of blended films depends on many factors such as film thickness, water, relative humidity, plasticizer content and the nature of blend components.

Packaging material should protect the foods from light emission in order to avoid the deterioration. UV visible spectroscopy was carried out to determine the transparency of films. It was observed that the addition of plasticizers and fillers reduced the light transparency of the film as a result of the strong interaction between filler and polymer matrix.

Gas permeability is an important factor in food packaging application because it provides product protection against environmental and transportation deterioration. The presence of starch fillers and plasticizer restricted the permeability of oxygen by reducing the free volume of polymers that is used as a transporting medium by the permeating particles. Similarly the water vapour transmission rate of PVA film with additives got decreased when compared with the pure PVA film. Since the modified starch is hydrophobic it blocks the entry of water molecules into the film.

H. Soil Burial Test

Biodegradability of a material is determined by the evolution of carbon dioxide and weight loss of the material. The pure PVA film got degraded quickly whereas the PVA film with additives got degraded after few days. This is because when PVA/Starch films were attacked by microorganisms' starch was consumed first and pores behind made the film structure weaker and accelerated fragmentation process.

XVI. CONCLUSION

The chemical modification of native starch was carried out by using various methods like Acetylation, followed by microwave radiation and acetylation. During Acetylation process, the starch became gelatinized upon heating in the presence of water so it was neglected and then acetylation was carried out by changing parameters. The resulted starch was in powder form. From FTIR analysis it was observed that hydroxyl groups of native starch were replaced by acetyl groups after acetylation. During acetylation the phospholipid groups got destroyed. Acetylated starch of various degree of substitution was obtained. It was observed that quantity of corn starch, acetic acid and acetic anhydride and reaction time brought changes in the degree of substitution. Then the swelling power of native, low DS and high DS of starch was determined. It was found that the acetylated starch with high degree of substitution had lower swelling power. Morphology of native starch, modified starch and modified starch nanoparticles was studied and it was observed that after acetylation granular structure of native starch got destroyed and nanoparticles prepared from high DS starch had average size of 200 nm. The nanoparticles formed are not with uniform size. The starch of low DS and high DS was subjected to TGA and was compared with native starch. The degradation temperature for high DS starch nanoparticle

was found to be. Since the high DS starch nanoparticles possessed better properties, it was incorporated as filler in PVA film preparation. The mechanical properties of pure PVA film and PVA film with acetylated starch nanoparticles was compared and it was found that as the addition of nanoparticles increased the tensile strength decreased whereas the elongation increased. The thermal degradation of PVA film with acetylated starch nanoparticles was found. The permeability of oxygen, moisture, light through the films was reduced by the presence of nanoparticles. From the biodegradability test it was observed that the destruction of pure PVA film occurred within soon whereas for the PVA film with nanoparticles complete destruction of material occurred only after a few days.

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AI-BASED HALTING OF BABY ABDUCTION AND CHILD MINDER BY INTELLIGENT RETRIEVAL

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Abstract: Smart contact lenses are super cool next gen of future at same time might it be the best solution for vanishing child abductions and best safeguard than the humans.

keywords: artificial intelligence, smart contact lens.

1. INTRODUCTION:-

AI based techniques and functions are grown everyday for children's and infant's in upgraded smart toy's as much equally the abduction and child abduction's in online are relatively increased nowadays, As tools grows fast, our next generation people's smart choice too growing fast through smart applications and devices and, we can't prevent those social intermediate from one to another, might some strangers utilize this best way of online abduction's even though infants' also abducting randomly. Those might or not be stopped but, Artificial Intelligence the Intelligent retrieval of smart contact lens can prevent those crime cases like abduction in infant's and children's.

2.LITERATURE SURVEY:-

Statistical Report of child Abduction victims
38% of forced laborer's
50% of sexual worker's
12% of other's

A.Major Reason's for Abduction and missing children's

- Endangered run away from home
- Personal family abduction's
- Non-personal family abduction's
- Lost injured or missing

NATIONAL CRIME INFORMATION CENTRE

Reported lastly that total of 87,438 active missing's .In that 30,618 are juvenile's some juveniles are found later years by AI recognition's.

B. AI-powered lens warning sign's:-

- Unhealthy activities
- Unusual physical touch
- Warning message to parent's when strangers are near
- Face detection of strangers

3.ANALYSIS:-

Child report and crime are increased in recent times ,which esn't change before and after, The definition of child abuse is not confined as physical abuse, except the infant abduction's online sexual abusing are reported equally. The main reason is because of not clear awareness about social media. In 2020, statistical report ,it stated 184 million cases of suspected online abusing .It also uplift the (CSAM) CHILD SEXUAL ABUSE MATERIAL ,Which has reported in exploitation of 45 million Images of children's .The Internet watch foundation found it Exactly 39% of CSAM are under 10 year's.[2]

Since, the technology has been raised and artificial intelligence Also developed. Eventhough ,the safer usage of AI has not been Well spreaded. In, current generations AI powered tool can detects child abuse images with 99% accuracy.

i)AI powered lens are relatedly based on smart work tool but many of them didn't know that smart lenses' are future caretaker for infant's and children's abduction's by stranger's and enemies' can be detected .Through smart lenses like zeolite etc.

ii)Online abductions are created by children's itself by stranger's request and unwanted gaming, personal feedbacks etc.. Those can be track and visually we can watch and fetch the stranger's information's to our child .so we can settle down in a safe zone from abduction's.

iii)Those fetching smart lenses can be manufacture one day, surely it make vanished the crime abduction's.

4.RESEARCH:-

Well, we talked about more and more queries and victims everyday Artificial Intelligence is more powerful and strong tool against child

Abduction's .Yes we have to move little bit Intelligent retrieval in Artificial Intelligence in the vision of Artificial smart lenses . The Future Generation can compactable in our vision lenses, which doesn't mean only for sophisticated and smart life. Well-being in a part of Halting in child abduction and safer minder in the Replacement of human.Morethan it provide user's to search Free independent effectively.[1]

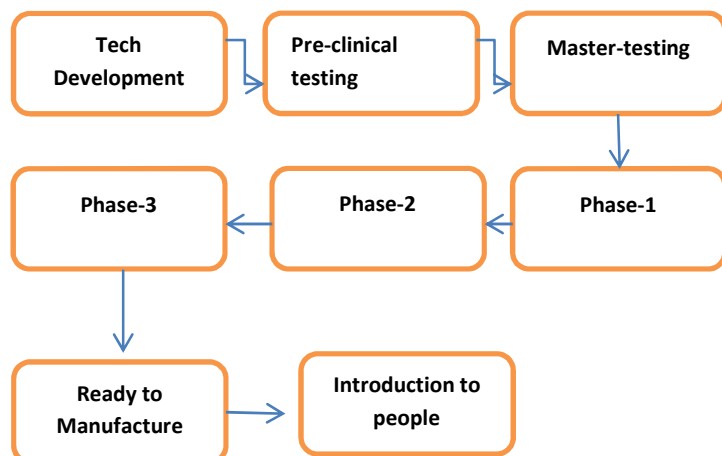
- Those lenses give unsurprising vision amendment.
- It changes the need to wear eye or vision glasses regularly.
- A whole scope of focal point type is accessible to addressing Single issues.

B.Need to Improve by AI:-

Cleaning and sterilizing our focal points can be little confused and poorly designed. Moreover the people in our planet are Experiencing the effects of being ill everyday. If the designing doesn't fit it may harm the optic nerve and lead to irreversible Vision.

Nano Technology for smart contact lenses wasn't readily set until the early 2000's ,[3]but even with that technology again it implementing and comes with many challenges ,actually the tracking lens are typically successful concept but the biggest ask is how do engineering to put everything together. Scleral lens neck device as processor, soft polarizing filter in lens etc.Every contact lens comes from difficult process, more pros and cons are faced in day by day situations too.

Example: Scleral lens, more protective and stable but not popular Because of difficult manufacture while takes more time to fit at early's but it is now much easier by improvement of AI in past



5.TESTING:-

Smart AI lens are start tested in various countries ,but It doesn't give exact solution to manufacture in people's choice.

S.NO	PROCESSING STEPS	FUNCTIONS
1	Raw materials	i)plastic polymer ii)soft polymer
2	Manufacturing	Perfect shaping by CAC
3	Molding method	Both analog and digital
4	Lathe process	Final of getting arbour
5	Finishing	Measurement
6	Quality control	Digital checking by shadow Graph
7	Packaging	Hydrophilic solutions

A.Pre process:-

PLASTIC POLYMER –It is a blend of materials combined by Molecules of various chemical substances.

SOFT POLYMER -poly hydroxyethyl methacrylate (pHEMA)

CAC- Curve of lens named the central anterior curve.

LATHE PROCESS - final of getting arbour that means lens are polished and mounted.

MEASUREMENT-It is a perfect clarity for perfect smart vision ,which designed by razer blade and posterior curves in measurements.

QUALITY CONTROL- It examines under magnification of shadow Graph's .If these have any errors the len's will be reflect by shadow. It is performed by digital work of computers[5]

After all, testing's it performs a worthy task called hydrohic process, these lenses are soaked in saline solution .which are similar To tears.

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I wish to thank my friends and staff's. So that I researched every particular things about artificial lens and how it will be useful. I also extend my heartfelt wishes once again to all .who motivated me.

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AN EFFICIENT LOW POWER ARITHMETIC CIRCUIT USING GDI BASED REVERSIBLE LOGIC

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Abstract: In recent years, VLSI design plays a vital role to enhance the density of integration in VLSI chips. VLSI is the process of generating an integrated circuit (IC) by merging millions of MOS transistors onto a single chip. It is considered as one of the best alternatives to work with this methodology, to help shorten power consumption and power dissipation. By using reversible logic, one correspondence mapping between input and output causes the tiniest loss of information and it scatters very low heat. Here quantum computing, optical computing, and nanotechnology devices, the reversible logic has built up a lot of absorption. Quantum computing devices hypothetically operate at ultra-high speed and consume immeasurably less power. In this project, an energy-efficient low power reversible arithmetic circuit is proposed by CMOS design using Tanner EDA.

Keywords- *VLSI, CMOS, GDI, Reversible logic gates.*

I. INTRODUCTION

Present-day multimedia systems outperform their antecedents in the speed of operation, hardware utilization, and the number of applications that they can process at a time. However, power consumption has been the price paid for the speed and complexity achieved. The main purpose of using reversible logic is- depth of the circuits, decrease quantum cost, the number of garbage output. This paper proposes a low-power arithmetic circuit using reversible logic. The paper is originating as follows. Section II elaborates on the existing method used in this paper, performance parameters for reversible logic. Section III presents the proposed reversible logic-based full adder along with the results of the analysis. Concluding remarks follow thereafter in Section IV. Current progress in MOS transistor miniaturization permits circuits with over 10^5 transistors (highly regular structures,

such as memories, which contain over 10^6 transistors) to be fabricated on a single chip. The design of integrated circuits may be regarded as a process of transforming the desired functional behavior into a circuit to be fabricated on a silicon chip.

A. ARITHMETIC CIRCUITS

The addition is the most commonly performed arithmetic operation in digital systems. Several arithmetic circuits modulus, which can be used to build larger arithmetic circuits. A software tool Tanner EDA of particular importance in the design of integrated circuits is the transistor level circuit analyzing. It provides a time-efficient and cost-effective method of estimating the performances and verifying the correctness of a given circuit before the circuit being fabricated. The ultimate aim of designing a 4-bit CMOS [2] full adder is to reduce power dissipation and to decrease the delay compared to existing work performance.

II. EXISTING METHOD

A. BIT CONVENTIONAL FULL ADDER

The 1-bit full adder circuit can be encapsulated in a single module. The 1-bit full adder cell contains 30 transistors. From different points of view, the different logic styles can be investigated. In a full adder circuit, the most digital circuit performs addition or subtraction. The full adder circuit adds together two binary digits, and a carry-in digit to produce a sum and carry-out digit. A one-bit full-adder adds three one-bit numbers, usually written as A, B, and Cin, A, and B are

the operands, and C_{in} is a bit carried in from the existing less-significant stage. The 1-bit full adder circuit produces a 2-bit output. Output carry and sum are generally represented by the signals C_{out} and S , where the sum equals $2C_{out} + S2.2$.

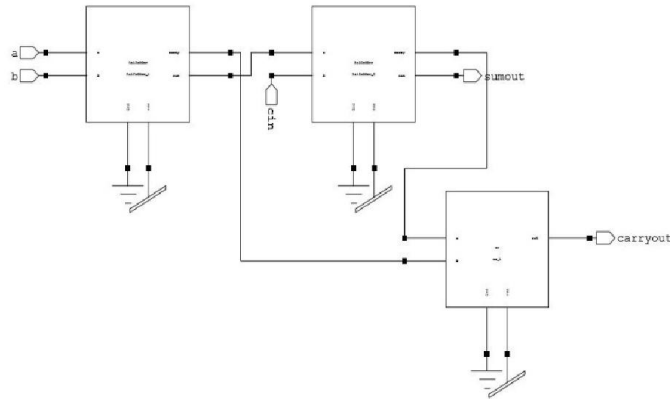


Figure 1: 1-Bit CMOS Full Adder

B. 1-BIT CMOS REVERSIBLE FULL ADDER

The concept of reversibility is a less process, where the un-computed results can be recovered. This reversible process where the energy dissipation is low or no dissipation. Reversible computing is mainly design with reliability and a higher degree of performance. This computing also brings significant changes in energy efficiency. The design cost of digital circuits with reversible logic will be less and hence reversible computing area is considered in the research domain. The reversible logic gates exhibit equal inputs as well as outputs. The Reversible logic gates are *Fredkin gate * Feynman gate * Toffoli gate * Peres gate.

C. FREDKIN GATE

The Fredkin gate [1] is invented by Edward Fredkin and is a computational circuit suitable for reversible computing. The basic Fredkin gate is a controlled swap gate that maps three inputs and three outputs. The Fredkin gate has the useful property that the numbers of 0s and 1s are conserved all the time, which in the billiard ball model means the same number of balls are output as input.

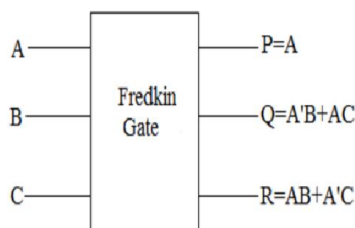


Figure 2: Fredkin Gate

Input			Output		
A	B	C	P	Q	R
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	1	0
0	1	1	0	1	1
1	0	0	1	0	0
1	0	1	1	1	0
1	1	0	1	0	1
1	1	1	1	1	1

Table 1: Fredkin Gate Truth Table

D. FEYNMAN GATE

The Feynman gate has two inputs and two outputs and it is also recognized as controlled-not gate (CNOT). To copy a signal The Feynman gate can be used. In reversible logic circuits, fan-out is not allowed, the Feynman gate is used as the fan-out gate to copy a signal.

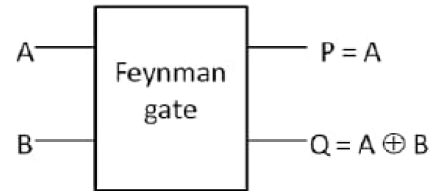


Figure 3: Feynman Gate

A	B	P	Q
0	0	0	0
0	1	0	1
1	0	1	1
1	1	1	0

Table 2: Feynman Gate Truth Table

E. 1-BIT FULL ADDER USING GDI

Gate diffusion input (GDI) is described as a new technique of low-power digital combinatorial circuit design. GDI technique [8]-[12] allows reducing power consumption, propagation delay, and area of digital circuits while maintaining low complexity of logic design.

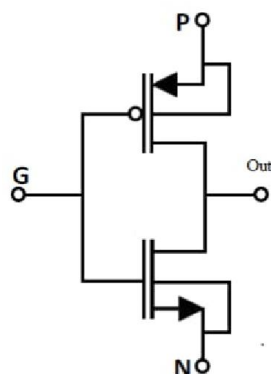


Figure 4: GDI Transistor

N	P	G	OUT	Function
0	B	A	$\bar{A}B$	F1
B	1	A	$\bar{A}+B$	F2
1	B	A	$A+B$	OR
B	0	A	AB	AND
C	B	A	$\bar{A}B+AC$	MUX
0	1	A	\bar{A}	NOT

Table 4: GDI Transistor Truth Table

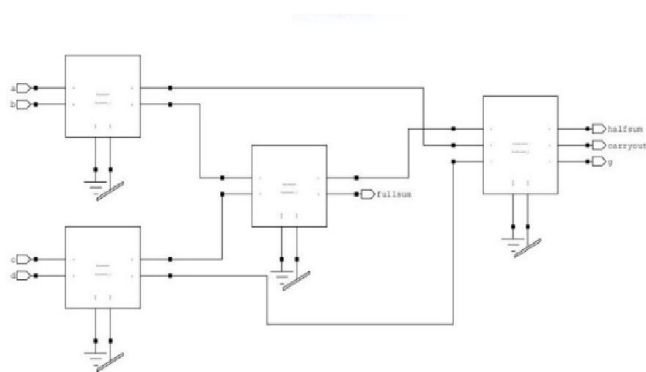


Figure 5: 1-Bit Full Adder Using GDI

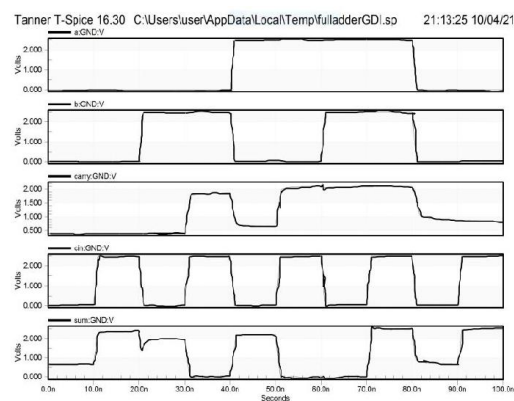


Figure 6: 1-Bit Full Adder Using GDI Output Waveform

DESIGN/METHODS	MOSFETS	POWER
1-BIT FULL ADDER	30	1669nW
1-BIT REVERSIBLE FULL ADDER	76	1021230nW
1-BIT FULL ADDER USING GDI	14	1.2457nW

Table 5: Comparison and Results

The above table shows that we reduced 20% of average MOSFETs using GDI logic in comparison with CMOS logic and, the power consumption is too low.

III. PROPOSED METHOD

A. 4-BIT CMOS FULL ADDER

Ripple carry adder is the simplest form of the adder. In ripple carry adder we will use half adder and full adder. In this project, using Fredkin and Feynman gate for designing 4-bit ripple adder. Alternative CMOS [6] logic is introduced to GDI logic. GDI gates provide reduced voltage in their outputs. The reduction in voltage is beneficial to power consumption. At an identical time, this could cause slow switching in the case of cascaded operations. At terribly low VDD operation, the breakdown output could even cause circuit malfunction. A ripple carries adder may be a digital circuit that produces the arithmetic sum of 2 binary numbers. Full adders are connected in cascaded, with the carry output from every full adder [10] connected to the carry input of successive full adders within the chain. It shows the interconnection of four full adders (FA) circuits to produce a 4-bit ripple carry adder. The F283 may be a full adder [7] that performs the loading of two 4-bit binary words. The sum outputs are provided for every bit and also the

resultant carry output is obtained from the fourth bit. The device features a full internal look-ahead across all four bits generating the carry term in generally 97.6 μ s.

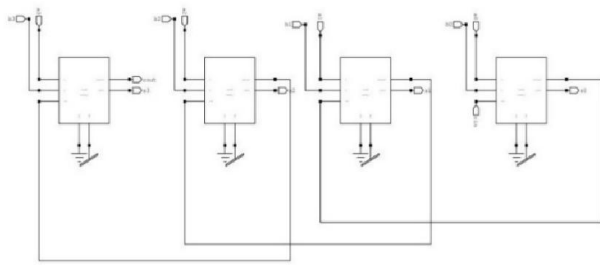


Figure 7: 4-Bit CMOS Full Adder

B. ADVANTAGES

The benefits of using full adder [3] GDI output, low power consumption, high speed, and robustness to supply voltage scaling and electronic transistor filter. The benefits of coming up with a 4-bit full adder are to consume low power and consume less time to form the output.

C. 4 BIT REVERSIBLE FULL ADDER.

Ripple Carry Adder or n- bit parallel adder is a combinational logic circuit. The purpose of loading two n-bit binary numbers is used. It can perform an additional process for n-bit sequences to get accurate results. It increases the propagation time.

Reversible logic gates (Fredkin and Feynman) are used to propose GDI logic [11]. where GDI gates provide reduced voltage in their outputs. The reduction in voltage is useful to power consumption. At the same time, this may lead to slow switching in the case of cascaded operations. I used Tanner EDA for simulating the output waveform in nanowatt. Time consumption is very low when compared to full adder circuits.

D. COMBINATION OF FREDKIN AND FEYNMAN

The combination of Fredkin and Feynman logic gates is used to form a full adder by using CMOS [5] logic and then proposed to GDI logic. The main difference between the GDI and CMOS-based design is that the source of the NMOS in a GDI cell is not connected to GND and the source of the PMOS is not connected to the source. This feature gives the GDI cell two extra input pins for use which makes the GDI design more flexibleness than the CMOS design.

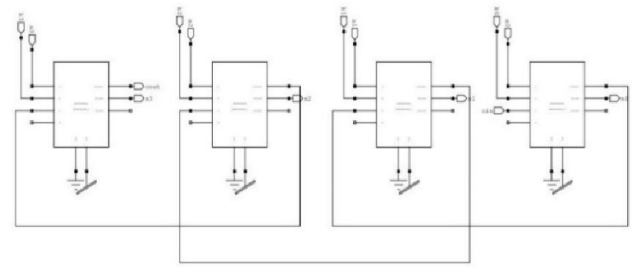


Figure 8: 4- Bit Reversible Full Adder

E. 4-BIT REVERSIBLE FULL ADDER USING GDI (PROPOSED)

As compared to other logic, the proposed 4-bit full adder using GDI logic is more reliable [9]. The 4-bit full adder using GDI logic consumes less power and time and it uses fewer MOSFET'S. Table 7 shows the difference between the various methods used.

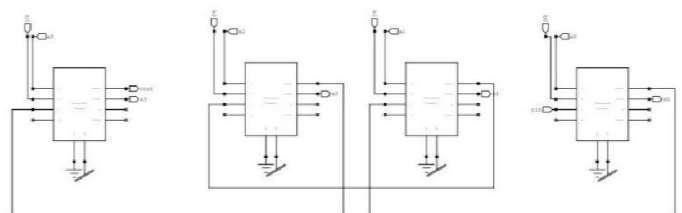


Figure 9: 4-Bit Reversible Full Adder Using GDI

IV. RESULT AND DISCUSSION

Here discussed a detailed analysis of average power consumption and delay of proposed GDI-based logic gates are done by using Tanner EDA simulation. Comparison of the proposed GDI technique with the existing conventional technique shows that the average power is decreasing by respectively. By proposing the proper analysis and design of low-power arithmetic circuits using reversible logic gates. To reduce the power of a GDI-based full adder [4] gates some more circuit-level power management techniques should be used so that they can be useful for low power applications. Execution of different kinds of logic gates and digital circuits have to be carried out in order to determine the fields of circuitry, where GDI is very much superior over other design styles.

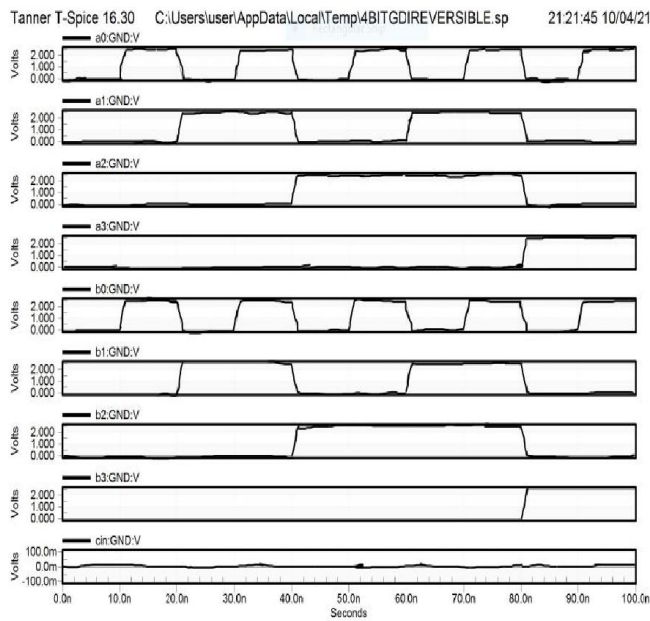


Figure 10: 4-Bit Reversible Full Adder Using the GDI Input Waveform

The above figure.10 shows that the 4-bit reversible full adder using GDI input waveform diagram.

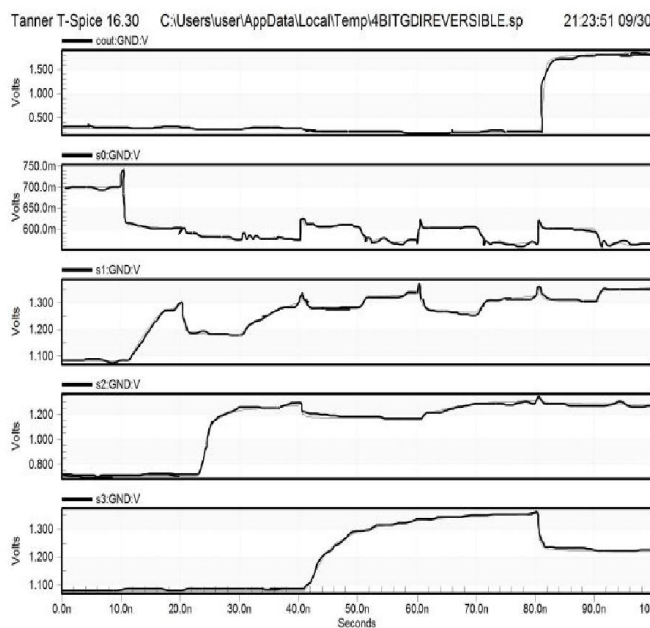


Figure 11: 4-Bit Reversible Full Adder Using the GDI Output Waveform

The above figure.11 shows that 4-bit reversible full adder using GDI logic output waveform.

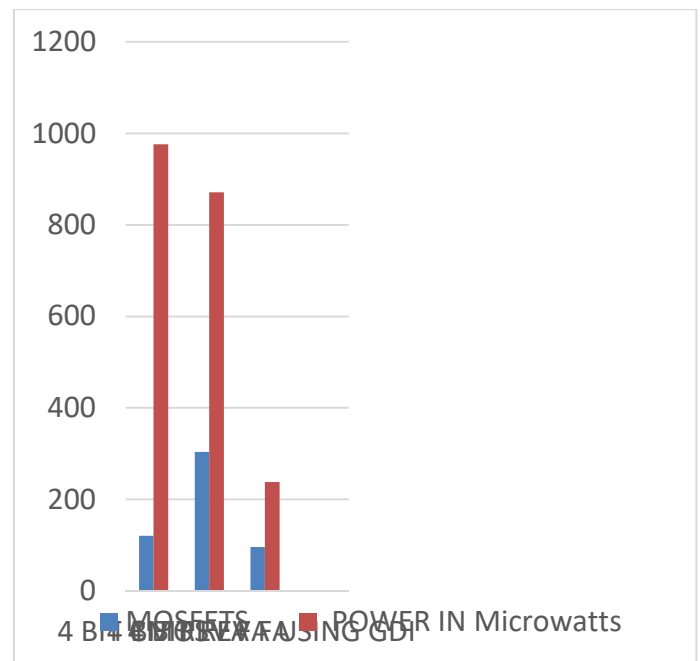
DESIGN/ METHODS	MOSFETS	POWER
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4-BIT CMOS FULL ADDER	120	976.46 μ W
4-BIT REVERSIBLE FULL ADDER	304	871.22 μ W
4-BIT REVERSIBLE FULL ADDER USING GDI (PROPOSED)	96	237.926 μ W

Table 6: Comparison and Results

The above table shows that we reduced 20% of average MOSFETs using GDI logic in comparison with CMOS logic and, the power consumption is too low. (i.e) shown in the chart below.

V. BAR CHART



The above Bar chart shows that the results of using GDI logic(proposed), reduction in MOSFETS (20%), and low power consumption (80%) in the above-designed simulation.

VI. CONCLUSION

Power Dissipation of Digital circuits can be reduced by 15% 25% by using appropriate logic and also it can be reduced by 20%-40% by lowering switching activity. Here, the Gate Diffusion Input Technique is analyzed for minimizing the power consumption and delay of static digital circuits. This technique as compared to other currently used

logic design styles allows less power consumption and reduced propagation delay for the low-power design of combinational digital circuits with a minimum number of transistors. In this paper, basic building blocks of digital gates and few combinational circuits are analyzed using GDI and other CMOS techniques.

VII. FUTURE ENHANCEMENT

The future work will be focused on the reduction of power and time in any combinational circuits using multiplexers and FIR filters.

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AN EMBEDDED BASED SMART SERICULTURE SYSTEM FOR EFFECTIVE GROWTH OF SILKWORMS

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Abstract-Sericulture is that the cultivation of silkworms to supply silk. India produces over 60% world's annual production. So, it's known as the second biggest manufacturer of silk. In silkworm progress wetness and temperature participate and act essential position within the progression of silkworms in every stage, the length takes place for improvement a specific young silkworm. Medical care is one in every of the admonishing parameters to be thought-about for healthy and triumphant silkworm rearing. The temperature parameter is a very important issue for silkworm growth and the maintenance of temperature is strenuous. So, the planned framework introduces Associate in embedded system with the temperature and wetness level to regulate the environmental circumstances at intervals of the arrangement in silkworms.

Keywords: *Arduino Atmega 328 Microcontroller, DHT11 Sensor, Peltier plate*

I. INTRODUCTION

Sericulture is the field that deals with the assembly of silk by rearing silkworms. India is the second-largest producer of silk within the world and it's the distinction of manufacturing of these business forms of silk particularly Mulberry, Tropical Tasar, Oak Tasar, Eri, and Muga. Madras is a hierarchical fourth place among the silk-producing state in India [2]. The seasonal fluctuations affect the morphological and organic chemistry aspects of a silkworm. The wetness level changes per atmospheric condition. The temperature plays an important role in the growth of silkworm [1]. It directly affects the physiological activities of silkworms as they are cold-blooded. So, it needs smart protection.



Figure 1: Silkworms

The most vision of this paper is to produce associate for observe the condition within the sericulture type. The temperature and wetness level of the space is analyzed and verified with the device. The main objective of the project is to keep up the wet level needed for the survival of silkworms. It involves the planning and implementation of embedded primarily based on the silkworm parameters like temperature, humidity. Here we tend to plan an automatic sericulture farm for maintaining correct environmental necessities for the expansion of silkworms. The sericulture atmosphere is managed by an exploitation device and automatic system [5].

II. EXISTING METHOD

Sericulture should be worn out closed premises and also the staff should add poorly vented premises. This creates metastasis issues for staff. The dead silkworms square measure handled by the staff with their clean hands that ends up in numerous diseases and infections. Workers have to be compelled to work longer for up to sixteen hours each day [3]. The disadvantages of existing system square measure the temperature of silkworms ought to be monitored perpetually if the temperature exceeds the extent, it causes harm to silkworms. Operating status isn't real-time, manual observance & controlled method is complicated.

III. METHODOLOGY

In the day-to-day life of sericulture production of silk is decreasing because of the farmer facing many problems by backing the conventional procedure of sericulture in consequence of the healthy growth of silkworm and its required environmental conditions. Therefore, we compared with the literature survey and select to improving the utility of our technique. In this strategy, when the resolved temperature is 18°C-33°C [9].

Where the silkworms are not in the resolved condition, it will lead the great losses to the farmers. So, we proposed the model as an automatic sericulture system.

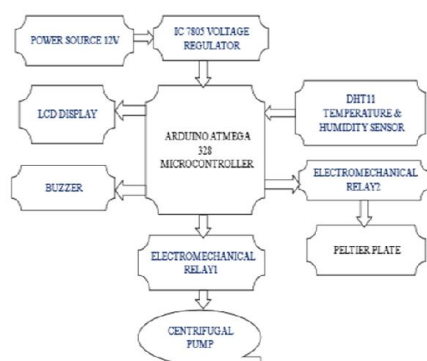


Figure 2: Block diagram

In this technique temperature and humidity senses the condition of silkworm to maintain the atmospheric state. By sensing the temperature values by sensors, the silkworms are observed and maintain the temperature of the silkworms in sericulture farms. The temperature and humidity sensor are maintained to the resolved equate of 18-33°C. The continuous monitoring of temperature by the sensors is done for every minute in the sericulture farm. The advantages of the proposed method are Cost-efficient the Requirement of less manpower, the change of error rate in maintaining climatic conditions is less.

IV. WORKING PRINCIPLE

In this project, the DHT11 device might sense the temperature and humidity level to take care of the climatic conditions[10]. Once sensing the temperature values by device, the information is going to be sent to the microcontroller for checking the condition of maintenance within the sericulture farm. The temperature and humidity device is maintained to the resolved equate of 18-33°C. when power source is given to voltage regulator for synchronize 12v to 5v then 5v supply is designated to microcontroller vcc and gnd pins. Temperature and humidity sensor has 3 pins vcc pin is associate to 5 volt supply gnd pin equate to ground then digital pins connected to the microcontroller. LCD display secured with arduino atmega 328 microcontroller.

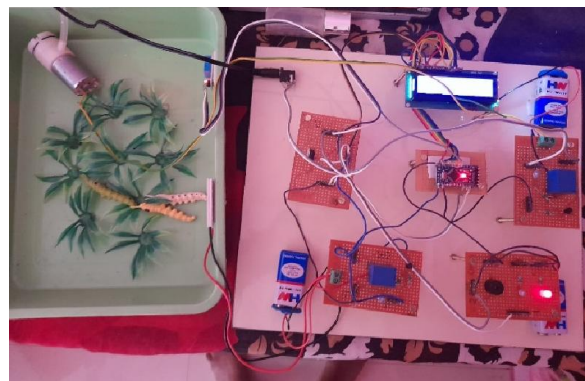


Figure 3: Experimental setup

Electromechanical relay has connect to 12 volt supply then controlled by microcontroller. when condition level can be in below or above the electromechanical relay can update their status.

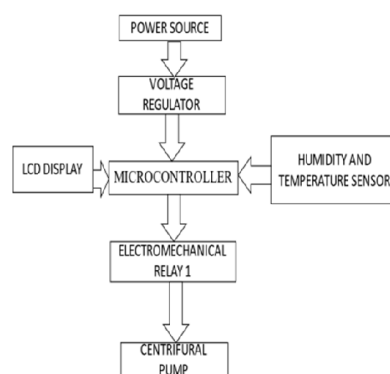


Figure 4: Flowchart for coolant activation

Once the temperature is higher than 33°C the data can be sent through microcontroller at that moment electromechanical relay 1 will activate the centrifugal pump still it reaches normal condition of resolved silkworms range.

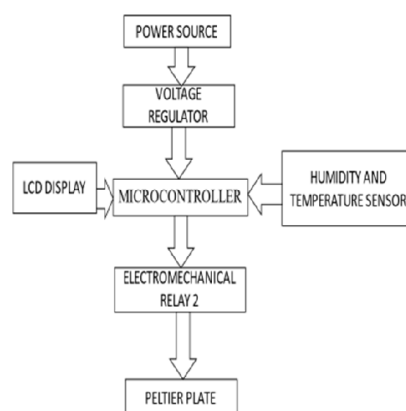


Figure 5: Flowchart for heater activation

Once the temperature is below 18°C when DHT11 sensor can sense the value and the data will be sent through the microcontroller at that moment electromechanical relay 2 will activate peltier plate

A. PELTIER PLATE

A Peltier part could be a device that converts electricity directly into a temperature distinction across a flat plate – creating one aspect hot and one aspect cold. It works in each direction too. That is if you set one between a hot iron and a block of ice it'll manufacture electricity. Peltier components appear as if flat, typically sq., plates with 2 wires extending from them. Between these 2 surfaces is an associate degree array of semiconductors asynchronous alternating between n-type and p-type (n-type has “n” for “negative” or several further electrons; p-type has “p” for “positive” or shortage of electrons). They're physically organized so once associate degree electrical current place through the system, the free electrons, and gaps in would like of free electrons square measure emotional in an exceedingly common direction concerning the 2 plate surfaces. This transfers the thermal energy from one aspect to the opposite.[6] The direction of warmth flow depends on the direct particle of current.



Figure 6: Peltier plate

In application, one aspect is sometimes guaranteed to associate degree atomic number 13 conductors that primarily tie that aspect to the temperature of the close surroundings. The opposite aspect is capped with ceramic and can become hotter or colder than the surroundings.[7]

B. ARDUINO ATMEGA 328 MICROCONTROLLERS

Arduino ATMEGA-328 microcontroller carries with it fourteen input and output analog and digital pins (from these VI pins are thought of to be a PWM pin), vi analog inputs, and remaining digital inputs. A power jack cable is employed to attach the Arduino board with the pc. Outwardly battery is connected with the Arduino microcontroller for the ability to provide. Arduino is AN ASCII text file microcontroller from that there's no feedback gift within the microcontroller. This Arduino board carries with it an I2C bus, which will be able to transfer the info from the Arduino board to the output devices. These Arduino boards are programmed over RS232 serial interface connections with Atmega Arduino microcontrollers. The operational potential unit ranges from 5v. The input voltage counseled for Arduino microcontroller is from 7v and therefore the maximum of 12v [4].

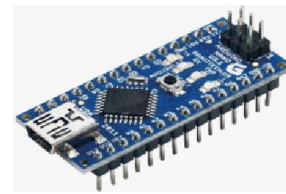


Figure 7: Arduino Atmega 328 Microcontroller

Arduino Atmega 328 Microcontroller, which acts as a processor for the Arduino board. Nearly it consists of twenty-eight pins. From these twenty-eight pins, the inputs are controlled by transmittal and receiving the inputs to the external device. It conjointly consists of pulse breadth modulation (PWM). This PWM is accustomed transmit the complete signal in an exceeding modulation. Input power provide like VCC and GND are used. These IC primarily consists of analog and digital inputs. These analog and digital inputs are used for the method of sure applications

C.DHT11 TEMPERATURE AND HUMIDITY SENSOR

The DHT11 may be a usually used Temperature and wetness sensing element. The sensing element comes with an infatuated NTC to live temperature Associate in an 8-bit microcontroller to output the values of temperature and wetness as serial knowledge. The sensing element is additionally manufactory mark and therefore straightforward to interface with different microcontrollers [3].

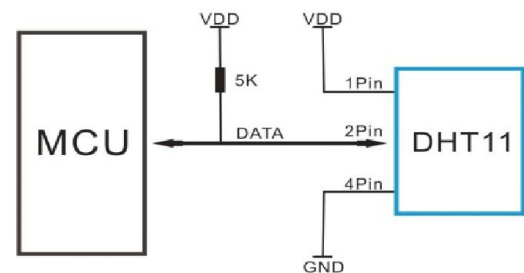


Figure 8: Temperature and humidity sensor

The sensing element will hang out the temperature from 0°C to 50°C associate wetness from 20% to 90% with an accuracy of $\pm 1^\circ\text{C}$ and $\pm 1\%$ [8].

V. RESULT AND DISCUSSION

This strategy presents information's about the use of automated monitoring and controlling techniques in the sericulture farm. We suggested an automated technique in sericulture farms which includes less human intervention towards maintaining proper environmental requirements for the growth of silkworms. This proposed framework discussed the role of different factors affecting the growth, survivability, productivity, and disease incidence in silkworms and maintenance cost making it suitable for rural usage this implementation increases the quality and quantity of silk production in rural areas. This system conjointly monitors and controls the temperature of the silkworm rearing space unendingly, at intervals the mounted temperatures vary therefore rising the yield.



Figure 9: When the silkworms are in Normal temperature

The temperature and humidity sensor are maintained to the resolved equate of 18-33°C.

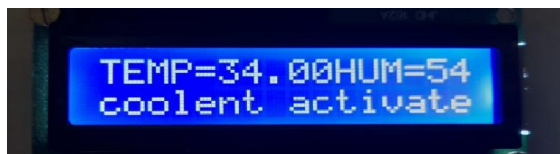


Figure 10: When the silkworms are in above temperature

When the temperature is above 33°C it is the peak point to activate the cooler.

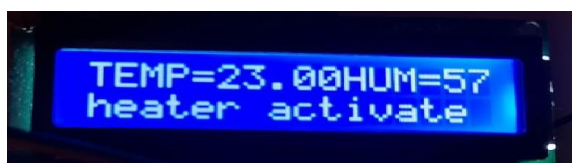


Figure 11: When the silkworms are in below temperature

When the temperature is below 18°C it is the valley point to activate the heater.

VI. CONCLUSION AND FUTURE ENHANCEMENT

This technique helps farmers to return out of their economic condition. We have a tendency to projected an automatic sericulture plant which incorporates less human intervention towards maintaining correct environmental needs for the expansion of silkworms, reducing the probabilities of reduction in silk production. This paper mentioned regarding the role of various factors poignant the expansion, survivability, productivity and unwellness incidence in silkworms. Image processing technologies will enable the end user to monitor. By making use of an SMS Prototype will operate in real time for monitoring and actuation inside the system. Image processing is used to monitor the complete silkworm growth and diseases.

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CHRONICLE ANALYSIS OF VARIOUS UPGRADATIONS CARRIED OUT IN UPCOMING 5G WIRELESS TECHNOLOGY

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Abstract:- Fifth Generation (5G) is an emerging digital technology which mainly had its application on wireless networking system. This tends to focus on mobile network innovations increasing in every part of the world. This paper is centered on every prior age of versatile innovation, developmental aspect of 5G innovation and essential architectural idea driving this wireless technology. Few researches have already been done on 5G Technology and these researches are generally identified with the improvement of World Wide Wireless Web (WWW) and Dynamic Adhoc Wireless Networks (DAWN). 5G innovations has couple of extremely extraordinary highlights in term of speed, data transfer and storing capacity which is more prominent than 1 Gbps. Frequency band which is between the ranges from 3GHz to 300GHz has superior quality video communication, high resolution multimedia streaming, media and entertainment through content innovation and so on. It causes this innovation to differ and unique among all the accessible existing portable advancements around the world. 5G depends on IPv6 and VOIP (Voice over IP) innovations carried out. Considering all such developments compared to the previous versions of the technological generations this paper has been frameworked.

Keywords- *Wireless Communication, 5G, WWW, IPv6, LTE*

I. INTRODUCTION

The advancement of remote innovation began in mid 1970's. In the following four decades the advancement of mobile wireless innovation anticipated from 1G to 5G innovation. 5G innovation is the fifth era innovation for mobile wireless innovation. 5G Technology is exceptionally astute innovation which includes a huge number of details to the 4G innovation and makes it totally remote with no restriction. 5G furnishes exceptionally high data

transmission with numerous other propelled highlights, for example, spectral efficiency, energy effectiveness, and so forth. Making it superbly wireless for genuine world thus makes powerful and useful for the clients. The 5G advances offer large data of network and storage capacities and unhindered call volumes and what's more an interminable information communicate with most recent portable operating system. The possibility of WWW is begun with 4G innovation and is finished with the 5G wireless innovation. It is expected to launch in 2020. This technology helps in making a universally connected globe with continuous access to data, communication and entertainment. This will change our ways of life in a significant way. The Internet of Things (IoT) is changing the manner in which we live and work. Its prosperity and real worth originate from the establishment of services over the associated IoT gadgets. According to the Report, there will be more than 30 billion connected devices worldwide by 2023, of which around 20 billion will be IoT-related devices. In the range from 2017 and 2023, the number of IoT gadgets is relied upon to increment at a compound yearly development pace of 19%, driven by promising IoT use cases such as smart wearable's, smart display, smart metering, smart power, robotic control/production automation, robotic surgery, autonomous driving cars, and drone surveillance. These applications are usually integrated with wireless mobile communications. Currently, a number of smart IoT devices exploit cellular networks such as the third generation (3G) and 4G long-term evolution (LTE) to maintain their connectivity and their connection with the cloud data centers. With the rapid development of information created by progressively enormous quantities of IoT

gadgets, a few burning issues stay to be explained in application environments. For instance, the transmission latency and performance of the current cellular systems can't be ensured, which thus restrains the adequacy and feasibility of many developing IoT applications such as the tactile Internet, autonomous driving cars, and robotic surgery, all of which require ultra-low latency and ultra-high reliability. The 5G technology has been invented with the capabilities of high throughput communication, small delay times, ultra reliable, and increased scalability. These capabilities can enable an enormous number of devices, with best quality-of-service and quality-of-experience provision, of ubiquitous connectivity solutions to fulfil their diverse IoT application requirements. 5G has the potential to allow the deployment of more Internet-connected devices without concern that existing issues would be exacerbated by an overcrowded

network. The rapid and dependable availability supported by 5G will make new conceivable outcomes for IoT benefits a long ways beyond those accessible today.

II.EVOLUTION OF MOBILE NETWORK TECHNOLOGY

The step for wireless communication was led by an Italian inventor, G. Marconi by communicating a letter up to distance of 3km (from beginning stage to its goal point) with the assistance of electromagnetic waves. After this commencement, remote communication turned into a significant piece of present styles of living. With the progression of time various changes continue occurring according to the need, which prompted various ages of remote advancements

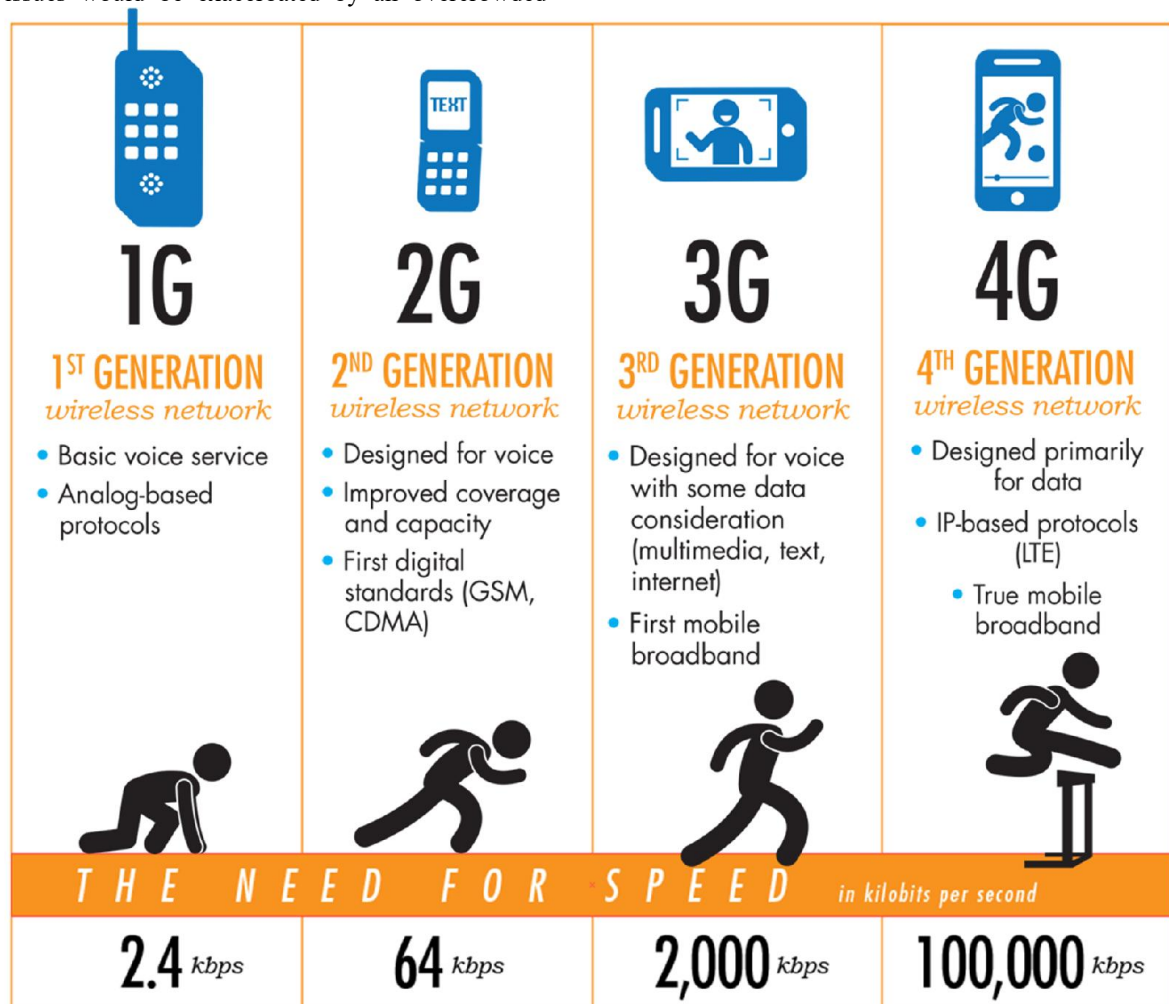


Figure 1: Mobile Evolution 1G, 2G, 3G, 4G, 5G

1G (First Generation):

1st Generation Mobile Network were developed in 1980s and completed by early 1990s. It depended on analogue system. It utilized simple radio sign with recurrence 150MHz and voice call modulation was finished with the assistance of Frequency Division Multiple Access (FDMA). Its speed was up to 2.4 kbps. Its principle highlight was it enables client to make voice calls inside a nation. The major problems with 1G are poor voice quality, poor battery quality, and large phone size.

2G (Second Generation):

It was introduced in 1991. It was based on digital system. It can give you speed up to 64 kbps. Principle services gave are computerized voices and SMS features with greater clarity, utilizing the transfer speed of 30 KHz to 200 KHz. It gave semi worldwide facility. Fundamental famous innovations were GSM and Code Division Multiple Access (CDMA).

3G (Third Generation):

It was introduced between late 1990s and early 2000s. Its transmission speed ranging from 125kbps-2 Mbps. User data are passed through Packet exchanging innovation and circuit exchanging was utilized for interpretation of voice calls. It gives superior voice quality. It additionally gives the facility of Video Conferencing, E-mailing, Online banking-charging, Global Roaming, portable TV and so on.

4G (Fourth Generation):

It was created in 2010. It is quicker and progressively reliable when compared with before systems. Its transmission speed is up to 100Mbps. It gives improved communication system dependent on IP. It gives superior in ease. Long Term Evolution (LTE) is considered as main technology for 4G. Sight and sound Messaging Service (MMS), computerized video broadcasting, High Definition (HD) TV, Video live chat are the services given by 4G along with features of 3G.

5G (Fifth Generation):

It is next coming phase of wireless networks. It provides 10 times more capacity than other existing systems. It expected speed will be more than that of 4G and peak speed exceeding up to 1Gbps. 5G technology is wireless multimedia internet communication operation without limitations supporting WWW. It is more consistent, ultra reliable and very faster in lower cost. It provides high capacity, more computing power, larger phone memory, faster data transmission speed, supports interactive multimedia, etc. 5G is expected to be

launched around 2020, providing pervasive connectivity with 'fiber-like' experience for mobile users. Apart from the expected 10Gbps peak information rate, the significant test for 5G is the monstrous number of connected machines and the 1000x development in mobile. 5G requires short of what one millisecond latency. Huawei and DOCOMO (a Japanese portable system) collaborated in December 2016 to conduct the world's first 5G huge scale field preliminary. Utilizing the 4.5 GHz frequency band, the two organizations recorded information move rates of 11.29 Gbps which is around multiple times quicker and endure shorter slack occasions than the current 4G standard. That speed is critical for autonomous cars, where timely decisions need to be made to avoid crashes. 5G will likewise have the option to transmit video in a split second over long distances, enabling one vehicle to impart live pictures to numerous others.

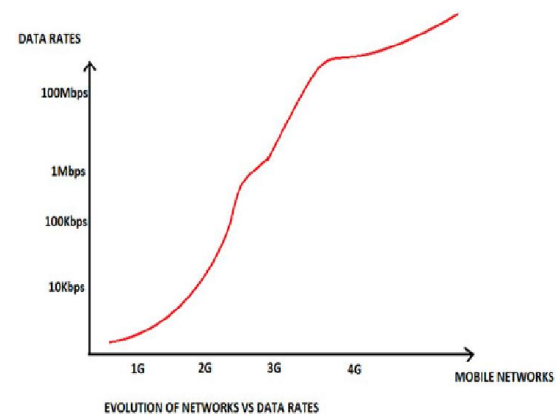


Figure 2: Evolution of Networks vs Data Rates

III. KEY CONCEPTS OF 5G WIRELESS COMMUNICATIONS

- A. Dynamic Adhoc Wireless Network (DAWN), Mobile adhoc network (MANET), Wireless mesh network (WMN) or Wireless power grids, combined with smart antennas and flexible modulation.
- B. Internet Protocol Version6 (IPv6), where a visiting Care of mobile IP address which is unique identity challenge for every individual technology is assigned according to location and connected network.
 - a. High altitude stratospheric platform station (HAPS) systems.

- b. Real wireless world that provide efficient and reliable close-to-commercial services with seamless carrier aggregation that makes it easy to access with no zone issues.
- C. User centric network concept which could offer the best user experience anytime and anywhere instead of operator-centric (as in 3G) or service-centric (as in 4G)
- D. WWW, i.e. mobile network that utilizes wireless data connections web applications that include full graphics, animation and multimedia capability beyond 4G network speed and capacity.

IV. NEED OF 5G MOBILE TECHNOLOGY

A few deformities and inaccessibility of certain properties or functionalities in the current framework turns into the requirement for the advancement of the people to come, so here it is functionalities and ailing in 4G advances. 4G innovation is fundamentally about the joining of various advancements and systems. 4G advances consolidate different existing and future remote advances to guarantee the opportunity of development starting with one innovation then onto the next. 4G can backings 100Mbps information rate in full portability wide zone inclusion and 1Gbps information rate in local area coverage. 4G coordinates all access technologies, services and applications boundlessly to go through remote over wire line using IP address. However, when we talk about 5G, it will bring us a perfect real-world or WWW. The possibility of 5G advancements began from 4G advances. Discussing the working of 4G, in spite of the fact that LTE gives benefits to certain individual's wide scope of powerful remote correspondence innovation. LTE is essentially for use in commercial areas so can't be utilized for making a situation to be utilized by average citizens for downloading reason, video call, and so on. Along these lines, this turned into the principle reason for the advancement of 5G innovation. Other than the various advantages of 4G innovation the most significant idea of 5G innovation is consumer oriented rather than service driven and operator oriented. In this innovation priority is given to buyers when contrasted with other existing mobile advancements. So being user oriented, a few highlights: less expensive traffic charges, security, fast, artificial intelligence (AI), storage, and so on, turned into the purpose behind the advancement of 5G advances. 5G innovation will give high band width. It incorporates every single propelled highlight which will make it most

overwhelming in near future. Significant highlights which lead the advancement of 5G development and development from 4G advancement incorporates complex security landscape, multimode client terminal, decision of choice of the best organize among the different accessible remote communication frameworks, charging and billing, information Encryption, gadget to gadget communication

V. NETWORK ARCHITECTURE OF 5G MOBILE TECHNOLOGY

The model of 5G innovation is completely IP based model for both portable and remote communication. The different segments associated with the design making it exceptionally quick, secure and popular among the clients in everywhere throughout the world are as per the following:

GPRS: General Packet Radio System (GPRS) is essentially a stage created for web access during the third era. It is the initial move towards the end to end wireless communication. It gives information rates from 56Kbps to 114Kbps. It additionally vows to give consistent connection of web to portable and PC clients. It devours relatively less battery during internet access.

EDGE: Enhanced Data GSM Environment (EDGE) gives a transformative way from 3G innovation to GSM and TDMA. It gives most extreme information transmission rate up to 473 Kbps. It is created to build the transmission capacity of GPRS innovation.

3G: 3 Generation (3G) innovations created to get to wireless communication. It gives excellent, cost-effective, wireless multimedia application, more prominent security highlights, video calls/meetings, and upgraded remote application when contrasted with already available services.

WLAN: Wireless Local Area Network (WLAN) gives the facility of remote connection and communication among the gadgets. It uses high frequency radio waves, micro waves, etc. for its functionality. Utilization of WLAN expands portability, profitability, versatility as it gives rapid remote connection.

LTE: LTE stands for Long Term Evolution. LTE works by utilizing all IP network architecture. It bolsters information just as voice communication. LTE supports MIMO (Multiple Input Multiple Output), because of which higher data rate is achieved. As a result LTE is a standard for high speed data transmission for portable networks,

giving a fast up to 100 Mbps. AS it uses improved design, the handoff from one locale to other is smooth. These outcomes in smooth information stream without any intrusion.

VI. NETWORK LAYERS OF 5G MOBILE TECHNOLOGY

The principle focal point of 5G innovation is client portability as the mobile terminals approach distinctive remote advancements at the same time

and can consolidate a few highlights of other organizes likewise thus, at last, chooses the strongest remote network. The idea driving the working of the 5G innovation is clarified as pursues:

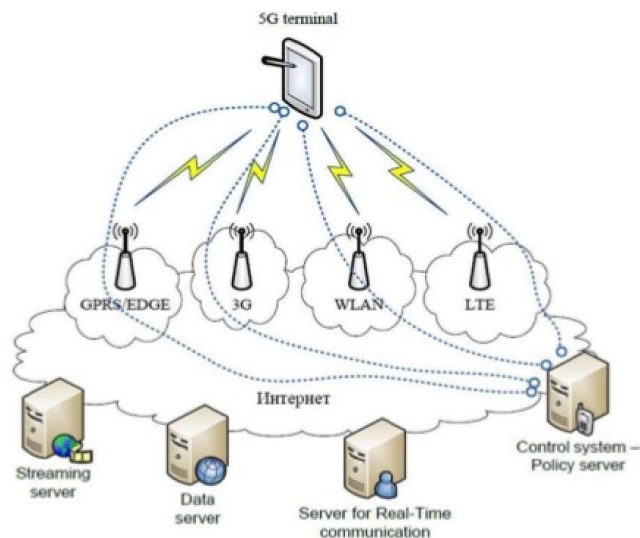


Figure 3: Architecture of 5G

OSI Model	Network Model	Model of 5G Technology
Application Layer		Application(Services)
Presentation Layer		
Session Layer		Open Transport Protocol(OTP)
Transport Layer		
Network Layer		Upper Network Layer
		Lower Network Layer
Data Link Layer(MAC)		Open Wireless Architecture
Physical Layer		

Table 1: Network Layers of OSI and 5G Technology

Physical/Data link Layer: The initial two layers of the OSI model for the 5G innovation depend on Open Wireless Architecture.

Network Layer: The Network Layer is an Internet Protocol (IP). IPV4 (Internet Protocol Version 4) is spread worldwide with certain constraints like restricted location space which are settled in IPV6 (version 6) yet were exchanged with greater packet header. Along these lines, portability still stayed an issue. At that point Mobile IP appeared and 5G innovation will utilize portable IP. Therefore mobile can be joined to a few remote networks all the while. 5G portable system will keep up virtual multi remote networks. For this reason, their falsehoods a detachment in the network layer to shape two sub-layers for 5G cell phones viz. Lower Network Layer and Upper Network Layer.

Open Transport Protocol (OTA) Layer: TCP adjustments are proposed for both remote and mobile networks. The TCP retransmit the lost or harmed TCP portions over remote connections. In 5G it assumes a significant job as its experiences with high installed speed and higher download. These mobiles can sensibly download updated version which is focused on specific remote innovations from the base station. This is here known as Open Transport Protocol (OTA).

Application Layer: An intelligent behavior facility of choosing best remote association out of various systems is given in 5G. Terminals approach quality testing and data storage in this layer. Countless algorithms are utilized for giving the astute behavior to the 5G innovation.

VII. APPLICATIONS

5G can possibly empower on a very basic level new applications, industries, and business models and significantly improve quality of life around the globe by means of phenomenal use cases that require high information rate instantaneous communications, low latency, and enormous availability for new applications for mobile, eHealth, autonomous vehicles, smart cities, brilliant homes, and the IoT.

Automotive:

The likelihood for vehicles to be associated with different vehicles, walkers, roadside infrastructure, or application servers empowers the improvement of numerous progressive services. Vehicles progressively framing a group, driving together, and continuing at a short good ways from one another; sharing driving intentions, sensor information, and recordings accumulated through installed cameras with roadside infrastructure, other vehicles, people on foot and network servers, for security and traffic efficiency applications, just as semi-or completely robotized driving; a remote driver or a V2X application that works a remote vehicle going in risky conditions, with disabled travelers locally available, or open transportation vehicles. It can send an alert to our mobile phone when someone opens our intelligent car. We can be able to lock our car or bike with our 5G mobile device when we forget to do so.

Data Analytics:

5G promises to empower keen network and application services with availability to remote sensors, enormous measures of IoT information and low-latency information transmissions. Big Data analytics will never again be an idea in retrospect, and it will play a huge role in the advancement of 5G principles empowering the intelligence across network, applications and business. It can be able to sense tsunami/earthquake before it happens somewhere.

Emergency Services:

Emergency services depend on the capacity to share mission-critical data among themselves and each other all together appropriately complete their

obligations. These interchanges have customarily been focused around conveying basic voice information. Be that as it may, the appearance of 5G presents a chance to change emergency services communications, empowering them to share a lot more extensive scope of interchanges information. One can almost certainly see his/her home in his/her mobile when somebody enters.

Healthcare:

One can almost certainly feel her child's stroke when he/she is in her mom's belly. One can almost certainly see his/her sugar level with his/her mobile. One can almost certainly charge his/her mobile with his/her own pulse. The mobile will ring as indicated by our temperament. One can most likely know the specific time of his/her child birth that too in nanoseconds.

Smart Cities:

For these brilliant and lively cities, a great deal of information should be gathered and kept up and it must be conceivable with an innovation giving higher speed and bigger capacity contrasted and the past advances. For this reason, there is a need of 5G or something new even after 5G. 5G concept will also help improving energy systems with low cost connections. It is widely used in smart home automation systems.



Figure 4: Applications of 5G in various sectors

VIII. FEATURES OF 5G MOBILE TECHNOLOGY

Fifth generation wireless technology is providing a large number of utility for consumers at highest priority. The fifth generation wireless technology provides a number of features which makes it perfect wireless for real world. It provides higher

bandwidth. It provides high quality services based on policy to avoid error. An advanced billing interface which is more effective and attractive is provided by 5G technology. It provides high resolution and bi-directional large bandwidth shaping. It provides a unified global standard which facilitates service portability and global mobility. It works on lower power consumption. It provides better network coverage. It provides huge broadcasting data with very high connectivity speed of 25Mbps which was never before. It is expected to provide downloading speed up to 1Gbps in LAN. Mobile data traffic of 5G technology makes it more effective accuracy results. Through remote management offered by 5G technology a user can get a better and faster solution. It also provides tools of subscriber supervision for fast action.

PARAMETER	PERFORMANCE (SUGGESTED)
Network Capacity	10000 times current Network
Peak Data Rate	10 Gbps
Cell edge Data Rate	100 Mbps
Latency	<Mbps

Table 2. 5G Wireless Performance

IX. CHALLENGES

The change from 4G to 5G presents a few transformational challenges which must be handled to completely understand the 5G vision. There are challenges faced with the new technologies enabling 5G. There are also challenges with the integration of this technology to provide services in different application scenarios. Some have criticized 5G for its high projected cost and that it is incompatible with the previous generations. Just as 2G phones could not connect to 3G or 4G networks, 3G and 4G phones will not connect to a 5G network. One is compelled to purchase another telephone which is probably going to be more costly than 4G/LTE service. To address these challenges, we need an extreme change in the design of cellular architecture. We likewise need to meet 5G framework execution necessities such as miniature cells, stringent latency, network versatility, exceptionally long battery life, and green communications. It is a test to fulfill these necessities and limit costs simultaneously [13, 14]. 5G is designed to work with diverse application and the complexity which makes major challenges to address. Since 5G is a platform for some remote

innovations to exist together, innovation suppliers need to beat difficulties as far as signal range, transmission protocols, security and system compatibility and so on. Many old machines will not support 5G. The deployment of 5G technologies is just beginning. Wireless industry around the world are striving to be first to market with 5G technologies and services to capture the bulk of the economic benefits from this new technology. Many observers are concerned about the vulnerabilities of 5G networks to exploitation by foreign intelligence services. An individual's ability to use 5G-enabled networks and systems for positive purposes also suggests this same technology can be exploited by foreign intelligence to manipulate perceptions and behavior. The measure of individual data accessible for misuse will extend exponentially with 5G innovation, alongside questions with regards to the security of the systems. This raises concerns among privacy advocates and national security professionals.

A. Integration of various standards: One of the big challenges facing 5G is standardization. There are now numerous groups attempting to think of benchmarks around interoperability, backward compatibility with more established advancements (4G, 3G), and ensuring the system will be future-proof.

B. Common Platform: There is no common architecture for interconnecting various applications. One basic governing body is required, which makes a typical stage for all building practices to regularize the interconnectivity issues just as information sharing. [16]

C. Building the infrastructure: It is a colossal task, with issues around range also, putting in new reception apparatuses. 5G is likely going to depend, at any rate to some extent, on higher-frequency bands. There is more space in those wireless transmissions accessible, however at such high frequencies, signals can't travel so far as they can over the frequencies utilized for 4G, bringing about a poor connection.

D. Obstacles: Like structures, trees and even awful climate can likewise cause obstruction. To counterbalance that, transporters should introduce increasingly base stations to guarantee better inclusion, and use reception apparatus innovations like MIMO.

X. CONCLUSION

The design of the 5G innovation is an open stage on various layers, from physical to application layer. The current work of 5G innovation is engaged upon providing determined administrations with WWW functionalities in least cost regularly, keeping the customers happy. There is lot more to come, which is definitely going to change the lifestyles of the societies. As 5G is only a step behind to arrive in Indian market with inexpensive rates, much reliability and will take connectivity speed and global mobility to new heights. The 5G wireless technology is going to deployed completely by 2020. As we have examined earlier the aim of 5G is to revolutionize general health care, public security, transportation, brilliant homes, and savvy traffic system and so on. Truth be told, by 2020 communication will occur in a constant as a result of the information rates which are relied upon to be conveyed by 5G and due to 5G, latency rate will be roughly limited to 2ms. On the off chance that we truly need to get the most extreme advantages for people, at that point asset being utilized and gadgets which may be utilized for the usage of 5G, it ought to be made conceivable that maintainable and natural well-disposed assets may be utilized.

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DATA PACKET SIZE OPTIMIZATION IN WIRELESS SENSOR NETWORKS

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Abstract—Wireless Sensor Networks (WSNs) comprising of battery-powered sensor nodes are being used in a wide range of applications. The feasibility of such applications is very influenced by the longevity of those networks. In this work, we present a sensible WSN lifetime optimization framework where transmission power levels for both data and ACK packets are optimally selected (i.e., an entire link-layer handshaking cycle is modeled). Log-normal shadowing path loss model is used to require under consideration the consequences of path losses. We utilized the developed Mixed Integer Programming (MIP) based optimization framework to research the impact of knowledge packet length on WSN lifetime. To quantify the consequences of knowledge packet length on network lifetime we explored the parameter space consisting of the amount of nodes and node deployment density. Our results show that the optimal data packet length is that the maximum allowed length.

Keywords – Wireless Sensor Networks; Network Lifetime; Energy Efficiency; Packet Size Optimization; Mixed Integer Programming

I. INTRODUCTION

A wireless sensor network (WSN), typically, consists of a base station and a multitude of spatially distributed sensor nodes to monitor real-world phenomena such as temperature, sound, pressure. Sensor nodes are composed of a limited energy source, usually a battery. Hence, WSNs should be designed to prolong the lifetime. To maximize network lifetime, sensor nodes are obliged to cooperate in forwarding data towards the base station and dissipate their energies in a balanced fashion so that premature death of any node due to over-utilization of its energy is avoided, hence, the lifetime of the WSN is maximized.

Data packet length optimization is one among the potential areas for lifetime maximization in WSNs and there are several studies on packet length optimization for WSNs within the literature. It is argued that higher rate of packet errors are more likely for extended packets which results in higher frequency of retransmissions. On the other hand, shorter packet lengths result in lower retransmission rates. The research shows that utilizing variable packet length scheme will increase the channel throughput, but on the other hand WSNs will ultimately suffer from the overhead of resource management.

Determination of the fixed optimal packet length for maximization of energy efficiency is studied in. For a set of radio and channel parameters, the effects of error control on the packet length optimization for energy efficiency is also explored. It is shown that forward error correction can

improve energy efficiency and retransmission schemes are not energy inefficient. Optimizations are made to increase battery-powered wireless sensor network by reducing internode interference. It is also shown that the use of optimal packet length significantly reduces energy dissipation.

A packet length control technique using variable sized packets based on channel condition is proposed. If channel is noisy (i.e., the channel is congested due to heavy traffic), shorter packets are generated. While in a quiet channel, (i.e., it's almost idle) it will generate larger sized packets. Hence the proposed scheme enhances overall throughput and efficiency.

Though the literature is rich on packet optimization and network lifetime, in these studies, either the packet losses due to bit errors are not taken into account and/or handshaking mechanism is not considered properly. For example, failure probability of a handshake is taken as a constant for all of the links for a given network node density which is a misleading assumption because even if the distances between all node pairs are constant the path losses will not be the same (i.e., the path loss under the assumption of log-normal shadowing includes a random term which varies from link to link). Furthermore, packet failure rates are not necessarily the same for data and acknowledgement (ACK) packets. Contrary to other studies, our model studies transmission power level optimized WSNs without ignoring packet losses which vary from link to link due to channel errors that can affect both data.

Our system model is elaborated, assumptions are stated, a succinct background on mathematical programming is provided, and the developed Mixed Integer Programming (MIP) model is presented in Section II. Numerical analysis to explore the parameter space and to compare the performances of the proposed strategies are provided in Section III. Section IV provides our concluding remarks.

II. SYSTEM MODEL

Increasing the packet length decreases the ratio of overhead to the payload, therefore, it can increase the network lifetime. However, longer packets are more likely to be corrupted due to the higher probability of packet error. On the other hand, shorter packets are less prone to failure, yet, the ratio of overhead bits to the payload bits is also lower for shorter packets. Furthermore, the number of data packets to transport the same amount of data bits is higher when the maximum packet length is shorter. Hence, there are multiple

mechanisms working in opposite directions, concurrently. To assess the net impact of packet length selection on WSN lifetime, we utilize an MIP framework for our quantitative analysis.

A. Overview

We consider a WSN consisting of a base station and multiple sensor nodes deployed uniformly to cover the WSN deployment domain. Sensor nodes convey collected data to nodes (multi-hop). Time is organized into equal timed rounds of duration 60 seconds ($T_{rnd} = 60$ seconds). In each round, node-1 generates number of packets. Data exchange between each successful transmission is replied with an ACK packet by the receiver. Nodes can select transmission power levels from a finite set for both data and ACK packets. The objective of our problem is to maximize the network lifetime that is the duration between the time network starts operating and the time when the first sensor node in the network exhausts all its energy.

B. Assumptions

Following assumptions are valid throughout this work:

- 1) The network consists of stationary nodes.
- 2) The base station has the complete topology information (e.g., path losses on each link) and sufficiently high processing and energy resources to perform the necessary computation for data flow planning in a centralized manner.
- 3) All nodes are roughly time synchronized.
- 4) Network reorganization period for a typical WSN is sufficiently long, therefore, the energy costs of topology discovery and route creation operations constitute a small fraction (e.g., less than 1.0%) of the total network energy dissipation.
- 5) A TDMA-based MAC layer is in operation which mitigates interference between active links through a time slot assignment algorithm which outputs a conflict-free transmission schedule.
- 6) Path loss for each link can be measured by a closed loop power control mechanism and we assume that such a mechanism is in effect for our system.
- 7) Generated data packets at sensor nodes are treated as atomic data units that cannot be fragmented or aggregated at any relay node.

C. link layer Model

We employed Mica2 motes' energy dissipation characteristics to model energy dissipation of sensor nodes. Mica2 motes are equipped with a At Mega 128L processor and a CC1000 transceiver, they are the most heavily utilized sensor nodes in experimental WSN research due to their well-characterized energy dissipation properties. Power consumption of the transceiver and the corresponding output antenna power for Mica2 motes are presented.

D. Background on Mathematical Programming:

Before presenting the MIP model for packet length we provide a brief background mathematical programming motivating the use of MI in our model. Mathematical programming models, both linear programming LP and MIP are used to find the best solution considering a given set of constraints which characterize the set of legitimate decisions. Alternative decisions are compared based on their objective function values.

Although they are used for the same reason, LP and MIP models cannot be used in place of each other in many occasions. Hence, they should not be considered as alternatives. For example in our model introduced shortly, flk variable indicates the number of data packets, therefore, it should take an integer value. As a result, we can say that this type of mathematical model to be used depends on the type of decisions to be made, which leads to an MIP model for our problem.

LP models whose variables take continuous values are relatively easier. This is due to the special geometry of the set of feasible solutions of LPs.

The vertices of the feasible set are defined by the constraints of the model and it is known that, given a nonempty feasible set, there is always a vertex solution which is optimal.

Unfortunately, MIP models do not have such a property in general and hence call for more advanced solution algorithms such as branch-and-bound, branch-and-cut. These methods guaranteeing an optimal solution are called exact solution methods.

Then, if an integer variable has a fractional value in the current solution, then the problem is divided into two sub problems by setting that variable's value to the closest integer values. Then the new problems are solved recursively in the same manner until the optimal solution is found. This basic method can be improved and fastened by incorporating problem specific information in the sub problem creation step.

Providing a comprehensive overview of published research on modeling WSNs through mathematical programming is beyond the scope.

E. MIP FRAMEWORK

In this section, we present the MIP framework used to maximize WSN lifetime. Our network topology is represented by a directed graph, $G = (V, A)$, where V denotes the set of all nodes including the base station as node-1. We also define set W which includes all nodes except node-1 (i.e., $W = V - 1$). $A = (I, j) : I \in W, j \in V$ is the ordered set of arcs.

Note that the definition of A implies j transmitted at power level- l and acknowledged at power level- k is represented as flk . The objective function to be maximized is the network

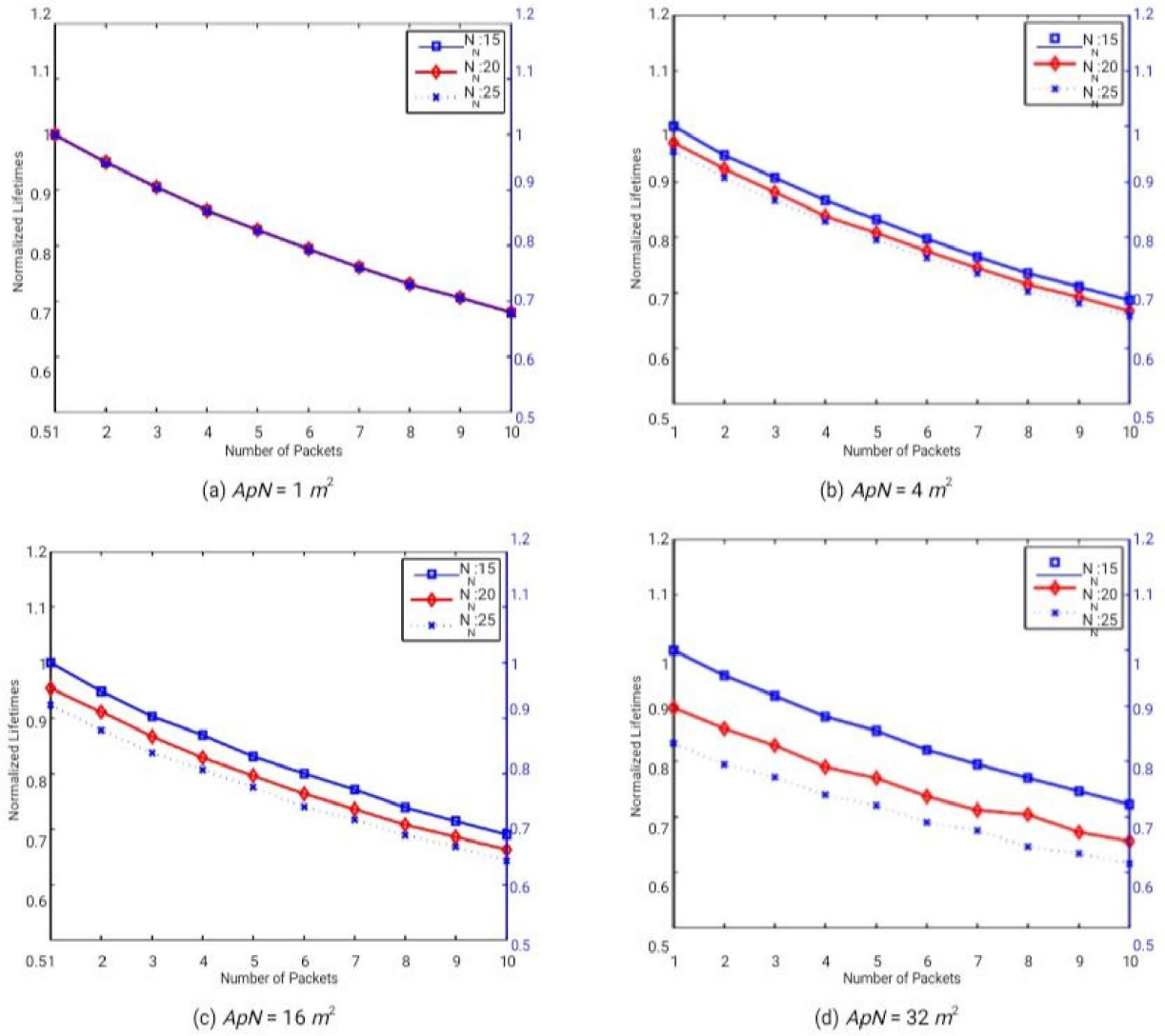


Figure 1: Network lifetimes wrt. number of packets generated at each round (s) for various N_w and ApN values.

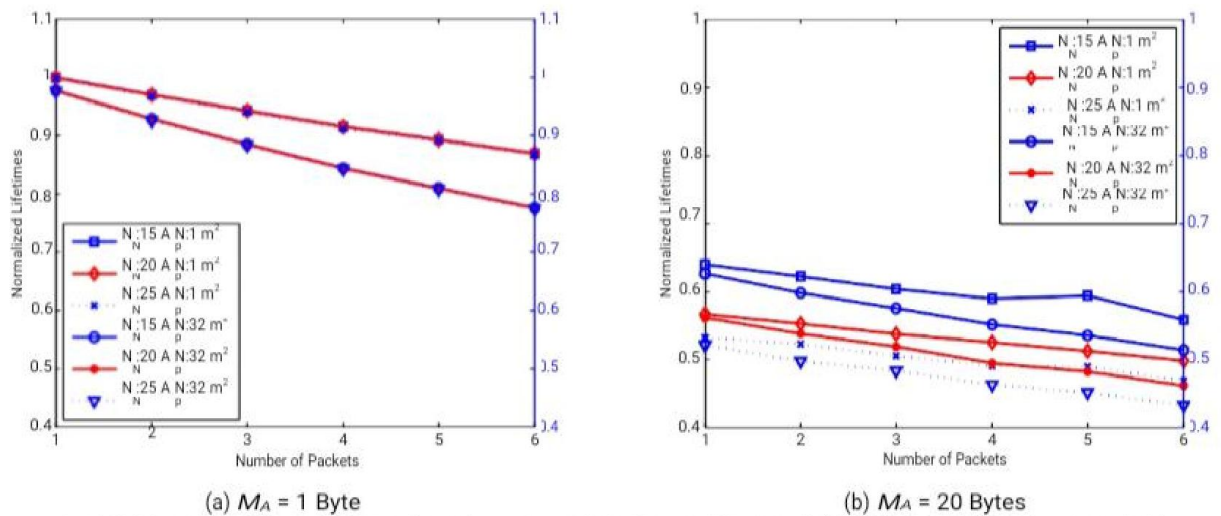


Figure 2: Network lifetimes wrt. number of packets generated at each round (s) for two different ACK packet sizes with various N_w and ApN values.

and the round duration.

Bandwidth constraint (i.e., bandwidth required to transmit and receive at each node is less than or equal to total bandwidth and the duration of all incoming and outgoing flows of all nodes is upper bounded by the total network lifetime).

III. ANALYSIS

In this section we explore the parameters space by numerical evaluations of the developed MIP model. We use a disk shaped network and the base station is at the center of the disk. Nodes are deployed uniformly by using the best known disk packing.

MATLAB is used to construct the Data link layer (Section II-C) and General Algebraic Modeling System (GAMS) with CPLEX solver for the optimization problems (Section II-E). The results presented in Figure 1 and 2 are the averages of 100 random runs. Each sensor node generates 1024 Bytes of raw data at each round to be conveyed to the base station.

Generated data is divided into several packets to observe the effects of packet length on network lifetime.

The reason for such behavior is that the impact of transmission is higher for sparser networks. Nevertheless, the main observation is that the network lifetime decreases at time.

We also investigate the effects of energy dissipation for ACK packet transmission. Actually, the question we seek the answer for is what the impact of energy dissipation on ACK packets on energy dissipation is. In Figure 2, ACK packet sizes are chosen as 1 Byte (a hypothetical case) and 20 Bytes, respectively. For these figures normalization is achieved by dividing the values in both figures with the largest value in Figure 2a. The general trend in both figures is that the network lifetime decreases as the packet size gets larger. There are some data points that violate the monotonic decrease of the normalized network lifetime as a function of decreasing data packet length due to insufficient statistical averaging, however, these anomalies are rare. Therefore, we ruled out the fact that ACK packet energy dissipation is the dominant term in energy overhead because otherwise the trend in network lifetime decrease for decreasing data packet length would manifest itself in other form (i.e., the fact that normalized network lifetime decreases as the data packet length decreases is evident for both short and long ACK packet lengths scenarios).

In our model which is based on actual measurements with Mica2 motes, the only way to increase the bit error rate (BER) is to increase the distance between nodes. By utilizing a wide range of ApN values we explored the effects of BER. Yet, we do not employ very sparse WSN deployments (i.e., $ApN > 36$ m2) in our analysis because WSN lifetime decreases sharply (e.g., network lifetimes with $MP = 1044$ Bytes, $MA = 20$ Bytes, and $NN = 25$ are 2.0 106 and 106 for $ApN = 1$ m2 and $ApN = 36$ m2, respectively)

As the network gates very sparse and the main philosophy in WSN design is against highly sparse deployment of sensor nodes.

IV. CONCLUSION

We investigate the tradeoff in determining the data packet length for WSN lifetime maximization by considering the whole link layer handshake cycle. In fact, we developed an MIP framework that accounts for almost all major sources energy dissipation in practical WSN platforms to assess the data packet optimization problem under realistic assumptions. The main conclusion of this study is that for maximizing WSN lifetime. It is preferable to utilize the maximum allowable packet length otherwise maximum possible network lifetime is not achievable (e.g., using ten packets to transport 1024 Bytes of data results in more than 30 % lifetime decrease when compared to using a single packet).

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DEEP LEARNING FRAMEWORKS FOR PATIENT HEALTH MONITORING SYSTEM

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ABSTRACT

Health monitoring services are targeted towards creating, designing with novel research initiatives and implementing in the hospital domain. We implement a health monitoring system which measures the heartbeat, temperature, respiratory rate using sensors. The patient live data's are continuously sent to the hospital monitoring system (cloud). The patient's health condition is updated to the hospital and suitable preparations have been taken by the hospital to treat the patient. Then any parameter reaches the threshold value, the threshold button blinks and the location of the patient is shared to the ambulance through the hospital. Wellbeing parts of person should be observed with most extreme consideration and must be treated with suitable medications. A few infections can be decreased by proactive observing of one's wellbeing.

Keywords: *Deep Learning, Artificial Intelligence, Threshold, Cloud*

1. INTRODUCTION

In this work, the mechanism has been developed to monitor the patients and the old people health condition by their family as well as the hospital when they are at home. Health monitoring already takes place in home for prevention and in hospital for

continuous assessment. It has become a crucial need for patients to provide quality of care at home too.

In the previous approach, when there was no concept of IOT, physicians need to visit the patient's ward or home for necessary diagnosis and advising. After that, patient monitoring system using Internet of Things has been introduced. Many unfortunate accidents take place inside the home for the older age peoples. Due to this, Public health monitoring system is needed to monitor the old people health status continuously. This approach requires a simple paradigm. Also this approach includes a smart ambulance mechanism which is used for traffic and collision avoidance. Due to heavy traffic, the ambulance has to move on step by step very slowly as this situation is a difficult one for the patient at a serious condition. So the mechanism has to be developed to monitor the health condition of old people, patients and the people whom are very weak in home continuously. And also an additional ambulance mechanism has to be developed to avoid traffic.

The other phase of this paper is for avoiding the traffic near the signal. The patient inside the ambulance may be in critical condition and any mishap can occur while moving slowly in the traffic near the traffic signals. So, an ambulance mechanism is needed to clear the traffic

near the signals. The aim of the paper is to design and construction of a hand cuff with various sensors used for monitoring the old people's health parameters and to upload it to the cloud in which all hospitals are connected.

The paper was divided into two phases. The First phase is to demonstrate the application of hand cuff having temperature, heartbeat, respiratory and MEMS sensor. The second phase of the project attempts ambulance mechanism to avoid traffic near the signal

2. PROBLEM STATEMENT

When there was no concept of Internet of Things and E-Health, physicians need to visit the patient's ward or home for necessary diagnosis and advising. Due to which, the healthcare physician must be present on the patient's side all the time to cure properly and the patient remains admitted in a hospital for a period. In the domain of healthcare of Internet of Things, the patient will not need to make as many trips to their physician anymore.

Nowadays, patient monitoring system at home requires some large hardware components to measure patient's health parameters. Some old people may have heart attack, stroke or fix when they are alone at home. Those old people health parameters need to be monitored.

Also, an ambulance mechanism is needed to avoid traffic and collision, while the person who is critical inside the ambulance. Some deaths occur while crossing the traffic signal due to heavy traffic.

3. PROPOSED SYSTEM

The system model that represents the Internet of Things based Health monitoring system and Traffic and Collision avoidance mechanism used in this work are given below in figure . Each section is explained separately as follows. The aim of the project is to design and construction of an arm cuff used for monitoring the health parameters of the patient and old people. Traffic and collision avoidance mechanism

used are used to pass through the traffic without any delay.

The paper was divided into two phases. The First phase is to demonstrate the arm cuff with three sensors, an ADC and a Node MCU which uploads the health parameters to the cloud. The second phase of the project attempts controlling Traffic module and collision avoidance. Temperature sensor, Heartbeat sensor, MEMS sensor and an Analog to Digital converter are interfaced to Node micro controller using I2c protocol, microcontroller receives the data from three sensor and process it according to the data from the sensor appliances are operated.

The arm cuff is attached to the arm of the patient and the sensors measure the heartbeat, body temperature and MEMS value. These data's in analog form are converted into digital data which is given to the Node MCU (Node Micro Controller Unit).

The Node MCU uploads the digital data to the THINGSPEAK cloud according to the network speed . Each hospital computer systems are connected to the THINGSPEAK cloud. Threshold value has been set in the cloud for each parameter.

If the parameter rate is greater than the threshold value, the danger button will blinks and the patient location is shared through NODE MCU to the hospital via cloud and the hospital sends the location of the patient via message. After that the map in the channel shows the location of the individual who is in danger.

The hospital monitoring station sends the location of the individual to the ambulance driver through a message with a link. The ambulance driver clicks the link and it shows the shortest route to reach the individual location.

3.1 Block Diagram

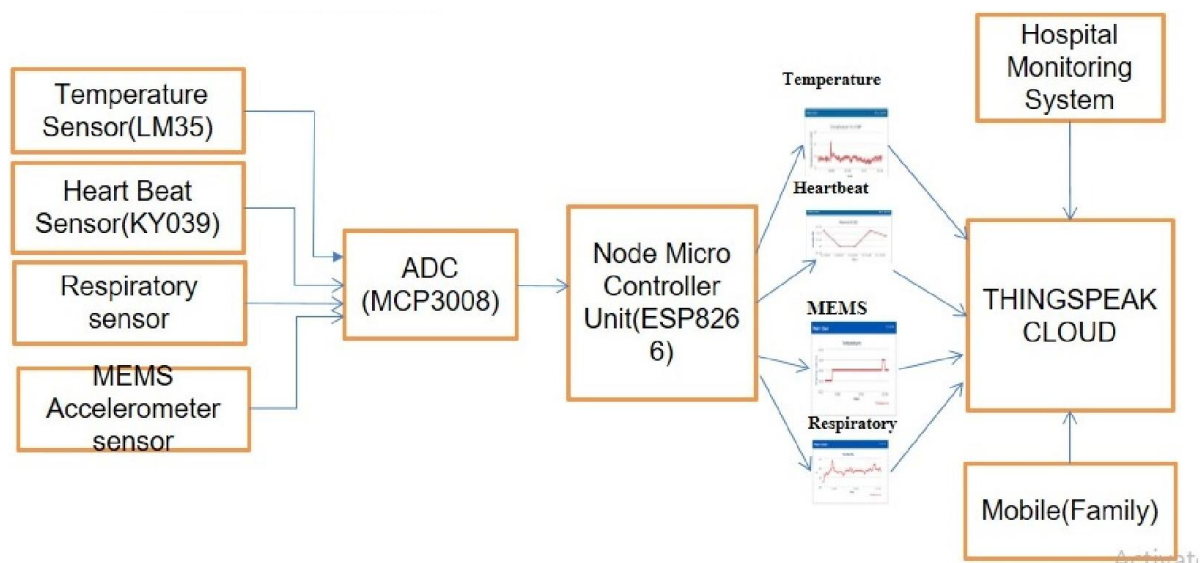


Figure 1: Block Diagram of Proposed System

The Proposed system consists of following sensors and modules 1. NODE MCU Micro Controller 2. ECG 3. GSM/GPRS Module 4. Temperature sensor 5. Heartbeat sensor 6. Body Movement Sensor 7. MEMS Sensor.

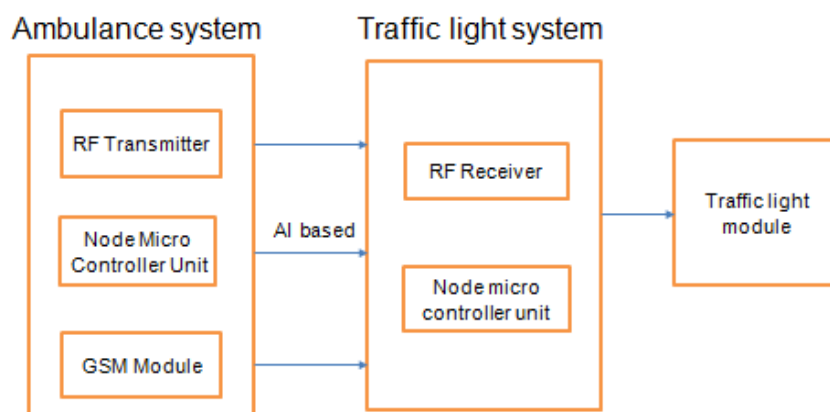


Figure 2: Ambulance Unit and Traffic Unit

NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT products. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266.

MCU stands for MicroController Unit - which really means it is a computer on a single chip. A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. They are used to automate automobile engine control, implantable medical devices, remote controls, office machines, appliances, power tools, toys etc.

3.2 KEIL SOFTWARE

Keil is a cross compiler. So first we have to understand the concept of compilers and cross compilers. After then we shall learn how to work with keil.

3.2.1 Concept of compiler:

Compilers are programs used to convert a High Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors. I.E the programs written in one of the HLL like 'C' will compile the code to run on the system for a particular processor

like x86 (underlying microprocessor in the computer). For example compilers for Dos platform is different from the Compilers for Unix platform

The advantage of interpreters is that they can execute a program immediately. Secondly programs produced by compilers run much faster than the same programs executed by an interpreter. However compilers require some time before an executable program emerges. Now as compilers translate source code into object code, which is unique for each type of computer, many compilers are available for the same language

4. RESULTS AND DISCUSSION

4.1 THINGSPEAK SETUP

ThingSpeak gives an excellent device to Internet-based tasks. Utilizing

ThingSpeak, we can stream our information and control our online framework utilizing the channels and website pages given by ThingSpeak. ThingSpeak "gathers" sensor information, "separating and picturing" information and "activities" by animating the response.

Figure 3: Channel Formation

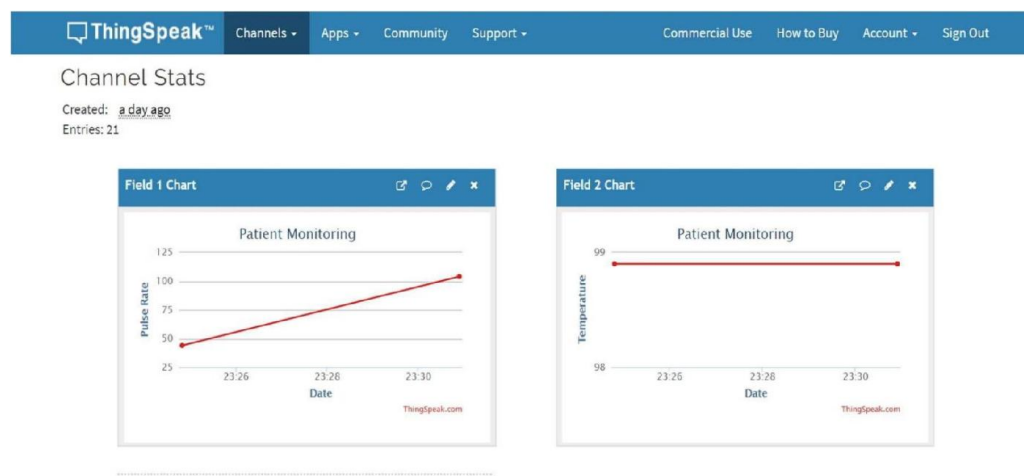


Figure 4: Channel Status**5. CONCLUSION**

The proposed system is useful for critical patient issues it monitors status of the patient health care in terms of temperature and heart bit. System found very useful for emergency treatment of patient during transportation as expert doctors are connected to the system. It provides transportation unit information and as well as patient health information, which is useful in further emergency treatment for doctors. It uses Visual basic software at PC in monitoring system to display location of ambulance by using Google map and displaying SMS. After receiving SMS hospital can prepare their staff for proper treatment of coming patient.

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INTELLIGENT ROBOT SYSTEM FOR DISASTER MANAGEMENT

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Abstract-In this project, increasing climatic change is leading to a greater numbers of natural disasters. Natural disasters affect human life in unexpected ways. Finding victims at a disaster site is the primary goal of search and rescue operations. We can never be fully prepared for what is happen. In this project, we devise a robot that can help people in cases of disaster management and prevention. The robot will successfully be able to detect the presence of humans in disaster places or in regions where it is difficult and time consuming for people to reach during rescue operations. To detect human beings, sensors such as PIR sensor and microphone can be embedded on rescue robot. Human being produces heat which is detected using this sensor. The drawback of these sensors is detection range. These sensors have to be in close proximity to the victim in order to detect it. UWB technology is then very helpful to ensure precise localization of the rescue robot inside the disaster side and detect the human being.

Keywords-PIR Sensor,natural disaster,UWB Technology

1. INTRODUCTION

Many people are killed annually and many others are disables in disasters across various parts of the world.At disaster areas, the usage of the robot teams for the purpose of victim detection and rescue became , very popular research area.

It is important to prepare measures for both pre and post disaster to ensure safety and peace of mind to public as well as to environment.In recent years automation and robots have been applied at different domains to coordinate.Collaborative behavior in distributed system and providing a powerful basis for proactive applications of complex nature.They must gather the location information and status of victims and the stability of the structures as

quickly.It is very essential to have a robot during disaster conditions like earthquake or bombblast ,where we have to identify live human beings as quickly as possible to save life.

The main objective in order to accomplish tasks would require as to localize the humans from the disaster areas.The design of the robot consists of a 'Human detection module' carried by a mobile robot platform sufficiently small enough to wander around the area and carry out its search activity.As passive Infrared sensor detects the Infrared rays emitted by the human body,it will be received by the PIR Sensor and Grid eye sensor overcome the limitations of the PIR sensor by detecting the human at stationary position. The robot will be also equipped with a camera to transmit live video, of the disaster location, to rescue team so that false alerts maybe omitted and a visual contact with the victim would be executed. Ultra-wide band (UWB) is a radio- based communication technology for short-range use and fast and stable transmission of data.

2. METHODOLOGY

The undertaking proposes a portable salvage robot that moves in the catastrophe, earthquake region and aides in recognizing the live individuals, harmed individuals, and salvage framework activities. Consequently due to the on auspicious identification in common disasters this can spare valuable life and extraordinary misfortune even without the assistance of extensive number of salvage administrators. The proposed framework comprises of a portable salvage robot, and mobile control. The mobile rescue robot consists of four units that are namely Sensor unit, Micro-controller, Motor driver unit, Transmission unit. The sensor unit must be directly interfaced to the

micro-controller. The sensor devices monitor current readings and sends data to the Micro-controller. The controller circuit is responsible for transmitting this information. Controllers are designed at hardware level. These data's are updated by the PC/APP so that rescue team can view the real time readings. The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core. As of 2013 the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno and Arduino Nano models. The microcontroller is used to gather the data from the sensor unit in real time and transfer the corresponding information data to the CPU of control room. It also receives commands from the app and transfers it to the robot unit for its movement. The microcontroller is the core of the surveillance robot. A sensor (also called detector) is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Four sensors are used in the project. They are ultrasonic sensor, Gas sensor, Temperature sensor and PIR (Passive Infra-Red) sensor. The real-time values observe by the sensors are transmitted to a ATmega328. This data information provide by sensor helps in having good knowledge about the environment in disaster area.

The robot driver unit is primarily concerned about the movement of the robot in x-axis and y-axis. The robot is of conveyor belt type as it helps to maneuver over debris and rugged terrain. Four DC motors of 100rpm will run the wheels of mobile rescue robot. When the wheels are given with positive pulse edge, then robot will moves in forward direction. When the supply is reversed mean the wheels are given with negative pulse edge, then it goes in backward direction and similarly by varying the negative and positive edge, left and right turn can be achieved successfully. The selection of supply given to each motor, L298N is used. This will drive the robot to move in forward, reverse and turn left and right. The transmission unit is used to transmit data. Transmission unit i.e Bluetooth module is mounted on the mobile robot unit; its function is to get information data from the micro-controller and transmitting it to the receiver.

Software and Hardware Requirements

- Arduino UNO
- LCD display
- RF transmitter & receiver
- Encoder & decoder
- Amplifier
- PIR sensor
- Grid-eye sensor
- Driver circuit

- Relay

3. ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures microcontrollers. "UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The UNO board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform, for an extensive list of current, past or outdated boards see the Arduino index of boards.

4. PASSIVE INFRARED SENSORS (PIR)

Passive Infrared sensors (PIR sensors) are electronic devices which measure infrared light radiating from objects in the field of view. PIR's are rent motion is detected when an infrared emitting source with one temperature often used in the construction of PIR-based motion detectors, see below. Aperture, such as a human body, passes in front of a source with another temperature, such as a wall. All objects emit infrared radiation; see black body radiation. This radiation (energy) is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term 'passive' in this instance means the PIR does not emit any energy of any type but merely sits 'passive' accepting infrared energy through the front of the sensor, known as the sensor face. At the core of a PIR is a solid state sensor or set of sensors, with approximately 1/4 inch square area. The sensor areas are made from a pyroelectric material. The actual sensor on the chip is made from natural or artificial pyroelectric materials, usually in the form of a thin film, out of gallium nitride (GaN), caesium nitrate (CsNO₃), polyvinyl fluorides, derivatives of phenylpyrazine, and cobalt phthalocyanine. (See pyroelectric crystals.) Lithium tantalite (LiTaO₃) is a crystal exhibiting both piezoelectric and pyroelectric properties. The sensor is often manufactured as part of an integrated circuit and may be comprised of one (1), two (2) or four (4) 'pixels' comprised of equal areas of the pyroelectric material. Pairs of the sensor pixels may be wired as opposite inputs to a differential amplifier. In such a configuration, the PIR measurements cancel each other so that the average

temperature of the field of view is removed from the electrical signal; an increase of IR energy across the entire sensor is self-cancelling and will not trigger the device. This allows the device to resist false indications of change in the event of being exposed to flashes of light or field-wide illumination. (Continuous bright light could still saturate the sensor materials and render the sensor unable to register further information.) At the same time, this differential arrangement minimizes common-mode interference; this allows the device to resist triggering due to nearby electric fields. However, a differential pair of sensors cannot measure temperature in that configuration and therefore this configuration is specialised for motion detectors.

Grid-Eye Sensor: The grid-eye sensor can detect temperature distribution in a two-dimensional area without contact. It works in tandem with software to identify the number and position of people based on their body temperature, outputting a thermal data image and recognizes where appropriate distancing or density is or isn't maintained.

UWB(Ultra-Wideband Technology): Ultra-wideband(UWB) is a radio-based communication technology for short-range use and fast and stable transmission of data. The main thing is, its unrivaled precision, transmission speed and reliability, UWB is often the technology of choice for indoor localization of moving assets in complex and space-sensitive environments.

5. WORKING

The main objective of this project is Human Detection Robot is a robot that can detect the presence of human; it sends the signal from the transmitter side to the receiver side and notifies it to the user by continuous buzz. Robot can move in all direction to increase the space of detection. The robot is automated to move in left, right, forward and backward directions based on the obstacles it encounters. In these days there are lot of robberies happening, so we need more security. The security system commonly used is ordinary surveillance camera it provides visual images but the ordinary surveillance camera cannot notify the user instantly about unauthorized presence. To overcome robbery and to notify the user as quickly as possible we developed a robot that can detect human. As the robot can detect the human it is named Human Detection Robot. This robot can be used in stores, banks, etc. to provide security after hours. It can also be used in earthquake areas to find victims and also in army to detect the opponent. The Receiver Side consists of ATMEGA328 microcontroller (Arduino Uno). Its input and output are Radio frequency receiver and a buzzer respectively. Once the signal from the transmitter is received by the RF receiver it notifies the Arduino. Arduino in turn sends a signal to the buzzer, which triggers the buzzer to produce continuous beeps.

This continuous beep indicates that there is a presence of a human to the user.

6. RESULT AND DISCUSSION

A new revolutionary sensitive life-detection system using PIR Sensor for locating human subjects under earthquake rubble or hidden behind various barriers has been constructed. The mode is selected through a micro-switch which is connected to the input pin of the microcontroller. A hardware prototype of the infrared life detection system has been developed and experimental results show that the proposed method is an efficient method which not only detects life signals but also the identification of people in a given area, to facilitate rescue team operations in case of any emergencies.

Future Advancement

The Robot can be modified further by attaching a visual camera with HOG algorithm.

If the robot is attached with SONAR(Sound navigation and ranging) it can determine the distance between the human and can detect the IR image of the object.

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AUTOMATIC UPDATION OF ELECTROMAGNETIC BILL AND UNIT CONSUMPTION USING SMART GADGETS

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Abstract— Today technology has changed across the world in a way human interact with the physical world. Internet of Things has paved the way for us allowing us to insert technology into day to day physical objects. In this paper an Energy Meter with Smart Monitoring of Home Appliances based on the Internet of Things is built. This paper proposes a system which eliminates manpower by self-regulating meter readings and bill generation reducing the flaws which are one of the major cause for energy-related corruption. The demand for transparency in the domain of energy estimation has emerged as there isn't a verification facility. Arduino Mega 2560 is used as the central controlling unit in this system. For energy meter, the ZMPT101B voltage sensor and ACS712 current sensor are interfaced with a microcontroller. The readings of voltage, current, the power consumed, no. of units and the corresponding price are calculated and are displayed over the 16*2 LCD Display module. An Infra-red based flame sensor is used as a fire safety measure. Monitoring of home appliances is done by using an 8 channel relay module to which loads are connected and operated over voice commands using Google Assistant with IFTTT (If this then that) platform which is interfaced with IoT based Blynk app on mobile. A DHT11 sensor is used for monitoring the temperature and humidity inside the house. All the readings obtained from the sensor is sent over the ESP8266 Wi-Fi module to Thingspeak cloud storage.

Keywords— *ESP8266 WiFi-Module, Arduino Mega 2560, IoT, Blynk, IFTTT, Thingspeak, Energy Meter, Google assistant*

I. INTRODUCTION

Today, technology is being implemented into everyday physical objects. With the advancement in it we are capable of teaching objects to respond to our presence, motion and other automatic physiological behavior. At present, there are many methods of energy metering. from recent works, there have been overall two types of metering systems, one is by counting the blinks of the LED present in the conventional meter and the other one is by measuring the actual voltage and current usage. The proposed a system using an LED counting method creating the server-controlled interface for the

electricity board where the service provider can control and monitor the service supply . Consumers an interface by IoT platform (Thingspeak) where they can see their daily consumption of energy and also if there is any breach in their supply . System giving SMS for everyday consumption is developed by the first type metering method . Consumer interfacing on the mobile app is introduced . It used the LED counting method for the unit measurements . The prepaid as well as post-paid energy meter is proposed .. It added an ARM controller to the conventional meter for the surveillance of the supply of electricity. we created a webpage and mobile app for interfacing with consumers where they can monitor the power usage from their home. The second method for measurement of energy consumption is by directly taking the values of current and voltage and then power consumption is calculated. built a web server for the service provider from where they can manage their services . we had uploaded the calculated power usage data which can be interfaced by webpage as well as the mobile app .we created a prepaid type of energy meter using current and voltage sensors [9]. Using the same method of measurement we created an energy meter that gives the consumer all data/history of the usage over the webserver on the IoT platform . we designed a device that monitors electricity consumption for a particular appliance . In a system, smart home automation is built which uses advanced features such as IoT based blynk application on mobile for easy and user-friendly applications. The smart way is proposed for carrying out home automation in an energy-efficient manner . A voice-controlled home automation system using NLP (natural language processing) is implemented for controlling home appliances both automatically and remotely . Kinect sensor-based voice-operated automation system is built with user-friendly features . In we. have implemented a wireless home automation system with people counter.

II. SYSTEM ARCHITECTURE

We many times come across the word Internet of Things. IoT is capable of interfacing various sensors, devices and people enabling a free-flowing connection between humans and machine. As a forward step in IoT devices, we propose an IoT based energy meter with smart monitoring of home appliances. This system uses Arduino Mega 2560 microcontroller as the main controlling unit. The functions of this project are of two types i.e. an energy meter with digital display and monitoring of home appliances using IoT. For energy meter the microcontroller is interfaced with a voltage sensor (ZMPT101B) and a current sensor (ACS712). The values are noted and the units are measured with the corresponding values and thus price is calculated. As a fire safety measure, a flame sensor is being introduced with a relay. It is used in case of a short circuit or any mishap. The output obtained is shown on the 16*2 LCD module. The readings collected is sent to the cloud storage (Thingspeak) over Wi-fi, where it is recorded and analyzed in graphical form. Monitoring of the home appliances is accomplished by interfacing the 8-channel relay module to Arduino Mega. Loads are connected to the relay module and are operated via voice commands using Google Assistant with IoT based Blynk app through mobile over Wi-Fi. A humidity and temperature sensor is interfaced for noting and monitoring the room temperature. Fig.1 depicts the structure diagram.

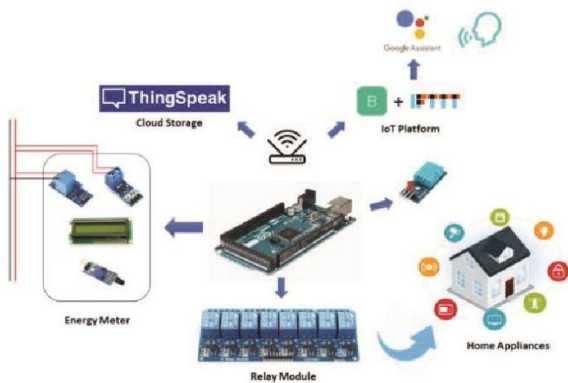


Fig. 1. Schematic Overview Structure of the proposed system

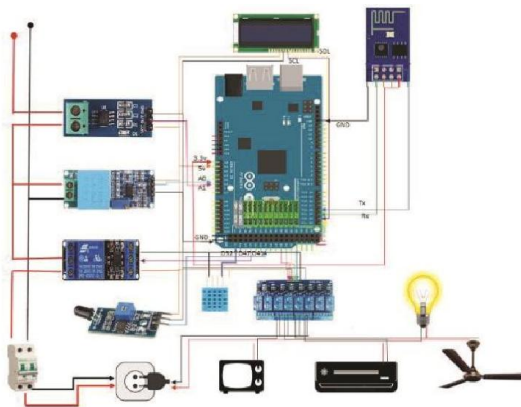


Fig. 2. Circuit Structure

III. WORKING FLOW

The system is capable of performing two functions i.e. as an energy meter and monitoring of home appliances at the same

time with a single source code uploaded on the microcontroller. Fig.2 shows the circuit arrangement.

A. The System when used as an energy meter device

The Arduino Mega 2560 is given its working power (5V) and it is interfaced with ZMPT101B voltage sensor calibrated to measure voltage up to 250V along with ACS712 current sensor sensing up to 30A of current. The mainline wires are connected to the sensors and the readings from voltage and current sensors are noted on the serial monitor. The number of units and the price is calculated by:-

$$\text{Power (kilowatts)} = (\text{Vrms} * \text{Irms}) / 1000$$

$$\text{Units} = \text{Power} * (3/3600)$$

$$\text{Rupees} = \text{Units} * 6.77$$

The output is shown on the LCD module and the output collected is sent over the Wi-Fi module to Thingspeak cloud storage where it is observed, analyzed and represented in a graphical manner. An infrared-radiation based flame sensor module is used here as the fire safety device. The mainline is operated via a single channel relay. When a fire is detected the main flow is switched off. Fig.3 shows the flowchart.

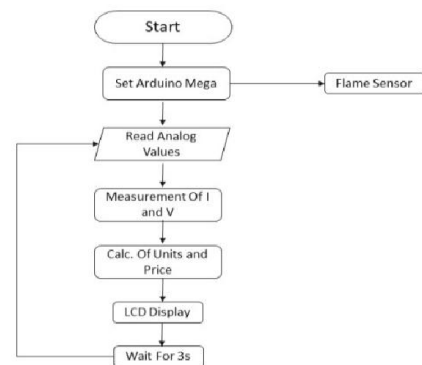


Fig. 3. Flowchart for smart energy metering.

B. The system used for home appliances

The Arduino Mega is interfaced with the 8-channel relay module which is an electromechanical switch used to monitor loads with high power. A DHT11 sensor is connected to monitor the room temperature and humidity present. Various loads like lightbulbs, fans, T.V., air coolers, etc. are operated by the Blynk app on mobile. It is connected to the micro-controller over the ESP8266 Wi-Fi module. Users can operate the devices by giving voice commands using Google Assistant with the IFTTT web platform. The flowchart describes the process in Fig.4.

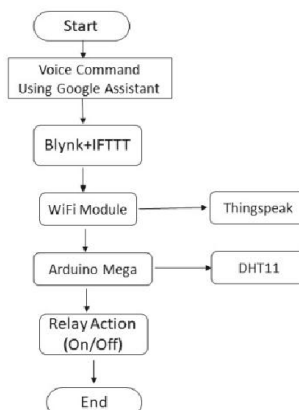


Fig. 4. Flowchart for Home Monitoring

IV. SYSTEM HARDWARE AND SOFTWARE

A. Arduino Mega 2560

It is an ATmega 2560 based micro-controller. In the given system it acts as the main control unit. Arduino Mega is one of the microcontrollers from the Arduino family which is specially designed for projects with more storage space and complex circuitry. The micro-controller is incorporated with 54 digital pins, 16 analog pins, 16 MHz frequency of crystal oscillator. As it comes with a greater number of pins, it is convenient to embed various parametric sensors of both digital and analog nature in large IoT based devices. The microcontroller used here comes handy with Arduino IDE software and also can work with other operating systems like RTX and FreeRTOS. Fig. 5 shows the Arduino mega.

B. Relay module

The system proposed here uses a separate electromechanical device for remote switching which can be controlled by the lower voltages. It follows the principle of electromechanical attraction. All the loads (household appliances) are connected to the relay module which is interfaced with the microcontroller. Fig.6 shows the relay module used.

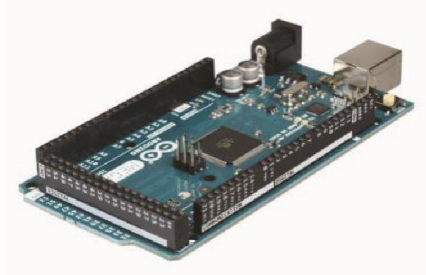


Fig. 5. Arduino Mega 2560



Fig. 6. Relay Module

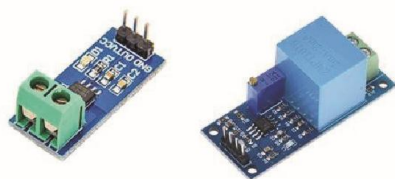


Fig. 7. Current and Voltage Sensor



Fig. 8. Flame and DHT11 sensor



Fig. 9. 16*2 LCD Display



Fig. 10. ESP8266 WiFi module

C. Current and Voltage Sensor

The proposed system uses the voltage and current sensors for calibrating the number of units consumed. Here we have used ZMPT101B voltage sensor. It is based on a high precision voltage transformer with accurate AC voltage measurements. It is a light weighted sensor module and can measure up to 250 volts. Its supply voltage varies from 5V to 30V with operating temperatures from 40°C to 70°C.

The current sensor used here is ACS712. Based on the Hall effect principle it uses ACS712 IC to measure current. Here we have used the ACS712 IC which measures current up to 30A. Both of the sensors are interfaced with the analog pins of the Arduino Mega. Fig.7 shows the sensors used.

D. Flame sensor

To detect fire flames an infra-red radiation-based flame sensor is used as a measure of fire safety. It is incorporated with a YG 1006 NPN phototransistor (black LED mounted on top of the module). The pinout of the sensors has one digital output pin, ground and Vcc.

E. DHT11 Sensor

It is a humidity and temperature measuring sensor which has a heat-sensing range of 0°C to 50°C with 2°C error and humidity range from 20-80% with 5% accuracy. It is incorporated with a thermistor and a capacitive (humidity)sensor. It is a digital sensor with low cost, embedded with various microcontroller boards. Fig.8 shows the flame sensor and the DHT11 module.

F. 16*2 LCD

A liquid crystal display is used in the system for displaying the voltage value, current sensor value, units and price. A 16*2 electronic display is a low-cost optical device with 16 pins. It has 32 characters with each character of 5*8-pixel dots. HD44780 IC on the LCD gets command data from MCU. Fig.9 shows the LCD.

G. WiFi Module- ESP8266

Manufactured by Espressif Systems it is a Wi-Fi module which aids in IoT embedded applications. It comes with 2.4GHz Wi-Fi employing 32-bit RISC CPU based on the Tensilica xtensa L106. It is incorporated with 64kb RAM (instructions), 96kb data RAM and 64kb boot RAM and is widely used as it is a low-cost standalone wireless transceiver. See Fig. 10 for the wifi module used.

H. IoT and Software Platform

The Arduino Mega 2560 is programmed on the software platform Arduino IDE. The code for the working system is compiled and uploaded on the micro-controller. The proposed system is assisted with an IoT based application called Blynk. It is an application that is interfaced with the microcontroller over the internet which helps us to operate devices on our mobile phone. It has various types of widgets on its dashboard. Fig.11 shows the Blynk and IFTTT interface. Data from

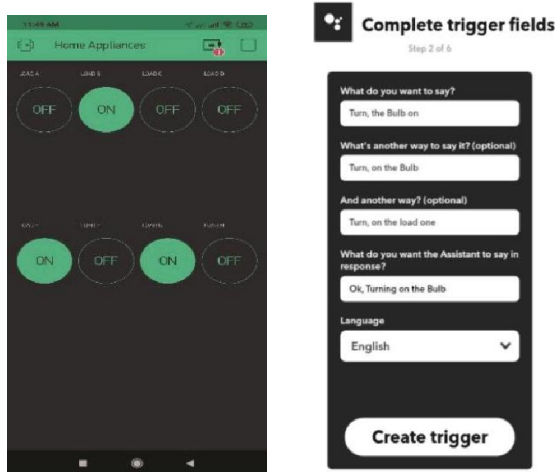
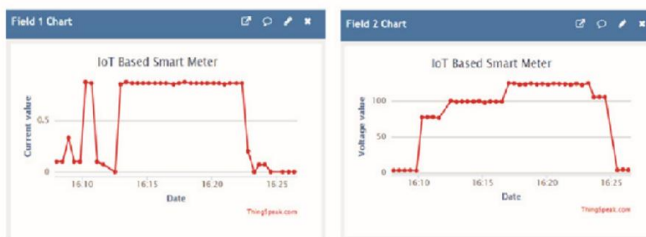


Fig. 11. Blynk and IFTTT interface



the various sensors are sent to the cloud storage over a Wi-Fi network using a cloud platform, Thingspeak. By creating a channel on the platform, the data collected is represented graphically.

Fig. 12. Results for Current and Voltage sensor

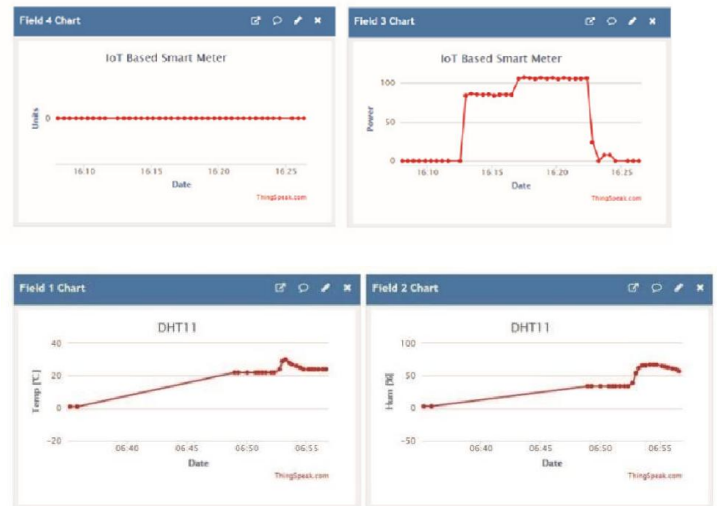


Fig. 14. Results for Temperature and humidity(Dht11)

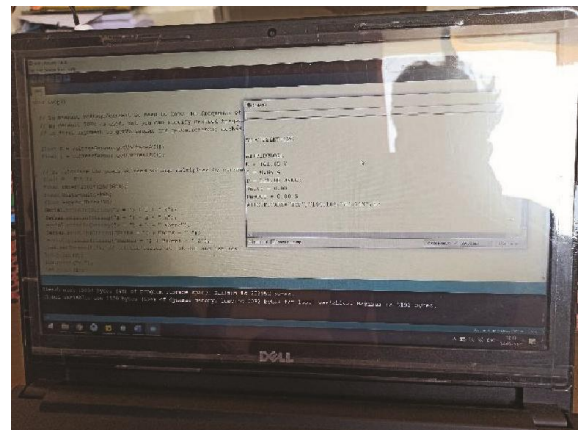


Fig. 15. Readings on Serial Monitor

I.

Fig. 13. Results for No. of Units and Power Consumed

IV. RESULTS AND DISCUSSION

Quite significant results are obtained after checking the working of the system. The readings of the current and voltage sensor along with the consumed units and prices are obtained on the output screen of the Arduino IDE platform. Values were displayed on the 16*2 LCD module. The cycle was repeated with a delay of 3 seconds. Graphical analysis of the data obtained is represented on the Thingspeak cloud storage platform sent over a Wi-Fi network. Fig. 12,13,14 shows the graphical results. The home appliances are monitored both by the Google Assistant voice command feature and also the IoT based Blynk app on the mobile device. Both of the features are worked over by the Wi-Fi network (ESP8266 module) and are aided in increasing the user-friendly ability of the device. Fig. 15 shows the output on the serial monitor.

As of whole, the performance and working of the system are well monitored with proper significant output and also it aids in less power consumption with safety measures.

The Arduino Mega 2560 based Energy Meter and Smart Home Appliance Monitoring System are built which is an energy-efficient system accomplishing two functions with a common microcontroller board. Also, the microcontroller used in this system allows more computer interfacing of other devices and is well connected over the ESP8266 Wi-Fi network. From the obtained results we get an overview of the working system proposed.

In future many more advanced features can be incorporated on the device as of consisting of the webserver by the electricity authorities for storing the data, taking necessary steps against electricity theft and also providing many more services in a convenient and faster way.

ACKNOWLEDGMENT

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MIND WAVE OF COMMAND THE DEVICE USING EEG BASED BLINK TALK METHOD

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ABSTRACT-We represent a real time method, EEG based on some blink talk algorithms for eye blink detection. The motivation of this research is the need of disabling who cannot communicate with human. Finally, an eye blinking detection based on eyelids state (close or open) is used for controlling android mobile phones. This method is used with and without smoothing filter to show the improvement of detection accuracy. The application is used in real time for studying the effect of light and distance between the eyes and the mobile device in order to evaluate the accuracy detection and overall accuracy of the system. Test results show that our proposed method provides a 98% overall accuracy and 100% detection accuracy for a distance of 35 cm and an artificial light. Hence, the proposed system makes wonder in such cases. Another reason for developing this system is to create a highly confidential communication system to communicate either in military or any other place where two people want to communicate secretly without knowledge of third person.

Keyword-BrainComputerInterface (BCI), Eye blink
Electroencephalography (EEG).

I. INTRODUCTION

Communication is a basic need for people to interact and express their thoughts and also, we take our ability to communicate easily with others. But there are millions of patients who survive for years with no power to express. They struggle every day to communicate the simplest things to their families or caregivers. Even with an absolutely alert mind, they are at the mercy of others. Accepting what they receive with no power to express. But with a paralysed body there is one part that doesn't betray most patients till the every end. "The eyes" in this proposal so, we try to assigned simple messages commonly needed by patients to basic combinations of eye movements.

We created sets of eye actions using the 8 alphabets of the eye language – Shut, Blink, Left, Right, Up, Down, Roll and Wink. Using the power of eye we proposed a method that is" blink talk "to solve this problem with Blink. To speak the world's first eye

language for patients who have an alert mind but a paralysed body. With Blink to Speak, patients are now able to express their needs and desires. Starting with basic action likes Yes or No. I'm okay they can easily learn the language depending on their health condition. With a simple 1 Wink they can ask their family to talk to them. And with 1 Left Wink, 1 Right Wink, 2 Blinks, they can say 'Thank You' to their doctor. They can even notify their family about any think they want food, medicine, water etc and sometimes they can feel are in danger or in emergency time they needed some help from others what are time they need someone help they just BLINKING eye by using eye movement based on some keywords we designed for patient's . We read the patient Brain waves by using EEG device in the form of headset or glass through that device the virtual keyboard type the patient needed thinks using their eye movements based and then after virtual keyboard words is converted into text format message through mobile phones and we can get message from our Mobile. So, we can easily understand the patient needed and we can easily communicate to patient at anytime in a friendly manner.

II. LITERATURE

It may also occur due to accidents which lead to loss of communication [1] in people. Latest research in the United States of America shows more than a million people suffering with such kind of problems. Multiple technologies are existing to develop the communication in patient such as mouth actuated joysticks, tongue movement analysis, switch mounted near user's head, actuated breathe puffing straws, etc [2]. Medical ailments like brain stroke, paralysis may result in speech disorders [3]. The Brain Computer Interface (BCI) is one of the communication channels used to make an interaction between human brain and digital computer. BCI monitors EEG waves from the Brain. EEG –Electroencephalography device analyse the electrical property of the brain over the Scalp (Non-invasive). The Neuro Sky mind wave

mobile measures intentionally directed EMG activity (blink strength)

[5-7]. Recent innovative technology brought in an increasing proportion of hardware to the growing market for buyers of wireless, wearable single-channel, and multichannel electroencephalography (EEG) devices; given their miniature size and reduced price, such devices may be used regularly by individuals [9]. The traditional high-quality multichannel EEG devices are commonly used in medical or research fields in hospitals and laboratories, allowing clinicians and researchers to assess neural signatures in the patients and control different functions such as motor, sensory, and cognition [10].

III. PROPOSED SYSTEM

The proposed project aims to bring out a solution for the physically helpless people without any harm to their body externally or internally. It overweighs the previously developed prototypes in this field because none of the components are in direct contact with the patient's body hence it definitely will prove to be safer.

The system is so simple that even an illiterate can operate the user interface. The operation of this system does not need any assistance, a brief detail of each blink and its corresponding responses need to be explained. There is no much hardware requirement needed for the execution, a system with the IR sensor is sufficient. The system after detecting the eye, starts focusing on the voluntary blinks the patient/user does.

Each blink is linked with certain task such as, on blinking once the need for assistance task is assigned, on blinking twice it indicates that the patient needs water, on blinking thrice it indicates the patient needs to use washroom and so on. Upon detecting the blink the system via sends a message to the specified number of the care taker and also calls to that specific number of the call taker where in a voice message is given to the care taker regarding the desire of the patient

Cost effective: The main objective of developing algorithm of a real time image processing is that to provide cost effective for those people who cannot afford. The existing technique for such patients to communicate is too costly. Thus, it is necessary to

design a system which is affordable to common people which includes cost effective components for designing.

Fast: There are few algorithms which are developed for blink talk method for communication. The main objective of this project is to develop an algorithm which is extremely fast compared to the existing ones.

Accuracy: The main objective of this project is to develop an algorithm which is more accurate compared to the existing ones

V. CONCLUSION AND FUTURE SCOPE

The EEG device analysis the brain wave and the eye glass is initiated the user face starts streaming on the display screen. Blink detection algorithm captures the eye blinking and detects the face. Eye aspect ratio is estimated based on which voluntary and involuntary blinks are differentiated. If any voluntary blinks are detected, count of the blinks is used to identify the task. Then, voice message via call and text message is sent to the caretaker about task given for particular count of blinks.

We can conclude that, our proposed system is helpful for the motor neuron disease (MND) patients and also many physically disabled people who cannot speak and can only use their eye to communicate with people. Though it is difficult for a system to analyze the blinks due to low lighting or fast movement of the patient's head or eye, our system is more accurate than the other proposed systems. This system is also less expensive so that every common man gets served by this system according to their needs. An alarm can be set when the caretaker fail to attend the call or miss to view the message. This alarm will alert the caretaker and they can respond it immediately. Another improvisation can be of setting the IOT devices. An IOT device can be set in a way such that the patient is able to operate light switch and regulate the fan with the help of blinks

TABLE 1: OUTPUT DISPLAY

which will reduce the work of caretaker and also patient feels independent.

EYE BLINKS	EEG READING (micro volt)	MSG COMMAND	GSM MODULE
1/2.5 sec	610 – 623	-	-
2/2.5 sec	624 – 628	Need water	-
3/2.5 sec	629 – 635	Need food	-
4/2.5 sec	636 – 655	Need medicine	-
More than 4 times	657 - 664	Come here	Voice call

VI. ADVANTAGES

- Easy and smart usage: This helps the common man to use the system with ease. Like the patient not be conscious all the time and is comfortable.
- Cost: The proposed system is less expensive and available to common people.
- It is comfortable and not painful.
- Patient's needs conveyed more effectively and efficiently.

VII. APPLICATIONS

- The system enables the patients to communicate with caretaker using blinks which are interpreted as voice messages.
- Face to Face Communication: This system helps patients to communicate easily with others.
- Hospitals: It can be used in hospitals for serving patients as it is applicable to MND patients

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PERFORMANCE ENHANCEMENT IN HYBRID ENERGY STORAGE MICROGRID SYSTEM USING ANIS CONTROLLER

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Abstract— In is paper proposes a novel control method for a Hybrid Energy Storage System (HESS) to avoid the negative impacts of ILC harmonic control. They are utilized as HESSs to supply low and high power frequency loads, respectively. The suggested approach compensates the ILC-imposed current oscillation using HESS fuzzy control. This technique uses a PR controller with a Harmonic Compensator (HC) to regulate the ILC to improve power quality and eliminate oscillatory currents. The suggested approach reduces DG power fluctuations and improves grid power quality under nonlinear load and transition circumstances. Simulation investigations in the isolated and grid-connected modes validate the suggested method's performance. MATLAB software environment

Keywords— *Hybrid energy storage, Interlinking converter, Microgrid, Nonlinear load*

1. INTRODUCTION

Wind turbines, photovoltaic (PV) arrays, fuel cells, dc loads, and energy storage components are increasingly being connected to distribution networks in a more systematic manner.[1, 2]. Achieve complete controllability for power exchange, power quality and reliability improvement, voltage regulation and other functions using ILC. The MG voltage at the PCC may be distorted due to increasing nonlinear loads such as diode rectifiers and variable-speed ac motor drives. Large nonlinear loads need costly passive or active power filters to reduce harmonic content, allowing ILCs to efficiently suppress harmonic currents imposed by nonlinear loads. In MGs and distribution networks, ILCs can enhance voltage stability [3, 4], compensate for voltage imbalance [5, 6], reduce flicker [7], and compensate for harmonics [8-10]. As nonlinear loads increase in distribution systems, ILC harmonic compensation becomes more essential. Harmonic correction may be done locally or remotely. Compensation for oscillatory loads in power systems and islanded MGs was widely studied.

[12, 13] provide a thorough overview of ILC harmonic correction techniques. Inverters have been utilized to compensate for harmonics in hybrid MGs [14]. [14] proposes two virtual impedance-based harmonics control strategies that use a feedback controller and a delay to enhance power quality in the distribution network. These control methods do not use closed-loop feedback and therefore are suitable for ILCs with low switching frequencies. It is suggested in [15] to use nonlinear current regulation to correct for harmonics and inter-harmonics. So even with nonlinear and unbalanced loads, the control technique provides pure sinusoidal currents to the grid. [16] Proposes a load current feed forward loop for ILC control to enhance grid current quality under nonlinear local loads. [17] Presents an integrated control scheme for load current back propagation technique for DGs that works both grid-tied and islanded. When ILCs are employed to compensate Second harmonic currents are generated by harmonic or asymmetrical loads are produced [18]. Harmonic, unequal 3-phase, and 1-phase loads introduce oscillating currents onto the direct current bus of Micro grid or Distributed generation When renewable energy sources such as solar, wind, and energy storage devices are connected to the dc grid, the OCC causes troubles. Some of the issues include: In addition to reducing battery lifetime, oscillatory currents also reduce power converter efficiency, decrease the lifetime of the FC and increase the amount of fuel used [20].

2. Control Design

Control of the Load current in a harmonic manner creates many issues which HESSs can solve. A representation of the under investigation system is shown in Figure 1

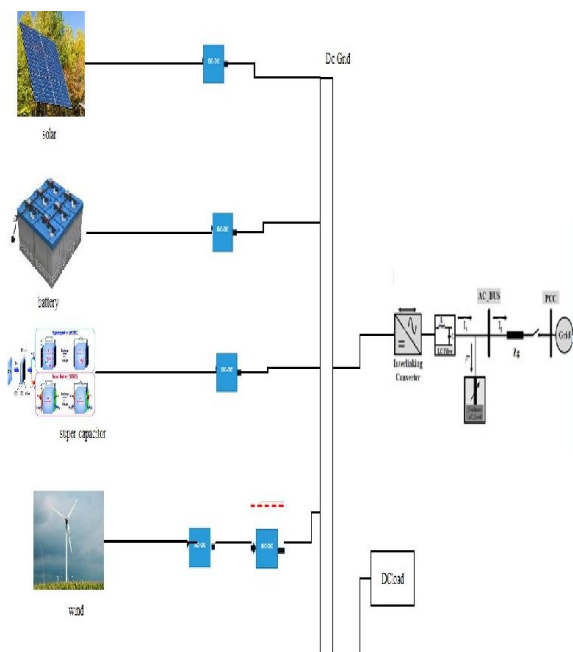


Figure 1

3. SIMULATION RESULTS

3.1 Hybrid energy storage systems connected [HESS]

Ongoing research on HESS-connected mode. The upper control system may determine the reference power. HPS is connected to the grid, and a quadratic load is connected to the Point of common coupling causing harmonics to be produced in the HPS. Harmonics must be corrected by the Load current in order for this to happen. supplied and received grid currents are sinusoidal. Figure 9 displays the dc-link voltage (a). The suggested technique kept the voltage fluctuations below acceptable limits. On the battery current in Figure 9(b). Until $t=0.4s$, the generating power exceeds the ILC's set point power, charging the battery. At $T=0.5$ sec the battery is drained by decreasing solar radiation. Using the suggested approach, battery current is completely smooth. Figure 9 depicts the SC current (c). When the non-linear load is connected to the Point of common coupling the HPS current includes oscillating harmonics from the SC. Figure 10 depicts PCC voltage (a). The PCC voltage is sinusoidal and distortion-free. Figure 10 displays the ILC current (b). The ILC absorbs most of the nonlinear load's harmonic currents. Figure 11 shows network currents with and without harmonics correction. The decrease in harmonics makes the sinusoidality of the current. As observed, the grid current is low harmonic, while the HPS supplies the nonlinear load current.

Hybrid Storages with PI/FUZZY+PI:

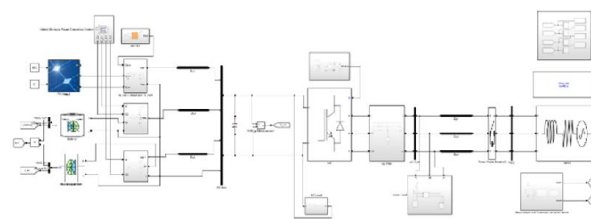
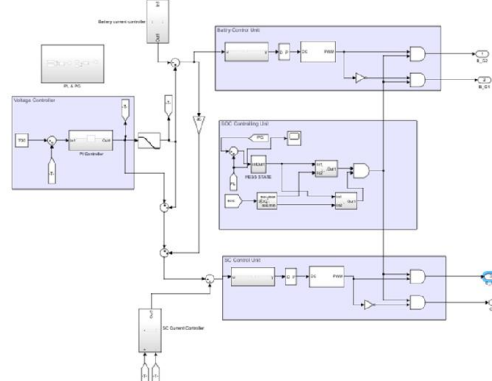


Figure 2: ILC control



Proposed strategy for hybrid storages power converters control

Figure 3 Battery Storage with FUZZY+PI:

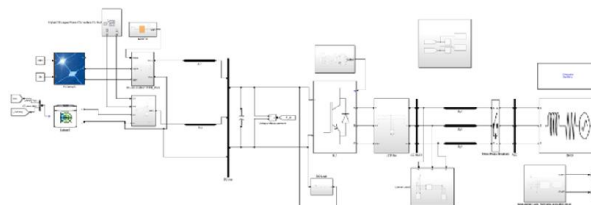


Figure 4

Battery Storage and Wind turbine with ANFIS control:

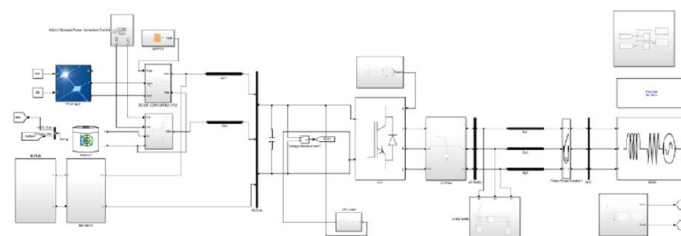


Figure 5

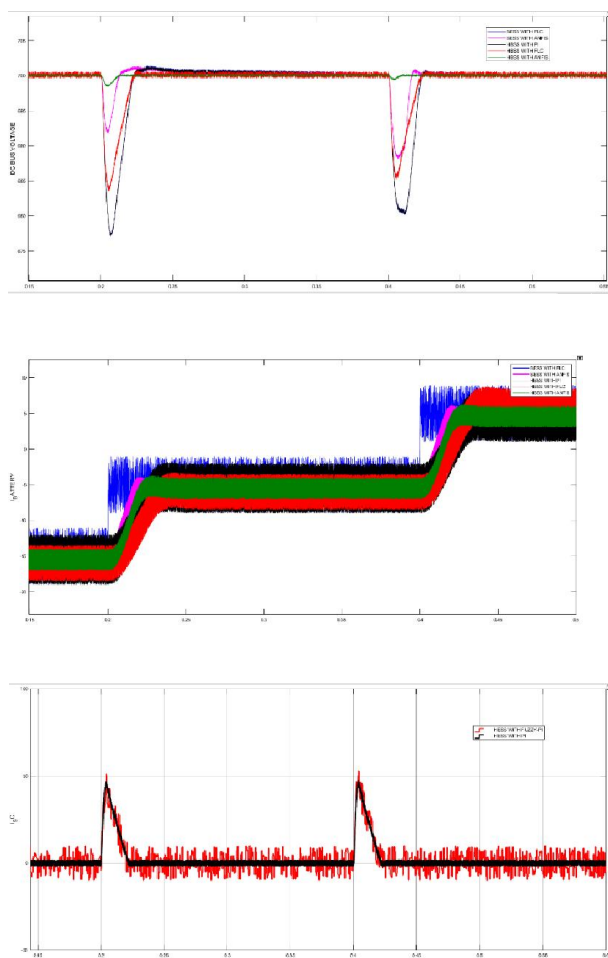


Figure 6. Simulation results for the isolated mode and linear load condition, (a) DC link voltage, (b) battery current, (c) SC current, (d) ILC current

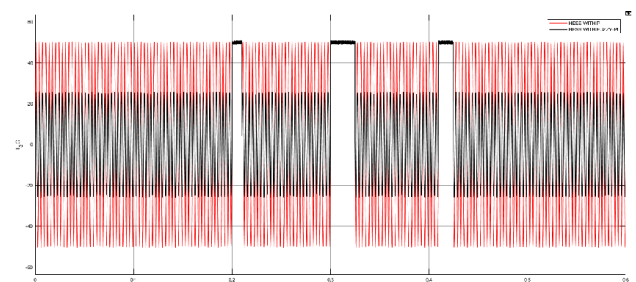
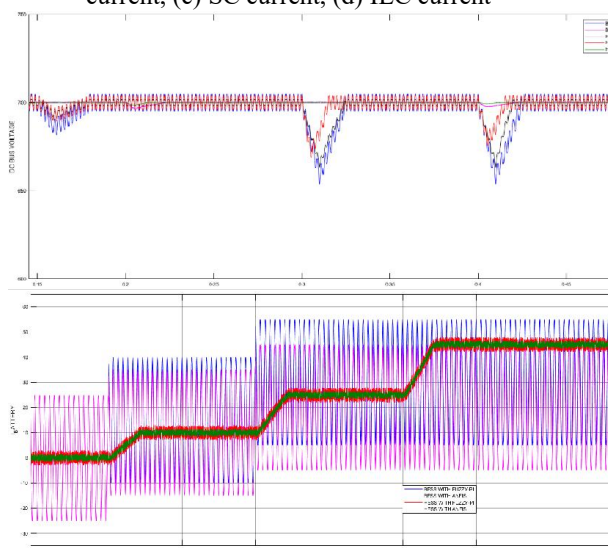


Figure 7. Isolated mode and nonlinear load condition, (a) DC link voltage, (b) battery current, (c) SC current

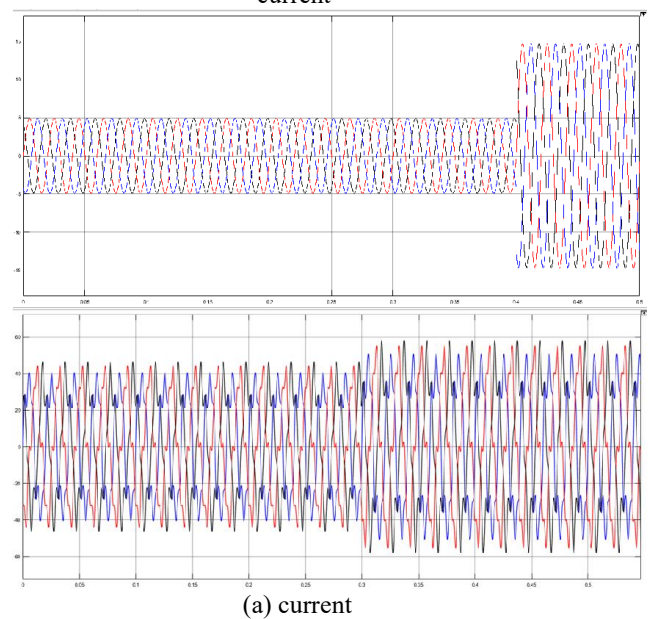


Figure 8. AC bus voltage and current under nonlinear load condition

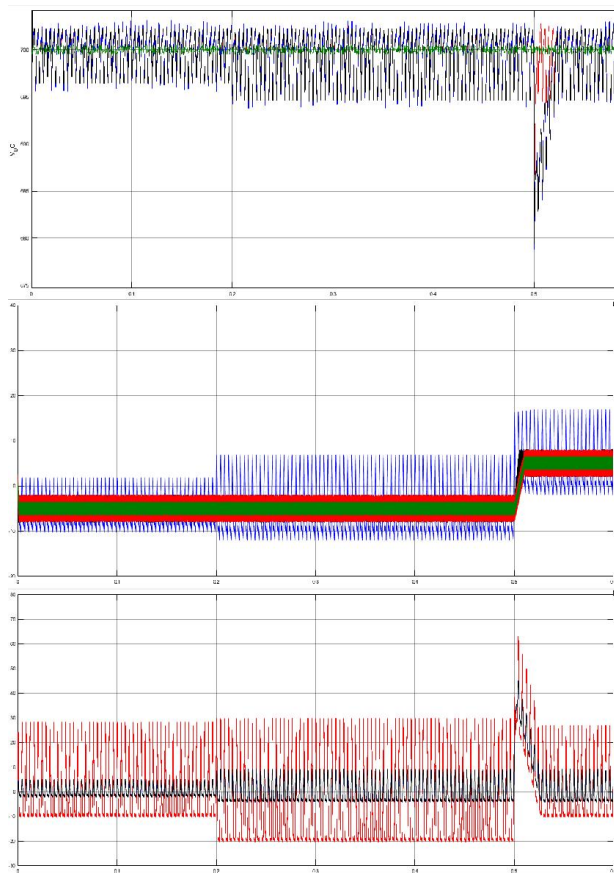
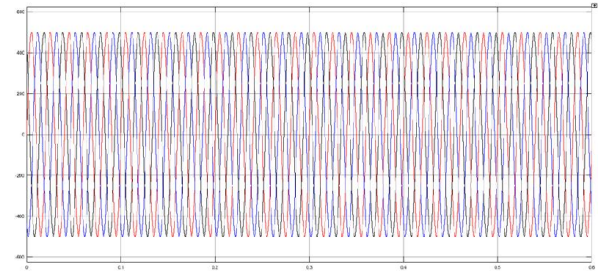


Figure 9. Grid connected mode and nonlinear load conditions, (a) DC bus voltage, (b) current battery (c) current of sc

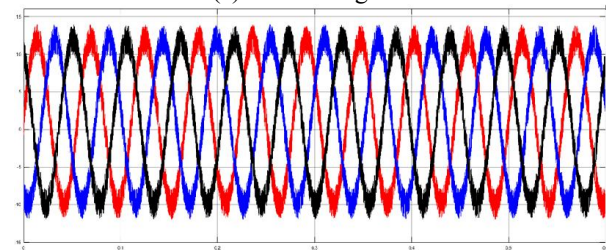
3.2. Grid-connected mode

This section examines the grid-connected mode. The top control system may set the reference power or use various situations. Asymmetric HPS is connected to the grid, while linear HPS is not loads are connected to PCC, producing harmonics in HPS. ILC must correct harmonics such that supplied and received grid currents are sinusoidal. Figure 9 shows the dc-link voltage (a). The suggested technique kept voltage fluctuations below tolerable limits. 9(b) indicates the battery voltage. So the battery is charged till $t=0.4s$. The battery is drained by reducing solar cell temperature at $T=0.5$ sec. However, a suggested approach ensures that battery current is completely smooth. Figure 9 shows the SC current (c). The HPS current includes oscillating harmonics from the SC when connected to the nonlinear load. Figure 10 shows PCC voltage (a). PCC's voltage is sinusoidal and distortion-free. Figure 10 shows the ILC current (b). Because the ILC absorbs most of the nonlinear load's harmonic currents. Figure 11 shows the current on the network with and without harmonics correction. Due to the decrease in harmonics, the current becomes

more sinusoidal. As observed, the grid current is extremely low harmonic, and the HPS supplies the nonlinear load current.

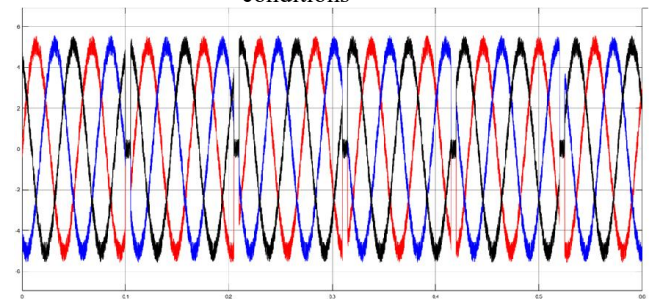


(a) PCC voltage

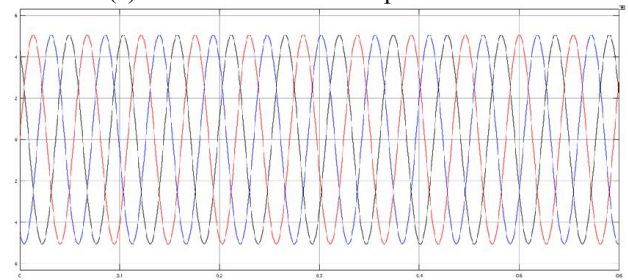


(b) ILC current

Figure 10. Connected to Grid and nonlinear load conditions



(a) Without harmonic compensation



(b) With harmonic compensation

Figure 11. ILC current

4. CONCLUSION

This article proposes a novel harmonic compensation technique utilizing an ANFIS controller for MGs, Wind Energy Conversion systems and grid-connected DGs. Harmonic currents affect grid electricity reliability, dc link voltage, and dc bus current when nonlinear loads are connected. Point of common coupling. The recommended method controlling the system's overall performance while

minimizing stress on the Distributed generating current. Principal benefits of the proposed control approach include improved dynamic and load-change performance, and dc bus voltage performance, and improved harmonic correction by HESS and ANFIS Controller. The findings also show that the suggested approach is robust to variations in RES production such as solar radiation. MATLAB/Simulink software was used to test the ANFIS method's efficacy under different operating circumstances.

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3D Brain Tumor Classification Using Stack Ensemble With Deep Learning Approaches

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Abstract - Classification of brain tumors plays an essential role in clinical and efficient diagnosis. In this paper, a technique for the classification of brain tumors into benign or malignant is presented that utilizes an ensemble of deep features and classificatory for machine learning. Our proposed approach, use the idea of transmission learning and employ multiple deep, pre-trained neural networks to extract deep characteristics from 3D MR images of brain. The deep features retrieved are subsequently assessed by several machine classifications. This method takes advantage of the complementarity of KNN (K-Nearest Neighbor) and CNN (Convolution Neuronal Networks), where their predicted values correspond towards the input of stacked ensemble meta-learners(meta-Classifier), which will be used to produce outbreak forecasts in the future. The identification of brain tumors in MRI scans by stacking one or more learning algorithms and the characteristics collected via learning algorithms are combined and used as input data to the meta-classifier (Support Vector Machine) or a stacking ensemble technique. The KNN has an accuracy of 88.3 %, while the CNN has an accuracy of 97.50 %, and the Stack Ensemble has an accuracy of 98.33 %.

Keywords - 3D MRI, CNN, KNN, stack ensemble

I. INTRODUCTION.

Brain cancer is an unregulated tissue collection, which may be implanted into the mental regions that impair the body's responsive functioning. The tumor may be divided into two types: benign and malignant tumors. Benign tumors may develop and damage the remainder of the healthy brain tissue. Malignant tumors often develop outside the brain and are spread to brain referred to as brain cancer [1]. The imaging method plays a significant role in the detection and treatment of brain tumors. In various methods, imaging of tumors may be done, including CT scanning, MRI, etc. The MRI brain image provides large volumes of information on the spatial brain anatomy and may be utilized for medical diagnosis. One of the most deadly and difficult kinds of cancers to detect and treat is brain tumors [2]. With over two decades of development, groundbreaking methods to the use of computer-aided techniques to segment the brain tumor progressively mature and get closer to conventional therapeutic applications. Brain MRI image is primarily utilized to identify tumors and stimulate the process of tumor progression. This information is particularly utilized for tumor diagnosis and therapy. MRI image provides more information about the medical image than the computed tomography or

ultrasound image. Detailed information on brain anatomy and brain tissue abnormality detection is provided by the MRI image. Magnetic Resonance Imagery (MRI) shows in figure 1 is a medical imaging technology based on radiology used to produce a depiction of bodily health and illness structure and physiological methods. MRI scanners are used to create images of the interior of the body using high magnetic fields, radio waves, and field gradients. MRI is based on nuclear magnetic resonance learning. Certain atomic nuclei may absorb and generate radiofrequency energy when put in an external magnetic field [3]. In clinical and research magnetic resonance imaging (MRI), hydrogen atoms are the most often used to generate an attractive radiofrequency signal that antennas detect when they are close to anatomical structures [4]. Hydrogen atoms naturally abound, particularly in water and fat, in humans and other biological creatures. This led to the introduction of computational and mathematical techniques into this area. In particular, different approaches and techniques of machine learning such as convolution neural networks and support vector machines were used to evaluate medical images. This article individually extends on previous research by evaluating pre-trained models concatenation. Also, present a neural network model composed of a series of modules.

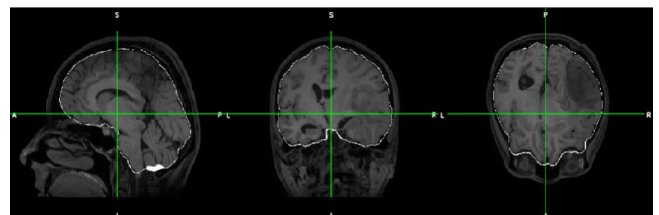


Figure 1: Input 3D MR Image

II. RELATED WORKS

Brain tumor detection using Kmeans Clustering was proposed by M. Masroor Ahmed et.al. and colleagues [5] in the journal NeuroImage. Nagalkar VJ and colleagues [6] developed a technique for detecting brain tumors based on soft computing. This method has the potential to result in false detection during a seeing scan. Rajesh C. Patil and colleagues [7] developed a method for extracting brain tumors from magnetic resonance imaging (MRI) images using the MATLAB programming language.

[8] The KNN classification method has been the focus of the study conducted by Shivakumarswamy and colleagues Akshay Patil, Chethan, Prajwal, and Sagar.V.Hande et.al. It is a multistep process, with the first stage consisting of the capture of an MRI image file of the patient. To eliminate noise and alter the image's size, the images have been pre-processed beforehand. Afterward, two methods are used to segment the data: K-Means clustering and Fuzzy C-means segmentation, both of which are based on the K-Means clustering algorithm. To determine how large a tumor is, it is necessary to separate tumor cells from normal cells and measures the diameter of the sick portion that houses the tumor. The stage of the tumor is established by calculating the surface area of the tumor and dividing it by two. Finally, the physicians inform the people who are concerned about the tumor's progression of its stage.

N. Saha Ray, R. B. Greiner, A. Murtha, and H. Zhang et.al. [9] proposed a method in which MRI slices are used in which axis-parallel boxes are identified from a selection of slices. It is primarily an unsupervised method for pattern recognition that allows the user to search the dissimilar region (which is defined by coordinates that seem to be rotation) between both the two halves together brain, one from the left with one on the right in the longitudinal direction view of an MR slice, and finds changes in the dissimilar region.

For image segmentation, Dunn employs the fuzzy c-mean (FCM) clustering algorithm, which he developed. The most difficult job in clustering is determining which clusters should be used to categorize pixels [10]. The fuzzy technique is both quick and accurate when used in this way.

A neuro-fuzzy segmentation methodology was employed to data collected from magnetic resonance (MRI) images to identify the various connective tissue including such brain structure, spinal fluid, grey matter, and neoplasms in this study [11]. The researchers used data obtained from Image data to identify the various tissues such as malignancy. While using fuzzy means algorithms, it is possible to improve the categorization of images by layer, which is a major benefit. The abstraction level is in charge of determining the weight vector at the lowest level of abstraction. Among other things, the researchers investigated tumor segmentation utilizing edge detection methods and the watersheds in the HSV color space.

The K-means method, as shown by Bhagwat et al [12], provides more accurate results than Fuzzy c-means and hierarchical clustering, according to the researchers. The majority of the algorithms in this area are derived from or improved upon k-means [13, 14, and 15]. The method improves the clusters repeatedly and continues in a loop until it finds the optimum solution, at which point it is terminated. The performance of the K-means method, on the other hand, is dependent on the starting values of the cluster centers. For this reason, by using several runs of the method, it should be evaluated for various results with different starting cluster centers.

Another method for the identification of tumors has been explored in the literature and is based on the concept of

threshold. This is the method used by Kalaiselvi, T and Sriramakrishnan et.al. [16] in their research article. A new paradigm for the identification of brain cancers has been presented. A human head scan was used to create the images, which were obtained via magnetic resonance imaging (MRI). MRI scans are pre-processed utilizing transformation methods to increase the visibility of the tumor region on the images. The images are then subjected to a fuzzy symmetric measure (FSM) in order to assess if they are abnormal in any manner. The Otsu's thresh-holding approach is then used to eliminate the tumor region if the findings are abnormal.

Tumor categorization and identification were automated using SVM, KNN, and Decision Tree (DT) in this study [17], which was conducted by V.Vani, M. Kalaiselvi Geetha et.al. Using a decision tree, the model claimed to have attained an accuracy of up to 98 percent.

Nikita V. Chavan, B.D. Jadhav, and P.M. Patil et.al. [17] developed a two-step approach for the identification and categorization of brain tumors. To extract tumor characteristics in their proposed technique, they employed the Grey Level Co-occurrence Method (GLCM) in the first stage, and in the second step, they used the K-NN classifier to categorize the tumor features. supervised machine learning approach was used to categorize benign stage cancers when it came to the classification of benign stage tumors. They have achieved an accuracy rate of 96 percent while using the KNN.

III PROPOSED METHOD

In the proposed technique, the prediction results of two classification algorithms are combined, and the final prediction is carried out using the Stack Ensemble. The categorization of tumors is implemented in this study via the use of Python scripting. In addition, python packages such as NumPy, scipy, scikit-learn, TensorFlow, and Keras are utilized in the development of this suggested system, as well as other programming languages. Figure 2 shows implantation steps draw to the proposed scheme.

A. Data Set

The Dataset consists of 120 images of 3D NIFTI format no additional in-house data was used in the development of a part of us network, which was implemented in Tensorflow [1] and trained on an NVIDIA Tesla V100 32GB GPU with the training dataset (120 cases). To ensure that the majority of the image content remained within the resize area, it used a random resize 160x192x128, which was used during training. As an input, individually concatenated four different 3D MRI modalities into a four-channel image, which was then processed? The network produces three nested tumor sub-regions as an output. Table 1 shows the split of the data's train and test model.

TABLE 1 Split Dataset

Images	Training	Testing	Total
Benign	38	20	58
Malignant	42	20	62
	80	40	120

Data augmentation is carried out on the training dataset after preprocessing. The result of the data augmentation process will increase the training dataset size to 360 shown in table 2.

The architecture of the Proposed Model

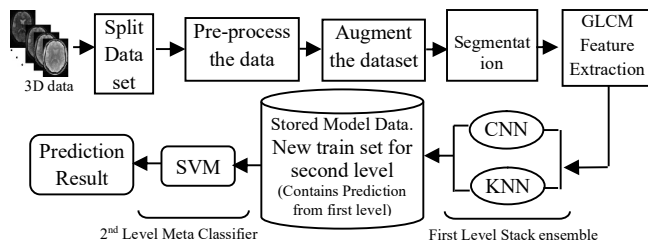


Figure 2: Proposed Architecture

B. Pre-Processing

To begin, import the original MR images into the computer for pre-processing. Following that, individually do thresholding on the MR images to transform them into binary images. In addition, privately conduct the dilation and erosion procedures to eliminate noise from the images captured. After that, computed the four extreme points (extreme top, extreme bottom, extreme right, and extreme left) of the threshold images by selecting the contour with the greatest area of the threshold images and selecting the largest contour of the threshold images. Finally, crop the image based on the information provided by the contour and extreme point information. Figure 3 shows Bicubic interpolation is used to enlarge the tumor images that have been clipped. This method is preferred over other interpolation methods such as bilinear interpolation because it produces a smoother curve than other methods such as bilinear interpolation.

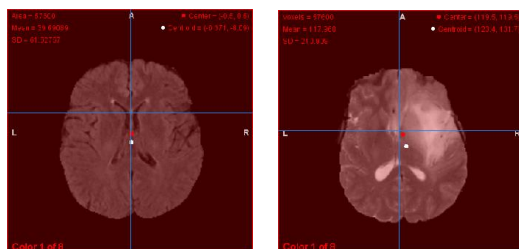


Figure 3: Tumor and No tumor MR Images

It is also preferred over other methods such as bilinear interpolation for MR images because of the large amount of noise along the edges. When comparing the intensity of one pixel to the intensity of its neighbor's pixels, individually used a median filter to minimize the difference in brightness between the two pixels. To get the required results, all Dataset Images are preprocessed using a median filter, edge detection, and binarization employing thresholding. Here, the three-dimensional data are adjusted to be compatible with the Python programming language. The 3D images are scaled, and the distortion produced by the non-uniform intensity of the magnetic field during the MRI scan is eliminated using the N4ITK bias field removal method, which is a variation of the N4ITK bias field removal technique. The skull is removed,

and the brain is separated. Noise is reduced by using a Median filter with three 3x3x3 filters. After scaling, the supplied image's dimensions are 120*120*77 pixels.

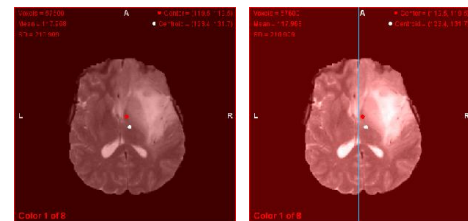


Figure 4: Preprocessing Image (Original Image, Noise Image, Noise Removal Image)

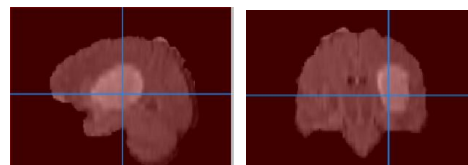


Figure 4.1: Skull Tumor Parts

C. Data Augmentation

To enhance the amount of the datasets, various random modifications have increased the data. By increasing the data, over-fitting opportunities were minimized and the model could be better generalized. The chosen increment choices include a 15 degrees rotation range, 0.1 height and width translation range, 0.1 heightened transformation range, 0.5 to 1.5 brightness range, and horizontal and vertical flips. Recent advances in neural network designs, data augmentation methods, and high-end GPUs have made it feasible to evaluate volumetric medical data using 3D deep learning techniques. In addition, since the size of a part of us MRI dataset was not particularly big, they utilized image augmentation techniques. An image augmentation approach is a method of creating an artificial dataset by altering an existing dataset. It is referred to as the process of generating numerous copies of an original image with various sizes, orientations, brightness, and so forth from the original. It has been stated that rather than gathering new data, it is possible to enhance the classification accuracy of the model by supplementing the data that already exists. In a part of the image augmentation phase, personally utilized two different augmentation methods (rotation and horizontal flipping) to create fresh training sets for the machine learning algorithm developed. The rotation operation, which is used for data augmentation, is performed by randomly rotating the input by 90 degrees zero or more times, depending on the situation. Then added horizontal flipping to each of the rotated images, which you can see below. Because the MR images in the dataset have varying widths, heights, and sizes, it is suggested that They be resized to have similar widths and heights to get the best results. This work entails resizing magnetic resonance images (MR images) to the size of either 194*194*50 pixels because of the input image dimensions of pre-trained CNN models. Training dataset (360 images) are split into 3 fold each fold consist of 124 images

TABLE 2 Augmentation Data split-up

Images	Training	Testing	Total
Benign	114	60	174
Malignant	126	60	186
Total	240	120	360

D. Segmentation

The tumor part is segmented using the watershed algorithm. This is implemented using python. Packages like scikit, scipy with opencv are employed in executing the segmentation.

E. Feature Extraction

It is necessary to extract features from images to conduct a binary classification of them using a fast Adaboost binary classifier, which requires the features to be extracted to be trained on. Following the above-mentioned segmentation procedure, individually extract GLCM features from the segmented images and store them. GrayLevel Co-occurrence Matrix (GLCM) is an abbreviation for Gray Level Co-occurrence Matrix. Analysis of Texture Using the Gray-Level Co-Occurrence Matrix (GLCM) is a numerical method of exploratory surface that takes into account the spatial connection between pixels and may be used to find patterns. The sample features extracted are depicted in table3.

TABLE 3
Sample Feature Extraction Parameter Values

Images	M	Sdv	Skw	Kur	En	Ent
Im1	39	61	0.00553	2.890	10.94	0.65
Im2	117	210	0.00655	2.740	16.37	0.94
Im3	39.40	75.59	0.01054	1.850	65.99	3.03
Im4	6.83	39.45	0.00517	3.333	8.11	0.45
Im5	11.90	38.81	0.02002	1.354	33.17	2.09
Im6	5.33	28.95	0.01647	2.054	13.87	1.12

M-Mean, Sdv-Standard Deviation, Skw-Skewness, Kur-Kurtosis, En-Energy, Ent-Entropy

IV. METHODS AND CLASSIFICATION

1. *K-Nearest Neighbor*: KNN is a straightforward classification technique that performs well in real-time applications. The training process is straightforward, and the sample contains class labels as well as a collection of tuples that are linked to those labels. This method is effective for modules with a random number of elements. The distance function is utilized by the KNN classification model to map samples to classes when mapping samples to classes. It is necessary to apply the KNN classification method to compute the distance between the assumed test illustration X and the existing examples y1, y2, and yk. There are selected by determining which neighbors are closest to the test instance and based on the selection of neighbors, the bulk of neighborhood lectures are assigned to the test samples. The distance function is applied between the samples using the Euclidean technique, the Manhattan method, or the Minkowski method, depending on the situation. When the values are continuous, these techniques are used to get the results. It is dependent on the number of neighbors that the

sample X probability assigns to each sample. When sample X is assigned to a class C, the probability of allocating it to that class is dependent on the number of neighbors considered, which is indicated by K. Table 4 shows the accuracy of the KNN classifier.

$$\text{Minkowski Function: } \left(\sum_{i=1}^k |x_i - y_i|^q \right)^{\frac{1}{q}}$$

Where, x_i, y_i = Data points, $q = 3$, k = Dimension

TABLE 4 Accuracy Table for KNN Classifier

Parameters	Test Accuracy %	Sensitivity %	Specificity %
KNN Algorithm	88.33	92.3	78.5

2. *Convolution Neural Networks*: Convolution neural networks are a type of profound neural learning network used to analyze and categorize images. A CNN operates by extracting the input image characteristics (array of pixels). The image goes through many layers before the last fully linked layer classifies the image based on "voting," consisting typically of convolutions, ReLU, and pooling layers. Table 5 shows the accuracy of the CNN classifier.

TABLE 5
Accuracy Table for CNN Classifier

Parameters	Training Accuracy %	Sensitivity %	Specificity %
CNN Algorithm	84.3	96.48	87.3

3. *Stack Ensemble-Meta Classifier*: Stacking is a technique for combining several classifications or regression models into a single model. There are a variety of methods for putting together models. Researchers present a support vector machine (SVM) model stacking expert system for accurate forecasting. By choosing a decision boundary that optimizes the distance between all classes' closest data points, SVM differentiates from previous classification methods. Because it looks for the most optimum decision boundary, an SVM does more than just discover a decision boundary. As a result, improvement can be seen in the overall performance, and may even end up with a model that is superior to any particular intermediate model. Model stacking is the ensemble technique used to integrate the diverse group of classification algorithms. Through model stacking, several model predictions may be merged to achieve superior predictive performance. Some of the methods of classification employed are assemblies themselves. KNN classifiers are bagging assemblies while CNN is an ensemble boosting. By training many decision-making bodies together and combining their forecasts, CNN classifiers can enhance their accuracy and avoid over fitting. On the other hand, KNN classifiers can minimize distortion and increase accuracy by increasing the gradient.

Algorithm

1. Divide the training dataset into n equal-sized sections.
2. A basic model is fitted on n-1 parts, and predictions for the nth component are produced using the results. For each of the n pieces in the train set, this process is repeated.
3. The base model is then fitted to the whole train dataset, which is the last step. This model will be used to predict the results of the test dataset.
4. The same procedure is followed again with another base model, resulting in another set of predictions for the train and test datasets.
5. To develop the new model, the predictions on the train data set are utilized as a feature.
6. The predictions made on the test dataset are based on the final model that was developed.

TABLE 6
Accuracy Table for Meta-Classifier

Parameters	Test Accuracy %	Sensitivity %	Specificity %
Stack Ensemble Meta-Classifier	98.33	97.5	76.54

V. RESULTS AND DISCUSSION

The proposed method conducts preprocessing feature extraction and classification in the same way as stack ensemble perception does, which identifies various objects, different textures, contrast, brightness, and depth of the image in the same way that it does in stack ensemble perception. Furthermore, if specific drugs are used successfully, the applicability of the suggested method may be expanded to include a broader variety of malignancies and MR modalities than those now available. With the use of a dataset, individually want to explore how well the suggested approach performs in more realistic and clinically bounded situations, with a wide range of scenarios encompassing several different features. Table 7 depicts the comparison of accuracy percentage calculated from the confusion matrix shown in figure 5.

TABLE 7
Accuracy of classification based on feature extraction is measured

Classifiers	Accuracy (%) without features extraction	Accuracy (%) with features extraction
KNN	84.25	88
CNN	89.53	97.50
Meta Classifier(SVM)	90.54	98.33

TABLE 8
A comparison of the accuracy of various classifiers is shown

Parameters	KNN	CNN	Stack Ensemble
True Benign	53	60	59
True Malignant	53	57	59
Specificity (%)	78.5	87.3	76.54
Sensitivity (%)	92.3	96.48	97.48
Accuracy (%)	88.33	97.50	98.33

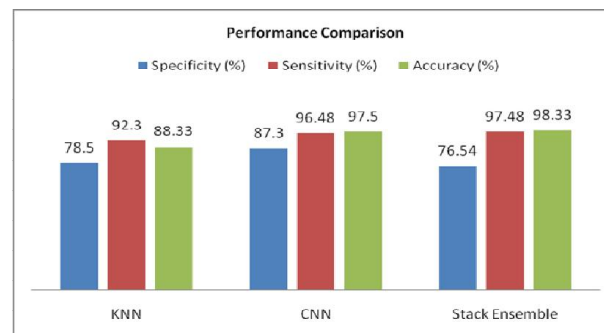


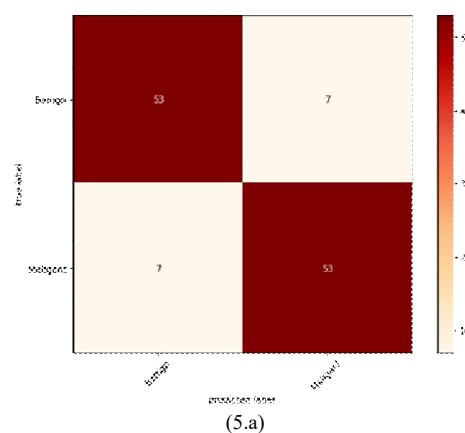
Figure 4
Performance Comparison

According to the different assessment criteria, Table 7 and Figure 4 provide a summary of the classification analysis of the results of the suggested models. When looking at the table, it can be seen that the KNN model has the lowest specificity (78.5 percent) and the highest sensitivity (92.3 percent). Furthermore, the Stacked Ensemble model outperformed the CNN model in terms of sensitivity (97.48 percent), specificity (76.54 percent), and accuracy (98.33 percent), all of which were greater than the KNN model. The Ensemble Model has shown an acceptable classification result, with such sensitivity of 96.47 percent, a specificity of 87.3 percent, and an accuracy of 98.3 percent, despite its relatively small sample size. However, the Ensemble Model has shown superior performance, with the highest levels of sensitivity, specificity, and accuracy.

$$\begin{aligned} \text{Test Accuracy KNN} &= \frac{\text{True Benign} + \text{True Malignant}}{\text{True Benign} + \text{True Malignant} + \text{False Benign} + \text{False Malignant}} \\ &= \frac{106}{120} \times 100 = 88.33. \end{aligned}$$

$$\text{Test Accuracy CNN} = \frac{117}{120} \times 100 = 97.50$$

$$\begin{aligned} \text{Test Accuracy Stacked Ensemble meta-classifier(SVM)} &= \\ &= \frac{118}{120} \times 100 = 98.33. \end{aligned}$$



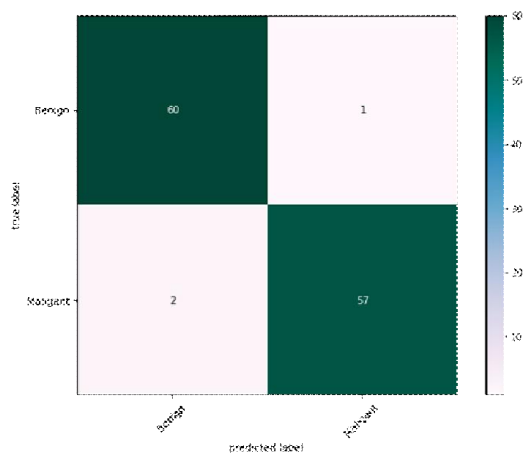
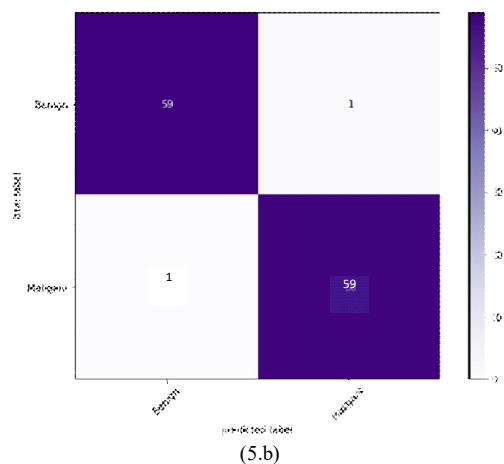


Figure 5

Confusion Matrix

5.a) KNN Classifier 5.b) Stack Ensemble Classifier 5.c) CNN Classifier

VI. CONCLUSION

This research looked at the use of ensemble methods to enhance the performance of individual classifiers in the crucial task of multimodal brain tumor classification, which is of vital significance. When comparing the efficacy of ensemble techniques to that of stacking procedures, the results are striking. The experimental results given in this study provide satisfactory answers to both of the questions asked at the beginning of the essay. On the first question, whether ensemble methods can improve the classification accuracy of individual classifiers in the context of automated multimodal brain tumor segmentation, the response is a loud affirmative. Without help have discovered via a part of us experiments that the performance improvement given by ensemble methods across a range of individual classifiers is higher than the performance improvement generated by the individual classifiers themselves. According to the research, the answer to the second question is that the ensemble that employs majority voting surpasses all other ensemble approaches when compared to other ensemble techniques. Due to this, the

research team thinks that it has carried out the most comprehensive study to date on the use of ensemble classification methods for multimodal brain tumor segmentation utilizing magnetic resonance imaging (MRI) techniques (MRI). Individually want to continue working on improving the temporal performance of categorization algorithms shortly. Because of the huge size of the MRI volume to be segmented, classification of all of the volume voxels takes a considerable amount of time to accomplish. MRI volume segmentation takes a significant amount of time to complete. Multi-core and GPU programming are needed for efficient implementation to achieve this. Private is now engaged in the process of establishing due to us long-term strategic direction.

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3D FINGER VEIN AND IRIS PATTERN BASED VERIFICATION SYSTEM

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Abstract— The finger vein modality offers distinct characteristics that enable it to play a critical role in biometrics. However, existing vein verification systems typically use a monocular camera to obtain a single-view 2D vein image from only one side of the finger vein and iris, which poses two issues. In contact-free mode, it collects limited vein pattern information for verification and creates noticeable discrepancies between samples of the same individual taken from different finger vein and iris positions. Both of these issues have a negative impact on the system's performance. Existing systems are generally more sensitive to differences in the position of the finger vein and iris, particularly those induced by movements in pitch and roll. Despite significant efforts in recent years to address this issue, it remains a challenge. This paper proposes an entirely new system that includes a software and hardware platform that collects full-view vein and iris pattern information from whole fingers and iris with three cameras, a novel 3D reconstruction method to build the full-view 3D finger vein and iris image, and a corresponding 3D finger vein and iris featureur. The experimental results reveal that, when compared to the classic single-view 2D mode of finger vein recognition, the novel approach both efficiently increases recognition performance while also taking full advantage of additional valid information offered by the finger vein and iris biometrics.

Index Terms—*finger vein and iris authentication, 3D reconstruction, texture mapping, feature extraction and matchin*

I. INTRODUCTION

The necessity of user authentication has grown as computer science and information technology have progressed, and traditional authentication techniques (such as keys, passwords, PINs, and smart cards) have struggled to match convenience, anti-spoofing, and high-security requirements. To satisfy these objectives, biometric technologies have been thoroughly researched and

widely deployed; the most representative systems are fingerprint and face recognition. For identity identification, biometrics uses one or more physiological (fingerprints, faces, iris, and veins) or behavioural (gait and signature) traits of humans. Finger vein recognition technology, which uses the vein structure pattern beneath the finger surface as evidence, has begun to play an important role in the field of biometrics because 1) it is difficult to forge because it uses the vascular structure pattern beneath the skin as evidence; 2) it can function under noncontact or weak contact measurement conditions, which are user-friendly features; and 3) it can function under noncontact or weak contact measurement conditions, which are user-friendly features.

II. RELATED WORK

Gongping Yang,¹ Xiaoming Xi,¹ and Yilong Yin[1] proposed this paper, (2D)² PCA is applied to extract features of finger veins, based on which a new recognition method is proposed in conjunction with metric learning. It learns a KNN classifier for each individual, which is different from the traditional method where a fixed threshold is employed for all individuals.

K.APPASAMY, R.S.SHANMUGASUNDARAM proposed this paper, the iris and vein pattern based authentication system is proposed.[2] The 2D filtering techniques are used in both authentication systems. Here, if the user left eye iris as well as right finger vein and right iris and left finger vein are matched the condition is true, it is an authenticated user, it not matched, the condition is false. The linear process used to the median filters, eliminates noise like reflections. The Edge Detection is used to vessels is extracted and analyzed datasets prediction level. The threshold segmentation is applied for all images segment to input as ROI selection. ROI process is determined in an image or in a volume, to the intention of measurement its size. The Hamming

Distance is measured the advantage of dissimilarity between input iris and vein templates and enrolled the templates. Experimental results prove that the proposed approach is more proficient likened to existing approaches for the deemed datasets.

K.APPASAMY, R.S.SHANMUGASUNDARAM [3] proposed this paper mainly focuses in introduction about finger vein and iris pattern, survey of existing research works done in the process under finger vein combined with iris recognition such as image acquisition, vein and iris enhancement, vein and iris pattern extraction and vein and iris pattern matching. Finally the challenges and future work are discussed in order to improve the left finger vein pattern with right iris and right finger vein pattern with left iris recognition.

Manjiri B. Patwari, Ramesh R.et.al [4] present an algorithm proceeds through three main steps 1. preprocessing operations on high resolution fundus images 2. For retinal vessel extraction, simple vessel segmentation techniques formulated in the language of 2D Median Filter 3. Segmentation for finding boundaries of the extracted blood vessels. Performance of this algorithm is tested using the fundus image database(245 images) taken from Dr. Manoj Saswade, Dr.Neha Deshpande and online available databases diaretdb0, diaretdb1 and DRIVE.

Yuji Hatanaka,et.al describes a biometrics method using the Jaccard similarity coefficient (JSC) based on blood vessel regions in retinal image pairs. The retinal image pairs were rough matched by the center of their optic discs. Moreover, the image pairs were aligned using the Iterative Closest Point algorithm based on detailed blood vessel skeletons. For registration, perspective transform was applied to the retinal images. Finally, the pairs were classified as either correct or incorrect using the JSC of the blood vessel region in the image pairs[5].

III. ARCHITECTURE AND MODELING

A full-view 3D finger vein and iris representation and matching model was constructed for the proposed system. To begin, we created a hardware setup that had three cameras mounted on the three vertices of an equilateral triangle facing the centre. The three cameras were then used to collect full-view photos of all of the finger vein and iris patterns that were scattered under one finger surface. Then, using the three finger vein and iris images, we used an unique 3D reconstruction technique and a texture mapping approach to create a full-view 3D finger vein and iris panorama. Finally, in order to accomplish 3D finger vein and iris verification, we present a 3D feature extraction and matching technique. This paper's main contributions can be summarised as follows:

1) We present a full-view 3D finger vein and iris verification system, which is the first system suggested and developed in the field of biometric identification, to the best of our knowledge.

2) We create a three-camera acquisition approach that can capture all of a finger's vein and iris patterns at the same time.

3) For the first time, we offer a new 3D finger vein and iris reconstruction technique as well as a texture mapping algorithm to build 3D finger vein and iris structure.

4) For full-view 3D finger vein and iris verification, we design a targeted feature extraction and matching method.

A. IMAGE PREPROCESSING

The suggested system employs a photoacoustic (PA) effect-based finger sensing approach[6]. Unlike pure optical methods, photoacoustic tomography (PAT) can get very detailed images of the vasculature with significant depth information. In PAT, a pulsed laser lights the skin surface, causing thermoelastic expansion, which is transformed into ultrasonic waves. After detecting the pressure waves, a PAT image based on the acoustic time of arrival may be rebuilt.

Because acoustic wave dispersion is three orders of magnitude less than optical scattering in tissue, PAT can identify deeper vascular structures at a better spatial resolution than pure optical imaging approaches [7]. Furthermore, light diffusion affects optical imaging, and ultrasound imaging has low sensitivity to narrow blood arteries.

Because non-absorbing tissue components do not emit PA signals, PAT pictures have a greater signal-to-noise ratio (SNR). The method used side optical illumination in our prior work, and the participant's hand was placed beneath the imaging platform. Both the participant and the operator found the system to be cumbersome and inconvenient. A little inaccuracy in the subject's hand positioning, for example, could cause misalignment in the light illumination, resulting in a considerable reduction in image quality. Furthermore, in portable biometrics systems, scanning the entire palm region is neither frequent nor practical.

To solve these challenges, we created 3D Finger, a new technology for accurate imaging of the finger and iris vasculature. We modified the light delivery technique and adjusted the scanning geometry of the system in comparison to the previous system.

Subjects now place their finger right on top of the imaging window with the new design. This imaging position enhances the user experience while also reducing the amount of time required to prepare the experiment. Furthermore, we achieved co-planar

light illumination and acoustic recording by using a high-performance cold mirror as an acoustic-optical combiner, considerably boosting the system's robustness.[8] The acoustic and light beams are always coaxial to each other, preventing alignment mistakes, regardless of finger positioning and curvature. Fingers, rather than palms, are used as the scanning target in this study, which makes it easier to apply in portable devices in the future.

We employed a 2.25 MHz centre frequency ultrasound transducer with 8.6-cm lateral coverage to cover a subject's four fingers (index to little). The field of view is more than twice as large as in our earlier research [6]. We have created a new vascular matching algorithm that takes advantage of the fact that people have unique vessel patterns that are determined not only by the overall vessel structure but also by the depth of the vessel within the finger. The programme uses a number of critical parameters to create a strong 3D vascular model that can distinguish between authorised and illegal users. We acquired good authentication accuracy and robustness after testing the system and algorithm on 40 patients.

B. METHODS

i. Photoacoustic Effect

The Photoacoustic effect is used to detect vasculature in our system. The initial PA pressure (p_0) can be described as follows under light illumination:

$$p_0(r) = \Gamma \mu_a F(r), p_0(r) = \Gamma \mu_a F(r),$$

$F(r)$ is the local optical influence, and μ_a is the absorption coefficient. The Grüneisen parameter is defined by the thermal and mechanical properties of the material. The PA amplitude is proportional to the optical absorption, according to Equation . PAT provides for direct detection of haemoglobin distribution because haemoglobin is the primary absorber in the near-infrared range (blood vasculature). Through terms of image generation, the reconstruction algorithm back-projects data to possible locations of the acoustic source based on the speed of sound in tissue and the time of arrival of PA signals. A 2D or 3D model of the optical absorber can be created once all transducer elements have been projected.)

ii. 3D Finger System

Figure 1 depicts an end-to-end overview of our 3D Finger system. To begin, we collected the raw PA signals from the fingers using the newly built PAT system. Reconstruction was used to create a 3D representation of the finger blood vessels. The biometric framework was then fed the 3D vessel structures, which comprises of three primary steps: (1) picture preprocessing, (2) vessel segmentation, and (3) pattern analysis.

iii. Experimental Procedure

A modest amount of ultrasonic gel was applied to the imaging window before the experiment to increase acoustic impedance matching. After that, we invited the subjects to place their fingers on the image glass and began collecting data. The entire experiment took around 35 seconds and covered a 3.5-cm motor scanning distance. The raw data matrix was 2048 by 128 (128 elements) by 350 (A-line length) (scanning steps). To create a 3D image, we stacked all of the 2D data based on their collection position after reconstructing 2D data obtained at each laser pulse. The final 3D data was depth-encoded and projected at its maximum intensity (MIP).

IV. 3D FINGER & IRIS IMAGE PROCESSING SCHEME

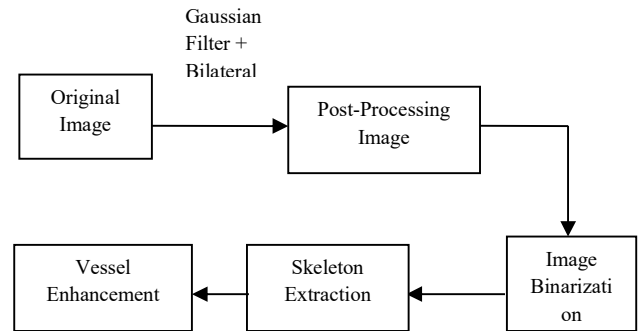


Fig.1 Flow diagram of the 3D Finger Vein and Iris image processing steps

To acquire detailed finger vessel patterns, nonvascular characteristics such as background tissue signals and electrical sounds must be removed. As a result, we used Gaussian and bilateral filters to de-noise and smooth the original reconstructed image [11]. The Gaussian filter was a low-pass blur filter ($\sigma=0.2=0.2$) for attenuating the high frequency due to the sounds' high frequency. A Gaussian kernel (spatialSigma=4s) is included in the bilateral filter to preserve vessel information. The following is a description of the produced image [12]:

$$\Gamma^{\rightarrow}(t+1)(x^{\rightarrow}) = \frac{\sum_{i=-S}^{+S} \sum_{j=-S}^{+S} \Gamma^{\rightarrow}(t)(x_1+i, x_2+j) w(t)}{\sum_{i=-S}^{+S} \sum_{j=-S}^{+S} w(t)}$$

with the weights given as follows:

$$w^{(n)}(\vec{x}, \vec{\zeta}) = \exp\left(-\frac{(\vec{\zeta} - \vec{x})^2}{2\sigma_D^2}\right) \exp\left(-\frac{(l(\vec{\zeta}) - l(\vec{x}))^2}{2\sigma_R^2}\right).$$

Here, $\vec{x} = (x_1, x_2)$, $\vec{\zeta} = (\zeta_1, \zeta_2)$ are space variables and w is the window size of the filter

To eliminate noise and identify vessel patterns, we employed a 3D vessel pattern segmentation technique (binarization) after smoothing. [13]. We created a binary image from a 3D PA image by replacing all values over a globally selected threshold with 1 s and setting all other values to 0 s. Due to poor image resolution, light scattering, and optical blurring, traditional optical methods [14] cannot provide a detailed perception of blood flow in the arteries. The 3D Finger, on the other hand, uses image binarization to expose high-quality vascular patterns in a computationally efficient manner.

We used a nearest-neighbor searching and vascular structure fine-tuning module (skeleton) to monitor the vessels, which joins disjoint vessels based on the number of surrounding background points and an SURF-based feature extraction to improve vessel pattern continuity. Using a multiscale vessel enhancement technique, we additionally altered the vascular structure based on the vessel distinctions. This programme scans the binarized PA image for geometrical shapes that can be called tubular [15]. With a normalised second-order Gaussian derivative, the image $L(x)L(x)$ is convoluted follows.

$$L(x, \sigma) \triangleq \sigma^2 \frac{\partial^2 G(x, \sigma)}{\partial u \partial v} * L(x),$$

where $\sigma\sigma$ represents the scales at which the answer is computed are shown by The Hessian eigenvalues $\lambda_1\lambda_1$ (along the direction of the vessel) and $\lambda_2\lambda_2$ (orthogonal to the vessel) of a perfect tubular structure would be $|\lambda_1| \approx 0$ and $|\lambda_1| \approx 0$ and $|\lambda_1| \ll |\lambda_2|$. Finally, using the equation below, a vesselness factor is constructed to exclusively increase the vascular patterns in the PA image:

$$LR(\sigma) = \left\{ \exp\left(\frac{\left|\frac{\lambda_1}{\lambda_2}\right|^2}{-2\beta^2}\right) \right\} \left(1 - \exp\frac{|\lambda_1|^2 + |\lambda_2|^2}{-2c^2}\right)$$

where $\beta\beta$ and cc are weights used to control the sensitivity of the filter. Even while vessel discontinuities are still there, they simply serve to reduce the number of features found in deep regions.

The existing features are adequate to assure a high matching accuracy, as shown in the results section.

Following vessel augmentation, we must choose relevant elements for user authentication that can highlight the various properties of finger vessel and iris patterns. We used (SURF) [16,17] to do this, which are insensitive to rotation, scaling, blur, and other noise interferences. While the vessel structure is in 3D, the SURF characteristics are designed for a two-dimensional environment. The technique, in particular, recovers critical locations such as bifurcations and endpoints. During the sensing process, the feature number varies depending on the user's finger position, muscle activity, and body metabolism.

The amount of similar feature pairs between two users was used to calculate a cross-correlation score (CrossCorr). The accuracy, false acceptance rate (FAR) [18], false rejection rate (FRR), and equal error rate were all calculated using the score (EER). In biometric investigations, these measurements are frequently used to analyse the uniqueness of the finger vein and iris pattern.

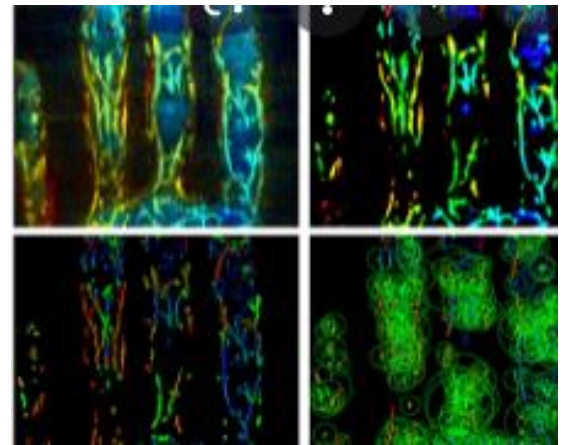


Fig. 2. (a) Gaussian and bilateral filter processed image. (b) Binarization of image (c) Final enhanced image. (d) Biometric features (marked with green circles) extracted by SURF.

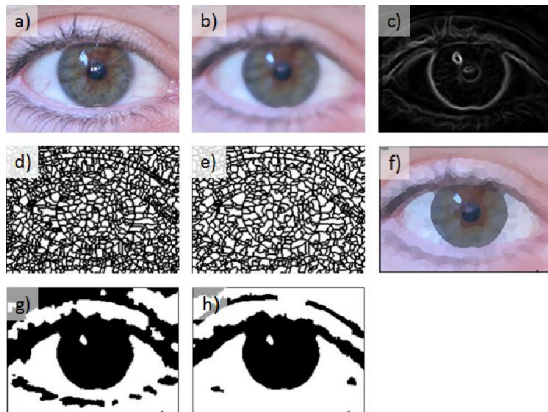


Fig 3.a) The Original Colour Image, b) The Smoothed Image, c) The Gradient Image, d) The Output Of The Watershed Transform (1100 Basins), e) The Pool Of Basins After The Merging Operation (690 Basins), f) the quantized image, g) the binary image produced by thresholding the watershed, h) the improved binary image

We investigated the uniqueness of 3D finger veins and iris (captured within a PA image) in 40 people to see if our approach could be used for biometric purposes (imaged eight fingers and two iris). The PA images of each participant were compared to those of the other 39 patients. The accuracy, FAR, FRR, and EER ratings were calculated using the matching results.

V. RESULTS

Figure 2 shows the post-processed results. The smoothed and denoised image [Fig. 2(a)] has an SNR of 9.8. [Fig. 2(b)] has an SNR of 16.2, whereas the reconstruction image Figure 2(b) shows the vessel structure after binarization. Although the vascular image offers intricate depth information, the patches of blood flow in between the arteries may nevertheless have an impact on the system's biometric authentication performance. Fig. 2(d) shows the feature extraction with the extracted features denoted by green circles.

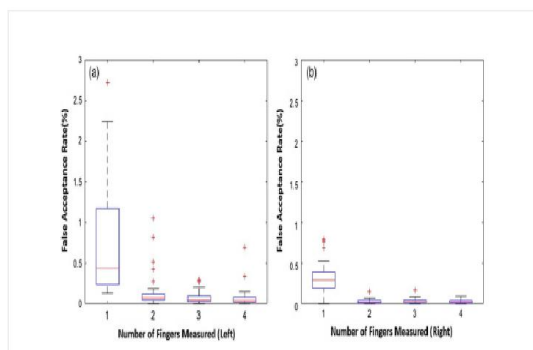


Fig. 4. False acceptance rate using different numbers of fingers. (a) Left hand. (b) Right hand.

VI. DISCUSSION

In terms of comparing our technique to an infrared palm vein scanner, earlier research [19] have demonstrated a difference in both settings based on SNR, demonstrating that infrared scanners result in fuzzy and less dense vessel architectures. Our system's current performance (EER1.23 percent) outperforms several commonly used biometrics (for example, EER 5.6 percent in 2D vein infrared scanners [20], EER 7 percent in gait [21], EER 2.5 percent in capacitive hand touchscreens [22]), making it practical to use in a real-world scenario. Preprocessing time averages, on the other hand, were around 0.4588 s, well within the real-time range. We may be able to develop the system in the future to incorporate a real-time display capability.

VII. CONCLUSION

In conclusion, we have created a dependable and durable 3D Finger biometric sensing system. By just placing fingers on the scanning pane, it enables for a quick and steady scan. Our approach delivers depth information from 3D vascular structure imaging, which is superior to conventional IR-based palm-vessel imaging techniques. The 3D Finger system is more user-friendly than the existing 3D PAT palm vessel sensing system, and it classifies subjects based on the vascular structure of the fingers and iris. We achieve a low average FRR (1.23 percent for the left index fingers and iris 0.31 percent for the right index fingers and iris) and EER after testing 40 patients' left and right index fingers and iris (0.13 percent for the left index fingers and iris and 0 percent for the right index fingers and iris). We anticipate that our technology will find a wide range of applications due to the growing demand for more secure identification and authentication devices.

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A NOVEL APPROACH FOR MITIGATING SMALL-PERIOD POWER FLUCTUATIONS IN WIND POWER SYSTEMS USING DIRECT INTEGRATION METHOD

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Abstract: The direct integration of energy storage devices features a amount of benefits appreciate reduction in power losses, cost, and complexity. This treatise for that reason presents a right away integration style used designed for super electrical devices employed in mitigating small-period power fluctuations in wind generation systems. This design uses a dual electrical converter topology for each grid affiliation and interfacing a brilliant capacitor bank. the main inverter of the twin inverter system is high-powered by the corrected output of a wind turbine-coupled permanent-magnet synchronous generator. The secondary inverter is directly connected to the super capacitor bank

Keywords—Direct Integration of Super Capacitors, Dual Inverter, Energy Storage Interfacing, Non Integer Voltage Ratio

I. INTRODUCTION

Small amount power barter victimization super capacitors is actively pursued in wind generation systems as manifest since the massive range of techniques reportable within the prose .These techniques will be separated into 2 major categories, looking on the manner that super capacitors are joined to the wind power system. within the initial kind the super capacitors are connected to the intermediate dc link of the backto-back convertor system as shown in Fig. 1(a) and (b). Even whereas the direct association shown in Fig. 1(a) is that the simplest, it'd be tough to induce the most use of the super capacitor bank thanks to dclink voltage boundaries obligatory by the grid-side inverter.

The property of this issue will well be reduced if an middle dc–dc convertor is placed linking the super electrical condenser and therefore the dc link as shown in Fig. 1(b). This dc–dc converter has to possess duplex power flow ability and so needs a minimum of 2 quick change devices rated

to the height power. Moreover, the low-pass filter (LPF), comprising an electrical device and a capacitor, degrades the dynamic response. Therefore, the interfacing dc–dc converter will increase the system cost, power losses, and complexity. within the second kind the common ac bus is employed for power replace, as shown in Fig. 1(c), and it needs an {extra} dc–dc converter, a dc–ac electrical converter, and a coupling transformer. Therefore, in each cases, these extra converters effectively increase the general value and power losses, which might be absent if an immediate integration theme with full controllability is available.

This thesis so presents a direct integration style for super capacitors with the employment of the grid-side inverter. the longer term inverter system is shown in Fig. 1(d), and it's fashioned by cascading 2 two-level inverters through a coupling transformer. the 2 electrical converters are named because the main inverter and therefore the secondary inverter.

The super electrical condenser bank is directly hooked up across the dc link of the secondary inverter. The dynamic behavior of the super capacitor voltage is handled by the inverter controller, eliminating the requirement for a further boost converter.

The key inverter may be a dynamical low- speed inverter that operates at elementary frequency, manufacturing sq. wave outputs. Harmonics created by the square wave output are stipendiary by the low-power high-speed secondary inverter

II. ANALYSIS ON SUPERCAPACITOR CHARGING AND DISCHARGING PROCESS

In the future system, the dc-link voltages of both the main inverter and the secondary inverter are permitted to vary separately and dynamically. As a result, the space vector diagram of the combined inverter takes different shapes at different dc-link voltage ratios as shown in Fig. 2. In Fig. 2, hexagons formed by the voltage vectors of the main inverter are named as major hexagons while the hexagons formed by secondary inverter vectors are named as sub hexagons. In the first five diagrams, shown in Fig. 2(a)–(e), the secondary inverter dc-link voltage is assumed to be stable while the main inverter dc-link voltage varies. When the major inverter dc-link voltage decreases, the major hexagon shrinks, making more overlapping of sub hexagons as in Fig. 2(b)

The opposite happens when it increases as in Fig. 2(e). Circles marked in Fig. 2 indicate the path of the reference voltage vector for this particular simulation. If the circle is within the major hexagon, as in Fig. 2(c)–(e), obtainable wind power is larger than the amount of power injected into the grid. When the circle is inside the major hexagon, the super capacitor bank gets charged. On the other hand, if the circle is larger than the main hexagon, as in Fig. 2(b), available wind power is not sufficient to meet the demand. Hence the deficit has to be supplied by the super capacitor bank by discharging its stored energy. In the second set of space vector diagrams, shown in Fig. 2(f)–(i), the major inverter dc-link voltage is set to a constant value while the secondary inverter dc-link voltage varies. Here, the path of the reference voltage vector is inside the main hexagon which results in a surplus of power. This excess of power is absorbed by the super capacitor bank. When it does so, sub hexagons get expanded. This results in an increase in overlapping of sub hexagons, as in Fig. 2(f). If the charging is not controlled, sub hexagons can even extend beyond the origin of the coordinate system. In such a case, the inverter output voltage waveforms get imprecise, but still, the fundamental component is controllable. A comprehensive discussion on charge/discharge control of Super capacitors at such limits through power reference adjustment can be found in. With the facilitate of the aforementioned analysis, a simplified representation can be developed for the charging/discharging method of the super capacitor bank as follows. If the wind speed is high, the major inverter dc-link voltage goes up,

and the major hexagon exceeds the circle. Then, the extra power is directed toward the super capacitor bank, resulting in an increase of its voltage. This yields an expansion of sub hexagons. On the other hand, if the wind speed is low, then the major inverter vector pattern shrinks, making the major hexagon to be inside the circle.

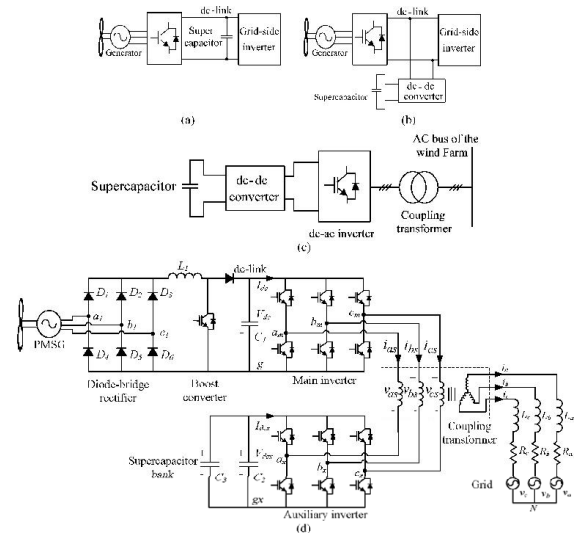


Fig.1. Interfacing methods for super capacitor energy storage system.(a) Direct connection to the dc link. (b) Connection to the dc link through a dc-dc converter. (c) Connection to the common ac bus. (d) Proposed grid-side inverter with direct connection.

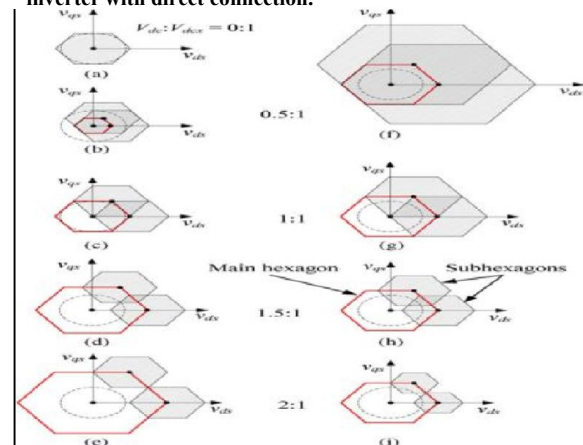


Fig. 2.Space vector diagrams at different dc-link voltage ratios.

(a)–(e) Varying V_{dc} while V_{dex} is constant. (f)–(i) Varying V_{dex} while V_{dc} is constant.

III. POWER SHARING MPPT AND GENERATOR-SIDE CONTROLLER

The per-phase equivalent circuit of the dual inverter system is shown in Fig. 3 wherever the output voltage vector

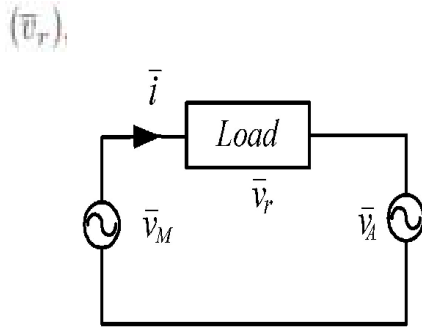


Fig.3. Per-phase equivalent circuit of the dual inverter

inverter voltage vector auxiliary inverter voltage vector and the current vector (\bar{i}) are also shown. The output voltage vector is corresponding to the count of the major inverter voltage vector and the secondary inverter voltage vector as in (1). The real power delivered to the load can be expressed as the dot product in (2). Furthermore, the output power is equivalent to the sum of the main inverter power and the secondary inverter power as expressed in (3). Equations (4) and (5) show the relationships between inverter voltage vectors and corresponding switching states. With the help of these five equations, an expression can be derived for the power of the auxiliary inverter, i.e., the super capacitor power, as in (6).

$$\begin{aligned} \bar{v}_r &= \bar{v}_M + \bar{v}_A & (1) \\ P_{grid} &= \frac{3}{2} \bar{v}_r \cdot \bar{i} & (2) \\ P_{grid} &= \frac{3}{2} (\bar{v}_M + \bar{v}_A) \cdot \bar{i} = P_M + P_A & (3) \\ \bar{v}_M &= \frac{2}{3} V_{dc} (S_{1M} + S_{2M} e^{j\frac{2\pi}{3}} + S_{3M} e^{-j\frac{2\pi}{3}}) & (4) \\ \bar{v}_A &= \frac{2}{3} V_{dc} (S_{1A} + S_{2A} e^{j\frac{2\pi}{3}} + S_{3A} e^{-j\frac{2\pi}{3}}) & (5) \\ P_A &= \frac{3}{2} \left(\bar{v}_r - \frac{2}{3} V_{dc} (S_{1M} + S_{2M} e^{j\frac{2\pi}{3}} + S_{3M} e^{-j\frac{2\pi}{3}}) \right) \cdot \bar{i} & (6) \end{aligned}$$

Where v_M , P_M , and S_{iM} ($i=1, 2, 3$) represent the main inverter voltage, power, and switching function while those of the auxiliary inverter are given by \bar{v}_A , P_A , and S_{iA} ($i=1, 2, 3$), respectively.

\bar{v}_r represents the output voltage, and P_{grid} represents the real power flow to the grid.

According to (6), it can be deduced that, for a given output power, super capacitor power varies with the major inverter dc-link voltage V_{dc} . Hence, super capacitor power can be controlled by controlling the major inverter dc-link voltage. Furthermore, according to (3), for a given output power, the major inverter power solely depends on the auxiliary inverter

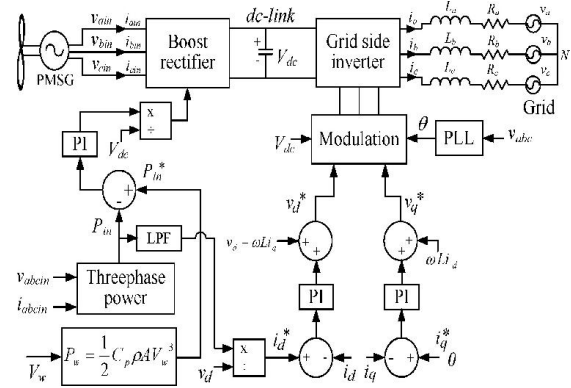


Fig.4. Controller block diagram of the proposed system.

Power .hence, the maximum power point of the wind turbine can indirectly be tracked by changing the major inverter dc-link voltage. The usual practice is to maintain this voltage at a constant level with the help of a controlled rectifier or a boost rectifier placed between the main inverter and the wind turbine generator (WTG) system. However, in the proposed system, the boost rectifier is used to vary the main inverter dc-link voltage and thus indirectly track the greatest power point of the WTG. The controller block diagram for this in direct maximum power point tracking (MPPT) is shown in Fig. 6. In this controller, the measured wind speed and the parameters of the turbine model are used to derive a power reference for the generator-side converter. The actual generator power is compared with the reference, and the mistake is fed into a proportional– integral (PI) controller which generates a voltage reference for the boost rectifier. This voltage reference is normalized to produce the modulation index for the boost rectifier.

IV. MODULATION AND CONTROL OF THE GRID-SIDE INVERTER

In the future system, the major inverter is operated in the six-step mode, which moves slowly from one vector to the next. This generates square wave outputs from the major inverter which get smoothened by the secondary inverter. Owing to this low-frequency operation, the major inverter switching losses get reduced. The

secondary inverter, which acts as an active filter, is operated at high switching frequency by utilizing a space vector modulation (SVM) method. Therefore, the overall modulation is a combination of the six-step mode and SVM. More information on this combined modulation technique can be found.

The grid-side inverter controller employs an inner current controller and an outer power controller as shown in Fig. 4. The grid voltage and current injected into the grid are converted into the synchronous reference frame. The direct component of the inverter output current i_d controls the active power trade with the grid while the quadrature component i_q controls the reactive power. Therefore, to generate a reference for the direct current component, the instantaneous active power of the generator-side converter is passed through an LPF. The quadrature current reference i_q^* is set to zero to keep the power factor at the grid connection point at unity. These active and reactive current references $(i_d^* \text{ and } i_q^*)$ are then compared by means of actual current components, and the errors are conceded through PI controllers to produce voltage references $v_d^* \text{ and } v_q^*$, respectively. Equations (7) and (8) are then used to calculate the amplitude and angle of the reference voltage vector. In (8), θ is the initial phase angle of the reference vector

$$A_m = \sqrt{v_d^{*2} + v_q^{*2}} \quad (7)$$

$$\alpha_m = \tan^{-1} \left(\frac{v_q^*}{v_d^*} \right) + \theta. \quad (8)$$

V. SUPERCAPACITOR SIZING AND IMPLEMENTATION ISSUES

The major reason of power fluctuations is the change of wind speed. Hence, the capacity of the energy storage system is also a function of the wind speed variation. In order to analyze this relationship, the wind is modeled as the sum of a dc quantity and a series of harmonics as in. In the following simulation, the wind speed fluctuation is assumed to be 20% of the mean value as in (10). The power captured from the wind can be expressed as in (11). ρ is the density of air, A is the swept area of wind turbine blades, and C_p is the coefficient of power conversion. Power fluctuations caused through the aforementioned wind speed change contain to be compensated through the energy storage system. Hence, the

$$v_w(t) = V_{w0} + \sum \Delta V_{wi} \sin(\omega_i t) \quad (9)$$

$$v_w(t) = V_{w0} \left(1 + 0.2 \sin \left(\frac{2\pi}{T} t \right) \right) \quad (10)$$

$$P(t) = 0.5 \rho A C_p v_w(t)^3 \quad (11)$$

Where v_w is the instantaneous wind speed, V_{w0} is the mean wind speed, ΔV_{wi} is the harmonic amplitude, ω_i is the angular frequency ($f = 1/T = \omega/2\pi = 0.1 \sim 10$ Hz), ρ is

$$E_{sc, discharge} = \int_{t_1}^{t_2} (P(t) - P_{grid}(t)) dt \quad (12)$$

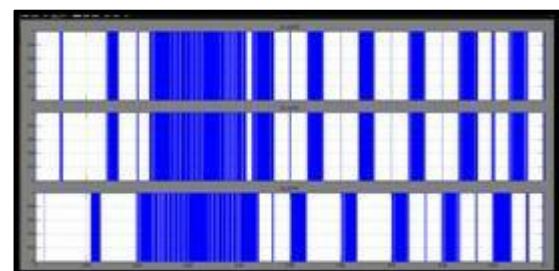
$$C_{sc} \geq \frac{2E_{sc, discharge}}{(V_{sc,H}^2 - V_{sc,L}^2)} \quad (13)$$

where $E_{sc, discharge}$ is the sum of energy taken away from the super capacitor during the discharging period, t_1 and t_2 are the starting time and end time of the discharging period, respectively, and $V_{sc,H}$ and $V_{sc,L}$ are the starting and end values of the super capacitor voltage.

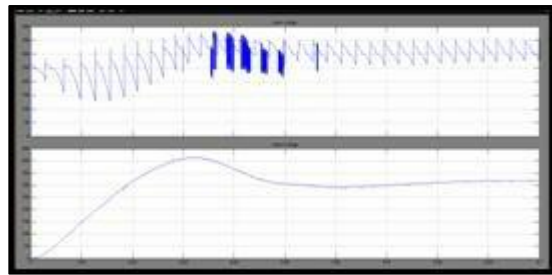
Super capacitors act as resistors on high frequencies (typically beyond few tens of hertz). Hence the future system requires an electrolytic capacitor to assist super capacitors at high frequencies.

VI. SIMULATION RESULTS

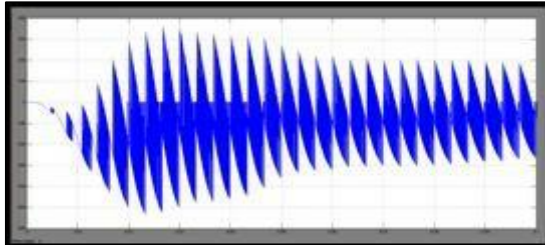
The proposed direct integration scheme has been tested using computer simulations on MATLAB/SIMULINK and the results are shown below:



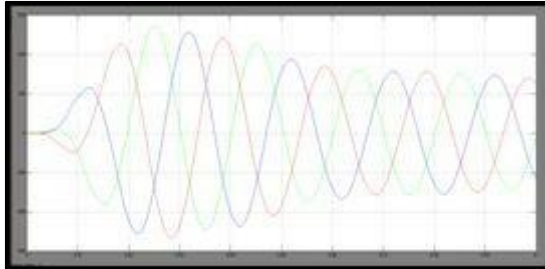
Auxillary Output



Boost Converter



Capacitor Charging And Discharging



Current Measurement

CONCLUSION

The undeviating integration of energy storage devices has a quantity of advantages such as reduction in power losses, cost, and complexity. Hence in this dissertation, the unpopular dual inverter topology was modified to attach a super capacitor bank directly into the dc link of the secondary inverter. The function of the future system was discussed in detail.

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A SMART HOME WITH RENEWABLE ENERGY SOURCE AND VEHICLE-TO-GRID FOR GRID

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Abstract— The main aim of our project is to create a optimization model to manage residential microgrid with solar power, energy storage and vehicle to grid system. The presents optimal strategies in home energy management system (HEMS) integrating solar power, energy storage, and vehicle-to-grid (V2G) capability for predetermined scenarios. The proposed system aims to address the demand response (DR) schemes, both real-time pricing and emergency load curtailment, Voltage to Grid mode of operation. In the interruption event, the HEMS operates in the vehicle-to-home (V2H) mode to ensure supply continuity. The control algorithms are experimentally implemented on the created hardware platform of EV and home batteries, solar power, and household loads with preset priorities. Both AC and DC charging technologies for EVs are considered. The HEMS simultaneously optimizes the scheduling of charging and discharging of EVs and home battery.

I. INTRODUCTION

ELECTRIC vehicles (EVs) provide a highly efficient mode of transportation with zero tail-pipe emission. The current estimate for the USA is that there will be 1.2 million EVs by 2020. Electric vehicles are, however, sustainable only if the electricity used to charge them comes from sustainable sources. Electricity generated from a fuel mix that is largely dominated by fossil fuels does not eliminate the emissions but mostly moves it from the vehicle to the power plant .While this can have environmental advantages, complete elimination of emissions is contingent on utilizing non-emitting resources for electricity production. It is here that the phenomenal growth in the use of photovoltaic (PV) systems for distributed generation and its falling cost over the years can have a direct impact. In today's world, the increasing need for energy and the factors, such as

increasing energy costs, limited reserves, and environmental pollution, leads the renewable energy

to be the most attractive energy source. Since these sources have unlimited supply and they do not cause environmental pollution, they are studied extensively lately and utilized more and more every day. Governments put in new legislations and feed-in-tariffs to encourage the investors to install new renewable energy utilization and studies on this topic are supported by many foundation. Renewable energy sources consist of solar energy, wind energy, geothermal energy, and wave energy which are considered . Since they exist naturally and they always renew It is one of the important topics that researchers and scientist work on to obtain energy from these sources and use this energy by transforming it into the form of electrical energy. Solar and wind energies have a distinguished place among these energy types. There are wind and sun everywhere on earth; therefore, there is more intense study on these sources. The aim is not only to obtain the energy but also to turn the energy to proper values, manage the existent energy, and terminate the harmonics. While managing all these, lowering the cost of the system in every step is taken into consideration. Today, producing electrical energy from these renewable sources appears to be the main. The combined operation of these systems is far more complex than operating them separately. In a system with only solar or wind energy, just one element is controlled. In a hybrid scheme, both sources are controlled individually and simultaneously depending upon the operating conditions and energy demand. During low sunlight conditions, photovoltaic (PV) solar panel cannot supply consistent power. Similarly, wind turbine will not work in conditions without wind. In this case, the

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required energy must have the structure to make up the lack of energy in conditions when this system does not work regularly. The lack of energy in loads. Here it is aimed at obtaining clean and sustainable energy in stable frequency and definite voltage.

OBJECTIVE OF THE WORK Management is important to assure both economical and efficient work of the system in combined usage of renewable energy sources. Variable weather conditions, day-night conditions, and rapid change in voltages make this necessary. Power management can be achieved by using maximum power point tracking (MPPT) [8] devices in order to determine the most efficient operating point of a system in a particular weather condition and by switching the systems so that they become active to support each other dynamically. It is important to keep the backup batteries full in times when there is neither sun nor wind. Without backup batteries there will be no energy in the system. In this case, for instance, it is computerized control mechanism's duty to link the system to the grid, connect the generator or determine, and manage the related situations. Nowadays renewable energy sources are structured in two ways as grid connected and standalone. Renewable energy sources as solar energy and wind energy can be used to feed loads far from the grid especially the home type ones. This article has been accepted for publication in a future issue of this journal, but has not been fully edited. Content may change prior to final publication. Citation information: DOI 10.1109/TIA.2020.2991652, IEEE Transactions on Industry Applications > REPLACE THIS LINE WITH YOUR PAPER IDENTIFICATION NUMBER (DOUBLE-CLICK HERE TO EDIT) < 2

However, there are problems in these types of systems when there is no sun or wind. Users become fully powerless after the batteries are flat which are used as backup systems. An alternative situation to this is to connect the loads to the grid if they are close to it, in conditions that there is no sun or wind and the batteries are empty.

In literature review, it can be seen that there are many researches which include wind turbine and PV solar panels used together. The main aim here is to gain maximum power according to environmental conditions and whether the obtained energy system. Solar panels systems according to changing load conditions. Similar to wind turbines and PV solar panels, the related. The energy and power flow in electrical power systems and other energy generation units. Energy sources such as PV solar panels, wind turbines, fuel cell, and diesel generator can be used both as standalone or hybrid. There are many studies and utilizations such as wind/PV, wind/fuel cell, PV/battery, wind/battery, PV/wind/fuel cell, PV/fuel

cell, PV/wind/battery, and PV/grid. The studies aim to increase power quality, ensure energy sustainability, and stabilize the amplitude and frequency of the voltage on the load side on a definite value. Besides, the energy management occupies an important part of the studies related to renewable energy utilization schemes. Energy management in renewable energy systems deals with both source and user side control issues to keep the overall system running smoothly.

In addition to this, MPPT is one of the important parts of the work, because IEMS calculates maximum power in WEC system. There are various methods which produce MPPT to obtain maximum power from RES. It is tried to run the system defining the maximum power point. While there are studies for calculation of instantaneous generated power decided according to measurements of the environmental conditions, studies which focus on the efficient controls are conducted for similarly used engines to produce maximum power production. It is aimed that the wind turbines work with maximum efficiency. In this study, there is an MPPT designed in a different way from these methods. Here, smart control software continuously and accurately calculates the maximum power. Obtained from the wind turbine. MPPT is an important part of IEMS.

Moreover, it is different than the other methods which include expensive control and measurement methods in that it is much cheaper and simpler. In this study, a power management system will feed the loads from a hybrid power generation system consisting of PV solar panels and grid. WES consists of a different and new MPPT method. The hybrid system is connected to a common DC bus, which is used as a power pool for sustainability. PV system is also connected to a backup battery unit to be charged for emergency usage when additional power is needed. In addition to the source side, the load side management is also very important for the renewable energy systems and also considered in this study. To environmental conditions, which keep continuously some amount of power in reserve and during instantaneous load changes control the system efficiently. This study is different from the others in its being efficient management approach and having different, cheaper, and simpler peak power point tracking. An increasing demand for electric vehicles (EVs) is expected worldwide to address energy crises and reduce environmental pollution. Large-scale integration of EVs will bring challenges to secure and economic operation of power systems. As a new type of load, EVs have impacts on different aspects of a power grid, such as generation planning, EVs may complement large-scale energy storage devices. In a power grid through vehicle-to-grid which enables the bidirectional power flow between EVs and a power grid. A significant amount of research has been carried out on the techniques. Applications, such as peak

spinning reserve frequency regulation, and system stability. In particular, frequency regulation services provided by EVs have been focused on the fast adjustments of Voltage to Grid power. This type of Voltage to Grid control suited for regulation services in electricity markets has been reported. Published literatures have investigated the economic feasibility control performing frequency regulation services. As the primary objective of EV integration into a power grid is to charge batteries satisfy their transportation usage control strategies must consider both frequency. Regulation and charging demands at the same time. Research on EV charging strategies combining these two aspects has been largely missing in the literatures.

With expected state of charge (SOC) level batteries, the contribution of EVs to PFR was evaluated control strategies were presented for EVs to participate in PFR. However, due to the lack of information on actual plug-in durations, it is difficult for these V2G control strategies to fulfill the charging demands of EVs. EVs participating in the supplementary frequency regulation (SFR) of an interconnected power grid have been analyzed. The use of EVs for SFR only makes sense if a large number of EVs are jointly considered. Therefore, a new entity, i.e., the so-called aggregators, is The V2G control for SFR has been discussed achievable power capacity which can be released from EVs. A power grid is estimated in a probabilistic manner and an optimal contract power capacity for providing frequency regulation is analyzed an aggregated EV-based battery storage model is built for load frequency control (LFC) simulations. Simulation results showed the effectiveness of Voltage to Grid to suppress area control error (ACE) for the West Denmark power system. Controllable loads such as EVs and household appliances were used to follow LFC signals. Although control strategies were developed. This study is different from the others in its being efficient management approach and having different, cheaper, and simpler peak power point tracking. An increasing demand for electric vehicles (EVs) is expected worldwide to address energy crises and reduce environmental pollution. The key to enabling the real-time optimal decision making under different modes of operation is to derive the solution with the existing practical constraints taken into account. This paper presents control strategies for operations of solar-based storage and EV-deployed households under predetermined scenarios. The difference between this work and mentioned past work is that the proposed HEMS accounts for the DR schemes, both real-time pricing and emergency load curtailment, V2G mode of operation. In the interruption event, the HEMS operates in the vehicle-to-home (V2H) mode to provide supply continuity security to the household. The control algorithms are experimentally implemented on the created hardware

platform of EV and home batteries, solar power, and associated power electronic converters. Both AC and DC charging technologies for EVs are included. The HEMS simultaneously optimizes the scheduling of charging and discharging of EVs and home battery. The main objective is to ensure the electricity continuity under the interactions among the HEMS subsystems. The main challenge is to design an efficient method for solving problems that, if they were solved once offline might appear trivial. The proposed HEMS is formulated for specific decision making problems such that the number of computations required is minimized. The proposed algorithm is tailored for a specific class of problems with a promising result. The paper is organized as follows. Section II describes the proposed HEMS configuration and functionalities. The optimal control strategy for each mode of operation is detailed in section III. In section IV, experimental results of operations under the predetermined scenarios are given. Section V concludes the work.

II. OVERALL DESCRIPTIONS OF PROPOSED HEMS To demonstrate the capabilities of both grid support and energy efficiency, the proposed HEMS incorporated with database server and graphical user interface (GUI) designs has been implemented to validate its capabilities. In Fig. 1(a), the single line diagram of proposed HEMS shows both AC (i.e., 220V, 50Hz) and DC (48V) electricity systems linked together by the bidirectional grid-connected inverter. Such system would practically provide the possibility of using DC EV, AC EV, or both DC and AC EVs in the home. Although AC charging station is typically installed at home, a few commercial EVs begin offering both DC and AC sockets. Thus, it is possible to charge these EVs with DC charging station at home, if available. Similarly, AC loads are typically used. However, DC loads would be of more interest to achieve higher efficiency in DC electricity system because AC-DC converter is not necessary.

Renewable generation is mainly from photovoltaic (PV) connecting to the unidirectional DC-DC PV converter to achieve one-way of power flow to the DC bus. In addition, the home battery, as an energy storage (ES), is included in the DC electricity system as well. In this proposed HEMS, the overall control system with communication protocols can be depicted in Fig. 1(b). The optimal strategies are primarily executed by HEMS controller, communicating with programmable logic control (PLC), three charging stations for ES, DC EV, and AC EV through TCP/IP protocol. All power converters, smart meters, DC transducers, and AC power meters are communicated by Modbus protocol using RS485 serial interface. The lithium-ion batteries of ES, DC EV, and AC EV are communicated by using CAN bus protocol. Both Modbus and CAN bus protocols are industrial standards widely adopted for

most power converters and lithium-ion batteries in the market, especially for EV and ES applications. Wireless communication such as ZigBee or Wi-Fi may be seldom found in these devices. The proposed HEMS is mainly implemented basing on available devices from the market. Tablet and mobile phone are also communicated with HEMS by means of Wi-Fi according to IEEE 802.11 protocol. This tablet is installed with web based application designed for power utility. It is used to send the following information to home, i.e., active power reference and electricity rate, which could be fixed, time of use (TOU), or real-time pricing rate for demand response and grid support events. On the other hand, the mobile phone is designed for home owner for monitoring key information only such as load status, total energy and power usage, etc, using web based application. Overall descriptions of each subsystem can be explained as follows.

A. HEMS station

The HEMS station is designed and built to connect with other subsystems both power and communication cables. The HEMS controller, GUI, and database are software implemented in the HEMS server, showing all GUI pages of other subsystems. The smart meters, DC transducers, AC power meters, PLC, magnetic contactors, 4-pole CB, TV display, and a personal computer (PC) with a touch screen are installed in this station. The main function of TV display is merely to show the overall real-time power flow measured by all above meters in the system. As seen in Fig. 1(a), the electricity grid is supplied to home through the 4-pole CB, smart meter, and then the 2-pole magnetic contactor. This 4-pole CB is only used for initiating the manual blackout for system testing. When a blackout event occurs, the islanding detection calculated by bidirectional grid-connected inverter using the sensed grid voltage and current would command turning off of this 2-pole magnetic contactor. At this moment, the smart meter is disconnected from both sides between grid and home. Fortunately, the HEMS server and all equipment still powered by uninterruptible power supply (UPS) in this station. When electricity is restored, the bidirectional grid-connected inverter can detect this restoration by using the sensed voltage, and then send this information to HEMS controller. Next, the turning on of this 2-pole magnetic contactor is commanded by HEMS controller when the electricity system within home is evaluated to be ready to properly connect the grid.

B. Energy storage station

Energy storage's charging or discharging operation (both demand and scheduling) is also optimally controlled by HEMS controller. The goal of ES control is to ensure the electricity stability throughout the day with uncertainties due to solar power generation, and EV charging/discharging and load demands as well as

unpredicted electricity blackout and grid support requested by power utility. In this station, the 5-kWh lithium-ion battery rated 96-V is primarily used as ES in the home. This battery capacity is typical size for general home use. The need of larger capacity is obvious in case of frequent events of longer electricity blackout. It can be charged or discharged by its charging station. This charging station consists of the 5kW bidirectional DC-DC converter and a PC implementing the battery charger controller, GUI, and communication to/from HEMS server. This PC and all equipment are powered by UPS installed in this station during electricity blackout. In addition, this charging station is automatically controlled by HEMS controller to perform the bidirectional power flow allowing both G2V and V2G in the optimal strategies. Users are not allowed to operate this charging station manually.

(a)

(b)

Fig. 1. Overall diagrams of proposed HEMS (a) single line diagram, and (b) control system with communication protocols

C. DC EV station

DC EV station is optimally controlled by HEMS controller, automatically managing their charging (G2V)/discharging (V2G) demand and scheduling in corporation of solar power, controlled loads, ES, and AC EV operations. For flexibility, the default operation of this station is configured as manual operation performed by users. This DC EV station has been designed for 96-V, 5-kWh lithium-ion battery of DC EV. Although it is not commonly found in the home, it can bring key benefits of efficient bidirectional power flow directly to/from DC loads, ES, and solar power within DC electricity system. Its hardware configuration is exactly same as previous energy storage station. Only a few differences are related to software configuration aspects such as GUI design especially for DC EV and possible selection of two operating modes, i.e., automatic operation controlled by HEMS controller or manual operation controlled by users.

D. AC EV station

Similar to DC EV station, both GUI design and possible selection between automatic and manual operations are implemented. Also, same hardware configuration such as UPS and PC implementing the battery charger controller, GUI, and communication to/from HEMS server are installed in the station. However, the 5-kW bidirectional AC-DC converter is installed on-board together with a 48-V, 5-kWh lithium-ion battery in the AC EV instead. This AC EV station is directly connected to AC electricity system in the home.

E. Load station

Total six wire-wound resistive loads installed in the

load station can be controlled by HEMS controller through PLC and their magnetic contactors. These loads would imitate home appliances. Power rating of each load can be manually adjustable according to types of home appliances. The ranges of power ratings are from 0 to 1.5 kW for each DC load and from 0 to 2 kW for each AC load. Additionally, in parameter setting on HEMS controller, these loads can be configured by users for their controllability priorities categorized as “top”, “medium”, or “low”. In the first category, HEMS controller cannot control any top priority load during their periods of user defined scheduling. On the other hand, HEMS controller can control medium and low priority loads with and without warnings, respectively. There is no user defined scheduling for these two priority loads. For medium priority loads, users could choose to reject or accept the controllability of HEMS controller when HEMS warnings are shown. These controlled loads would meet both demand side response and user satisfaction while supporting the grid and energy efficiency.

F. PV converter and grid-connected inverter station
Eighteen PV modules are connected into six strings on rooftop of building. Three PV modules are in series for each string. This PV system would be rated at 113.4 V and 5.94 kW. This power rating is typical size of PV panel installed in most homes according to available roof area. Its size is actually limited by Thailand’s solar rooftop regulation, i.e., maximum limits of 10 kW, 160 sqm and 20 kg/sqm. The 6.6-kW unidirectional DC-DC PV converter is usually operated basing on its maximum power point tracking (MPPT) algorithm. It is installed in the PV converter & grid-connected inverter station. Next, the 5-kW bidirectional grid-connected inverter is installed in the same station as PV converter. It is employed to bridge between DC and AC buses in the HEMS. It can be operated in either current source or voltage source. The islanding detection unit is also included by taking the measured grid voltage and current feedbacks. When electricity is blackout, the inverter would turn off the main magnetic contactor, isolating from the grid. Then, it would be operated in voltage source, otherwise current source.

The proposed HEMS has been successfully implemented as illustrated in Fig. 2. As explained earlier, six stations (or cabinets) containing power converters, PCs, server, meters, and others associated with subsystems as indicated in Fig. 1(b) are constructed and integrated together both power and communication. In this Fig., the functions of each numbered station can be explained as follows.

1. DC EV. It is emulated as DC EV consisting of a 96-V, 5-kWh lithium-ion battery on vehicle.
2. AC EV. It is emulated as AC EV consisting of a 48-V, 5-kWh lithium-ion battery and a 5-kW

bidirectional AC-DC converter on vehicle.

3. AC EV station. It performs AC charging station for AC EV.
4. PV converter and grid-connected inverter station. This station is installed with a 6.6-kW unidirectional DC-DC PV converter and 5-kW bidirectional grid-connected inverter.
5. Load station. It is emulated as both AC and DC household loads.
6. HEMS station. It is installed with HEMS server to mainly perform the optimal strategies of home energy management system.
7. Energy storage station. This station is installed with 5-kW bidirectional DC-DC converter. It performs as DC charging station for ES.
8. DC EV station. This station is installed with 5-kW bidirectional DC-DC converter. It performs DC charging station for DC EV.

Fig. 2. Overall hardware setup of proposed HEMS III. OPTIMAL STRATEGIES

In this section, all optimal strategies implemented as software in HEMS controller for EV-deployed household with ES and PV system are explained in details. A rule-based algorithm which is significantly more resource-efficient than other optimization algorithms have been developed for various modes of operation including cost minimization, stand alone and grid support. The following practical constraints are imposed on the algorithm while guarantees for reliable operation.

- 1) DC bus voltage: the DC bus voltage must always be maintained by one of the battery converters or the bidirectional grid-connected inverter to prevent the system from collapsing.
- 2) Ramp rate: when there is a power demand, the system can only response up to the maximum ramp rate of the participating converters.
- 3) Battery operating windows: a proper safety margin in operation of the Li-ion battery must be included and reflected the state of health of the battery. This may somewhat reduce an opportunity to utilize the EV batteries presented in the system.
- 4) Bottleneck of DC-AC and AC-DC conversions: in the developed hardware, the bottleneck of power conversion is mainly due to the bidirectional grid-connected inverter. This imposes a constraint on the AC power demand in the event of grid interruption and grid-support operation.
- 5) The bidirectional grid-connected inverter must be able to operate as a voltage source. That is forming stable voltage and frequency for the system.

The above constraints present the need to solve an optimization problem at every decision instant. Constraints of automatic energy management for all lithium-ion batteries installed in energy storage station,

DC EV, and AC EV are defined by users. There are six user's state of charge (SOC) parameters (i.e., $SOC_{MaxRating}$, SOC_{MaxOpt} , $SOC_{MaxUsable}$, $SOC_{MinRating}$, SOC_{MinOpt} , and $SOC_{MinUsable}$) as shown in Fig. 3. In this Fig., five intervals of SOC's called as A, B, C, D and E can be used to determine charging, discharging, or stopping operation of lithium-ion batteries whenever the current SOC falls into one of these five intervals. Both $SOC_{maxRating}$ and $SOC_{minRating}$ are typically determined by battery manufacturer. In reality, the battery's operation never reach to these extreme limits due to high risk of battery malfunction. Similarly, the SOC_{MaxOpt} and SOC_{MinOpt} are maximum and minimum SOC's allowing battery to be operated. On the other hand, the

$SOC_{MaxUsable}$ and $SOC_{MinUsable}$ are key parameters of normal operating SOC (interval C) configured by user. They are dependent on the user's behavior of low battery anxiety. To keep battery health, the proposed HEMS allows user to select stopping in manual operation of battery in DC EV and AC EV when their required SOC's are met the user needs. In case of ES, the narrow interval C tends to operate battery with a lower number of cycles, saving the battery life. This following interval determination of battery operations can be described below and is included in optimal strategies.

- $SOC_{MaxRating}$ SOC SOC_{MaxOpt} (interval A): battery needs to discharge only to decrease SOC, not exceeding its maximum rating of battery.
- interval C allows HEMS controller to fully control the batteries in the system. The lowest available SOC users need is guaranteed by this $SOC_{MinUsable}$ parameter.
- $SOC_{MinUsable}$ SOC SOC_{MinOpt} (interval D): unlike interval B, battery can be either charged or stopped to increase or maintain SOC.
- SOC_{MinOpt} SOC $SOC_{MinRating}$ (interval E): unlike interval A, battery needs to charge only to increase SOC, not less than its minimum rating of battery.

The optimal strategies are mainly designed to operate the proposed HEMS during an occurrence of three following events. Firstly, power supplying to/from this household can be requested by power utility for grid support functionality and demand response capability with highest user satisfaction. Secondly, during electricity blackout, home energy would be managed by HEMS controller in such a way that users would affect the energy shortage as least as possible. Lastly, the proposed HEMS is designed to manage the energy with minimum energy cost based on fixed, TOU, or real-time pricing rate during household consumption as load. These three situations will be described in details in the following subsections.

SOC
100%

A	discharge only
B	discharge, or stop
C	charge, discharge, or stop
D	charge, or stop
E	charge only

- SOC_{MaxOpt} SOC $SOC_{MaxUsable}$ (interval B): battery can be either discharged or stopped to decrease or maintain SOC.

- $SOC_{MaxUsable}$ SOC $SOC_{MinUsable}$ (interval C): battery can be charged, discharged, or stopped to increase, decrease, or maintain SOC. The $SOC_{MaxUsable}$ and $SOC_{MinUsable}$ are the maximum and minimum usable SOC's, respectively, that users expect on their battery's available energy during HEMS server automatically manages these batteries. Therefore, this

Accident Alert System with IOT and Mobile Application

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Abstract :

When we think of our loved ones, the first thing that comes to mind is their safety. With cities continuously increasing and traffic and road accidents on the rise, the safety of our loved ones commuting on a daily basis or travelling great distances is in jeopardy. People remain in touch with them to find out how they are doing and whether they have arrived safely at their destination. The current project aims to create an embedded system based on IoT technology that allows us to monitor and assure the safety of the people we care for on a continuous basis. To detect collisions, the system is equipped with a gyro sensor and several collision-detection sensors that are attached all around and under the vehicle's chassis.

Keywords: Accident Alert System; Accident Alert IOT; Family Accident Alert Application; Vehicle Collision Detection; Vehicle Accident Alert

I. INTRODUCTION

Safety is one of most essential parts of one's life and people give significant importance to their safety varying from health to driving. Driving being a most common and essential part of today's world, there exists a downside which is road accidents. With substantial increase in traffic every year, there is also a soaring rise in occurrences of accidents every year. This has been an unavoidable concern in everyone's thoughts while their loved ones are commuting or travelling in a vehicle. The family of a person who has been in an accident is frequently unaware of the situation and state of the person for a significant period of time after the accident. This can be a significant element that influences critical areas such as receiving proper assistance and receiving the best possible care and assistance from hospitals. Hospitals frequently do not deliver their best care to people whose families have not contacted them in a long time, and the proposed approach can help to change this state of unawareness and uncertainty among the family. The suggested system is intended to maintain track of two main elements of the vehicle: its state

(normal or unusually tilted) and the occurrences of vehicle collisions. If one of these elements changes unexpectedly, the system notifies all family members of a possible accident and communicates the person's location, which is accurate to within 2 metres. This can assist the family in responding quickly to the accident and providing the person with the best possible assistance and care.

II. ABOUT THE PROPOSED WORK

2.1. Literature Survey

This section overlooks similar existing solutions and examines their advantages and disadvantages. IOT The An existing system for accident detection, reporting, and vehicle navigation [1] is an approach to accident detection, reporting, and navigation. To determine the state of the car, this current system used a shock sensor, NFC tags, and GPS. To identify a person, this system uses the user's existing data. When airbags are deployed in an accident, the shock sensor is triggered, and the driver's location is immediately relayed to the server through HTTP Request. As soon as a request is received, assistance can be dispatched to the area and necessary medical assistance provided, as the person has already been identified. The Automatic Accident Detector and Reporting System [2] is a cutting-edge and innovative system.. methodology behind this system is by automating the alert system by automati-cally requesting for nearby medical assistance upona collision or an accident to the vehicle. This task is achievedby usage of an application by the public at the incident and byapplication linked to the sensors of the system. Both these entities contribute in de-termining the location of the accident and provide medical assistance as quickly as possible. User Alerting System for Vehicle Accident Detection System [3] is another similar system aimed at providing information about the accident. This system uses vibration sensor to detect abnormal vibrations the vehicle has undergone and reports the geographical location of the vehicle via SMS .

During the crisis, it does not provide any type of rescue or assistance to the passengers.

2.2. Work Proposed

The proposed work is explained at a high-level scope in this section. The system is divided into three distinct phases:

- (a) In-vehicle/on-vehicle hardware setup
- (b) Detection of Accidents
- (c) On request, an accident alert is sent to the family.

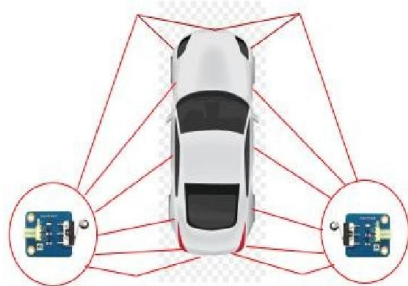


Fig. 1: Placement of collision sensors across the car chassis to detect collision or crash from all possible sides.

Along with collision sensors around the car, gyro sensor(s) are placed inside the vehicle in flat position. The gyro sensors are used to detect if the vehicle has undergone a tilt caused due to falling off the road or colliding into railing. Gyro sensors are secondary way of detecting if the vehicle has suffered a severe accident. The gyro sensors are calibrated in a way to trigger an alert only upon crossing certain tilt angle. Angles caused by the ramps, bumps or hilly regions are taken into consideration and the most abnormal angles will only be triggering an accident alert by the gyro sensor.



Fig. 2: InvenSense MPU-6050 gyro sensor which is used for measuring tilt angle of the vehicle

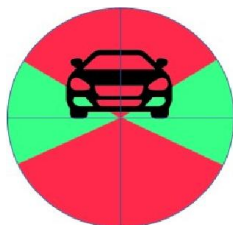


Fig. 3: Picture depicting the safe and abnormal angles of a car.

Green being a normal angle and red being an abnormal angle possibly stating an accident.

Sensors that are utilised to detect accidents. The GPRS module is used to serve while it is in the process of executing POST operations to the server even if the GSM network has a weak coverage region. The SIM800L module is largely employed because it operates on a cellular network, and most vehicles are always under cellular service.

The GPS Module is one of the system's most important elements, as it provides the vehicle's geographical location. The module is accurate to within 2 metres and provides geographic coordinates to the server on a regular basis. The module POST coordinates on to the server after an accident is detected until a successful POST is done.

The Second phase deals with accident detection. Accident is detected when the collision sensors or the gyro sensors trigger to an event. The collision sensors close the circuit upon a collision from either side thus giving a signal to the Arduino. The Arduino will then POST the coordinates of the location of the vehicle on to the server along with accident alert. The system is connected to mobile network under GPRS network and is ready to POST data at any given point of time.



Fig. 4: Screenshot of Accident Alert on a smartphone

When the user first launches the app, they are greeted by a screen with a red alert icon indicating the occurrence of an accident and an option to view the accident's location. The user can also choose to disable the alarm sound from this screen..

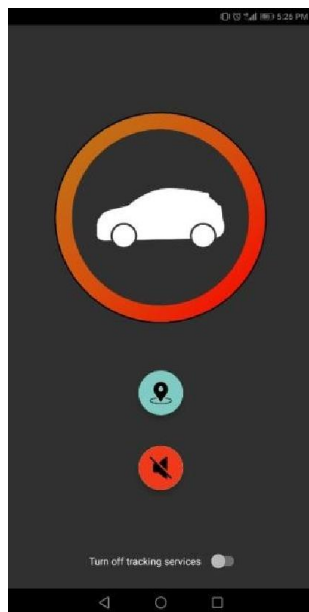


Fig. 5: Screenshot of Mobile Application for Proposed Work

When the user opens the maps, he or she can see the location of the accident and take the necessary steps to provide medical assistance to the victim. The screen indicating the accident location is shown in figure-6. When the user opens the maps, he or she can see the location of the in figure-6.



Fig. 5: Screenshot of Maps in Application pointing to the location of the accident.

2.2. Design and Workflow

The backbone of the proposed work is an active network. The system is connected to internet and a cloud service is used as a bridge between the system and the mobile application. A cloud service is necessary for this work as the embedded system cannot directly report to the mobile application from a remote location. The Fig. 6 represents the basic structure of the proposed system.

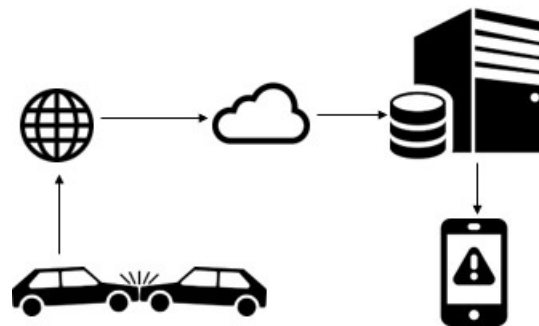


Fig. 6: Structure of the Proposed Work.

The embedded system and the application both check for the possibility of an accident on a regular basis. As the collision sensors complete the circuit and send a signal to the microcontroller, the microcontroller checks for a signal that indicates an accident has occurred. In order to keep track of the vehicle's state, the microcontroller continuously reads the values of the gyro sensor. If either of these sensors indicates that an accident has occurred, the system uploads the accident log as well as the vehicle's geographic locations.

On the application side, the programme checks for database updates on a regular basis. If the app detects a value indicating an accident, it will sound an alarm on the phone, alerting the family. The alert sound will not be ignored, and required steps will be taken to provide medical aid to the victim. Until the user addresses the application, the screen identifying the accident site is displayed. The suggested work's simple workflow is depicted in

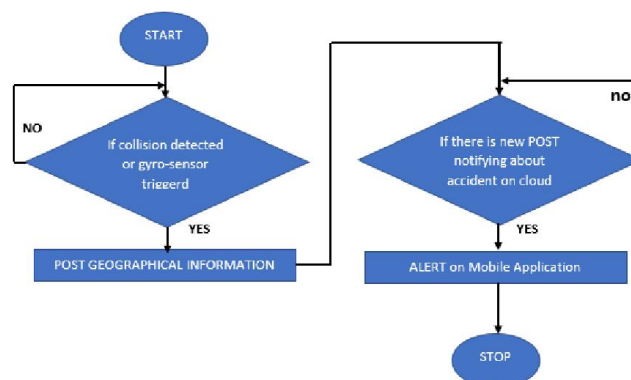


Figure 7.

Fig. 7: Flowchart of proposed system

III. CONCLUSION AND FUTURE WORK

The proposed and realised IoT system in this research may aid society in reducing the number of deaths caused by car accidents. The proposed strategy will assist the family in collecting information about their loved ones' accident as soon as possible, avoiding any delays in receiving information about the accident and its location. This method would assist people in keeping track on their family members who commute on a regular basis and removing the fear of their safety till they arrive at their daily destination. The proposed work could be improved or extended further by including a feature that notifies neighbouring emergency services such as hospitals and fire departments about the occurrence of an accident, allowing the individual to obtain the help they need.

Even if there is a shortage of aid from others, the essential assistance should be sought as soon as feasible.required .

ACKNOWLEDGEMENT

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ANALYSIS OF POWERSYSTEM STABILITY IN A STANDARD IEEE BUS SYSTEM WITH RENEWABLE ENERGY INTEGRATION

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Abstract -Nowadays, Renewable energy source are increasing day by day as well as the utilization of nonlinear loads are also increasing rapidly. Due to increase sharing of renewable energy generation and other Nonlinear, Industry loads in a grid connected system .The power profile of the bus system is disturbed and the disturbance weakens the parameter (voltage , frequency , real and reactive power) of bus system. When nonlinear loads connected to it, which also affect the neighboring buses. This leads to high imbalance in the grid system and aggravated power quality problem .The power quality (PQ) problems includes harmonics, sag, swell, disturbance in voltage profile. Which becomes a serious issue in power system recent days. In this paper standard IEEE test bus system is connected with Nonlinear load, industrial loads and Also integrated with Renewable Energy Source , solar power plant 100 KW. The real time data are obtained using power quality analyzer (FLUKE) for the industrial loads .The power quality profile of each bus and THD%(TOTAL HARMONIC DISTORTION) at the point of common coupling are measured using MATLAB SIMULINK this paper analyze the impact of PV integration on the bus system , power profile and power quality parameters are measured according to IEEE Standard 519 -2014 .

Key word: Renewable energy source, Harmonic, stability , THD, standard IEEE bus system, power system.

I. INTRODUCTION

The demand for power is increasing at shocking rate. Availability of conventional sources of energy are decreasing, and thus, the need to develop alternative, renewable, and sustainable resources of energy has arisen. [1]. Moreover, the number and multiplicity of nonlinear loads have also grown manifold in the commercial and residential sectors. Battery chargers, electronic ballasts, computers, and variable frequency drives inject harmonic rich currents into the electric distribution system these current harmonics cause distortions in the point of common coupling (PCC) voltage wave form and may consequently cause malfunctioning of other electric equipment that are connected to the distribution system. Therefore, power quality (PQ) improvement is an important requirement of today inter connected grid system. The total harmonic distortion of the voltage and current are analysis with IEEE 519-2014 and IEC 61000-4-30 power quality standards [2]

II. INTRODUCTION TO IEEE-14 BUS

The standard case IEEE 14 bus represents the part of the (AEPs) American Electrical Power System as shown in fig:1. This 14 bus test case not having any line limits and bus limits. Compared to old power systems, it has low base voltages and an surplus of voltage control capability of system. As system shown for good result purpose to increases the loadability of system and analyze the system for limits violation and depend on that put compensation on bus and observe the results and output. IEEE14 bus system has 14 buses, 5 generators, and 11 loads [10] following data as an input data for this paper. Table 1 and 2 shows the bus data and line data respectively.

By considering this input data to the MATLAB program. The voltage stability [10] also called as load stability, this is now a

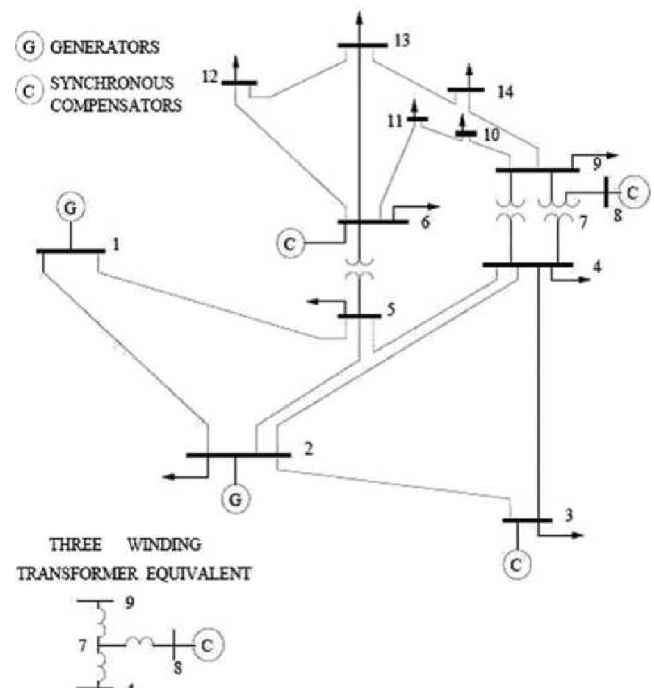


Fig .1 Standard IEEE14 bus system

The Newton Raphson technique is used for analysis; this is mostly preferred load flow technique method. Using the

major problem during planning and operation of electric power system. As power transferred to be increases and the interconnection of networks is also increases because of the advantages and there is need for mild use of available transmission facility [12]. Considering the voltage limits of 5% tolerance and simultaneously in this case we are not considering thermal limits, stability limits. However, the requirement of reactive power that it can be absorb, inject or generate into the system [7]. Some of the standard are detailed of individual harmonic in the following tables [3].

TABLE: 1 BUS DATA - IEEE 14 BUS SYSTEM

Bus No	Bus Code	Voltage Magnitude	Angle Degrees	Load		Generator				Injected MVAR
				MW	MVAR	MW	MVAR	Qmin	Qtnai	
1	1	1.06	0	30.38	17.78	40	40	0	0	0
2	2	1.045	0	0	0	232	0	-40	50	0
3	2	1.01	0	131.88	26.6	0	0	0	40	0
4	0	1	0	66.92	10	0	0	0	0	0
5	0	1	0	10.64	2.24	0	0	0	0	0
6	2	1.07	0	15.68	10.5	0	0	6	24	0
7	0	1	0	0	0	0	0	0	0	0
8	2	1.09	0	0	0	0	0	6	24	0
9	0	1	0	41.3	23.24	0	0	0	0	0
10	0	1	0	12.6	8.12	0	0	0	0	0
11	0	1	0	4.9	2.52	0	0	0	0	0
12	0	1	0	8.54	2.24	0	0	0	0	0
13	0	1	0	18.9	8.12	0	0	0	0	0
14	0	1	0	20.86	7	0	0	0	0	0

TABLE:2 LINE DATA - IEEE 14 BUS SYSTEM

Sendind end Bus	Receiving end Bus	Resistance p.u.	Reactance p.u.	Half Susceptance p.u.	Transformer tap
1	2	0.01938	0.05917	0.0264	1
2	3	0.04699	0.19797	0.0219	1
2	4	0.05811	0.17632	0.0187	1
1	5	0.05403	0.22304	0.0246	1
2	5	0.05695	0.17388	0.017	1
3	4	0.06701	0.17103	0.0173	1
4	5	0.01335	0.04211	0.0064	1
5	6	0	0.25202	0	0.932
4	7	0	0.20912	0	0.978
7	8	0	0.17615	0	1
4	9	0	0.55618	0	0.969
7	9	0	0.11001	0	1
9	10	0.03181	0.0845	0	1
6	11	0.09498	0.1989	0	1
6	12	0.12291	0.25581	0	1
6	13	0.06615	0.13027	0	1
9	14	0.12711	0.27038	0	1
10	11	0.08205	0.19207	0	1
12	13	0.22092	0.19988	0	1
13	14	0.17093	0.34802	0	1

III. MODELING

In this paper 100KW solar PV system is designed for IEEE 14bus system Grid connected 100-KW PV system. The PV model consists of 66 strings of 5 series-connected PV modules connected in parallel. Number of series- connected cells in each PV module is 96 and the open circuit voltage (Voc) and short-circuit current (Isc) of PV module is 64.2 V and 5.96 A,

respectively. The Voltage and current of PV module at maximum power is 54.7 V and 5.58 A, respectively. The maximum power of 100 kw is obtained at 1000 W/m² sun irradiance. The model consist of DC-DC boost converter at the range of 5-khz .The boost converter increases the PV natural voltage from 273 V DC to 500 V DC. Model consist of MPPT controller automatically varies the duty cycle in order to generate the required voltage to extract maximum power. 1980-Hz 3- level3-phaseVSCconvertsthe500VDClinkvoltage to 260 V AC and keeps unity power factor. 10-kvar capacitor bank is used for filtering harmonics produced by VSC.

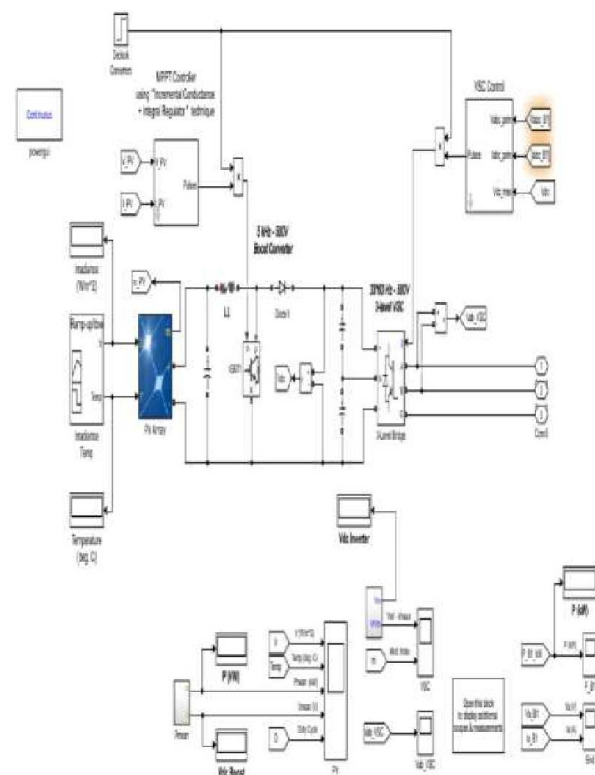


Fig .2 100KW solar PV array model

IV. SIMULATION RESULTS -1

This system is developed using the combination of both the standard IEEE 14 bus system and the 100kw solar PV array shown in fig 2 is carried out using the MATLAB /Simulink software. The solar PV is connected to the bus 8 as show in fig 3. Already existing bus 8 is replaced by the 100 kw Solar

PV system . Now bus 8 act as generator bus. Solar PV is already tested with various loads.

The load is considered to be nonlinear load. When the 50 KW load is connected in the network which is considered to be less than the maximum power output capacity of PV generation. The load utilizes the power from solar P V system from fig 4 the settling time and the peak overshoot is less. When the 100 KW load is connected in the network which is considered to be greater than the maximum power output capacity of PV generation. The load unable utilizes the power from solar PV system from fig 5 the settling time and the peak overshoot is high. To meet out the demand of the load the power is supplied from other buses of the system .

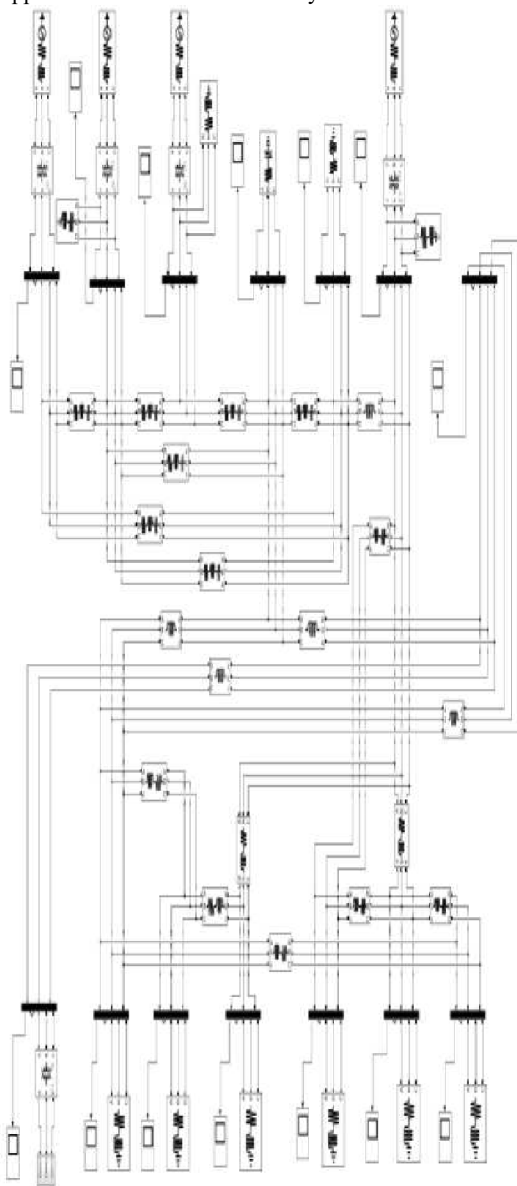


Fig. 3 MATLAB/Simulink model of PV integrated IEEE 14 bus system.

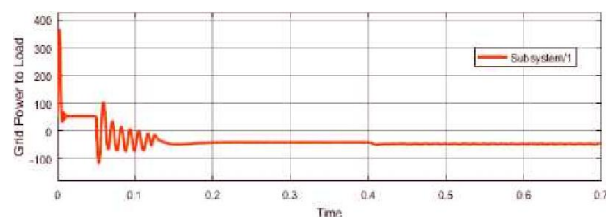


Fig. 4. Power level of Grid under 50 KW load.

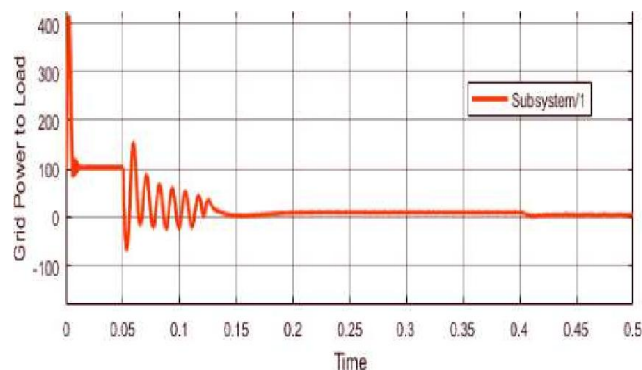


Fig. 5. Power level of Grid under 100 KW load.

IV.SIMULATION -IRESULTS

The MATLAB simulation result of bus voltages in three phase before and after integration of solar .the result shown in fig 6 is the FFT window it clearly shows the THD% and the frequency changes in per unit .the harmonic injected in standard IEEE bus system , because the solar energy produced is not constant and conversion of dc to ac current need converters for exchange , due to power electronic converter and nonlinear loads that are connected to the neighboring buses the waveform is distorted .The harmonic wave are analyzed using FFT and THD values are measured for bus 8 and the waveform are analyzed . Table 4 shows the THD value of each bus before and after solar PV integration. From this table we infer that the THD% is 4.21 when solar PV alone connected to the standard system where as when the nonlinear loads are added further THD% increase to 7.59. The harmonic distortion not only affect the bus 8 but also affect the buses connected within the network which can create a serious problem in maintaining the degree of safety and quality of the power system .

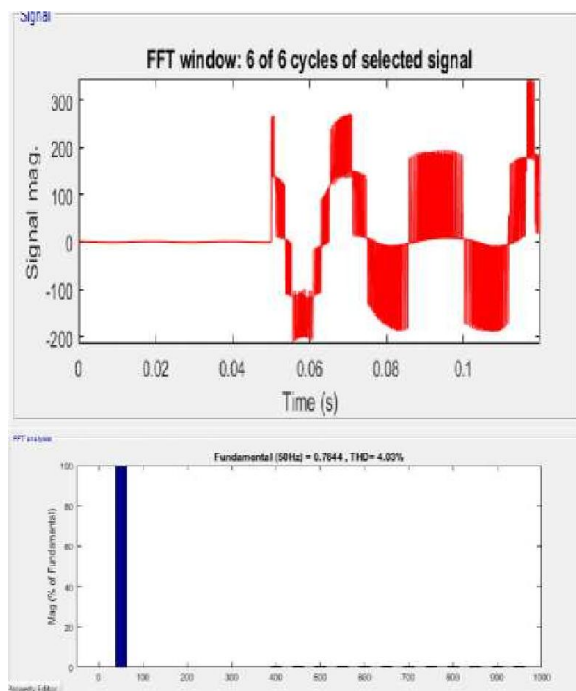


Fig :6 THD value of solar integrated bus (Bus 8)

TABLE 4: THD Measurement Of All Buses Before And After Solar Integration

B/S No	IEEE 14 BUS TEST BUS SYSTEM		SOLAR PV INTEGRATION OE BUS 8 IN IEEE 14 BUS SYSTEM		SOLAR PV INTEGRATED WITH NOMINEAR LOAD BOTH TOGETHER CONNECTED TO IEEE 14 BUS SYSTEM AT 8 th BUS	
	FREQUENCY (HZ IN PER UNIT)	THD(%)	FREQUENCY(Hz IN PERUNIT)	TO(%)	FREQUENCY(Hz IN PERUNIT)	THD(%)
1.	1.012	0.00	0.9891	0.18	0.997	0.91
2.	1.004	0.00	0.9809	0.19	0.9888	0.98
3.	0.99904	0.00	0.9564	0.33	0.9684	1.61
4.	0.9953	0.00	0.9646	0.28	0.9756	1.39
5.	0.9974	0.00	0.9309	0.74	0.9625	3.97
6.	0.9781	0.00	0.9701	0.30	0.986	1.28
7.	0.9781	0.00	0.9560	0.15	0.9636	0.88
8.	0.9838	0.00	0.8839	4.12	0.9419	7.59
9.	0.9784	0.00	0.9278	0.87	0.9517	2.93
10.	0.9816	0.00	0.9289	0.76	0.9503	2.61
11.	0.9784	0.00	0.9398	0.52	0.9556	1.94
12.	0.9816	0.00	0.9530	0.33	0.9642	1.36
13.	0.9754	0.00	0.9446	0.36	0.9567	1.46
14.	0.9862	0.00	0.942	0.61	0.9608	2.22

analyser it has several advantage and they are used to

V. SIMULATION RESULTS -2

The MATLAB Simulink model of IEEE 14 bus connected with industrial loads like motor drives and induction motors, real time data of a industry is also taken into consideration for analysis of the power quality profile and voltage profile and the real time data measured using FLUKE 435 ii series. FLUKE 435 is a power quality

measure power, voltage, current and energy of any system. The most admirable feature of power quality analyser is calculation of Total Harmonic Distortion (%THD) and Harmonic profile of a system at an instance.

This analysis is split into different categories to get a clear study about the impact of Non linear loads connected with a balance grid system.

Case (i) 2 kW brushless motor without drive connected to a grid

Case (ii) 12 KVA Induction Motor with driving System to a grid

Case (iii) parallel connected 2 kW brushless motor and 12 KVA induction motor connected in grid system

CASE (i): 2 kW BRUSHLESS MOTOR WITHOUT DRIVE CONNECTED TO A GRID

In this case 2 kW brushless motor is connected as load to a 33 kW grid system with 50 Hz frequency is shown in fig 7. Grid system consists of delta connected transformer 1 MW, a line inductor is also connected to the grid to provide protection to the 2 kW brushless Permanent Magnet (PM) motor. Demux is connected to the motor externally and control the motor changes like stator current, rotor speed, bus voltages etc.

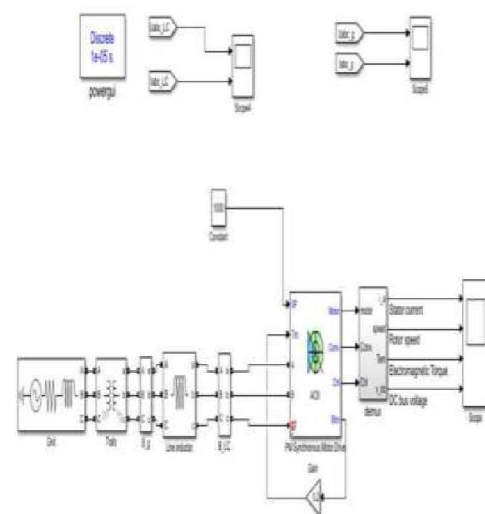


Fig 7 Grid connected Brushless synchronous motor

From the simulation result fig 8 it is clear that voltage and the current profile of the grid system is stable at point of common coupling (PCC) since synchronous motor without drive causes less harmonics and small distortion. It can be

cleared with the help of protection device and filters the stability of the system is under control state .

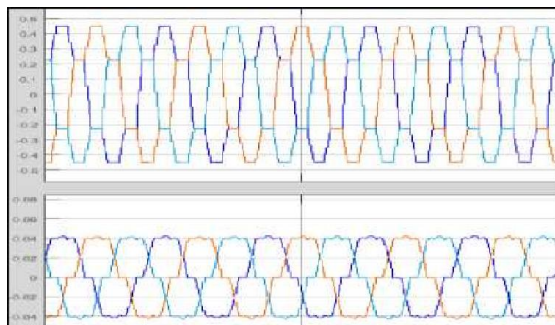


Fig 8 voltage and current profile of grid system at PCC connected with Brushless motor

CASE (ii): 12 KVA INDUCTION MOTOR WITH DRIVING SYSTEM TO A GRID

In this case 12 KVA induction motor along with driving system is conneted as load to a 33 kW grid system with 50 Hz frequency is shown in fig 9 Grid system consist of delta connected transformer 1 MW a line inductor is also connected to the grid to provide protection to the 12 KVA induction motor motor , Driver circuit is necessary for starting and speed contol of induction motor . Driver circuit records change in rotor speed , stator current . Power electronics switching drives are fast in operation and easy speed control compare to conventional speed control . The main draw back of driver circuit is harmonics . From the simulation result fig 11

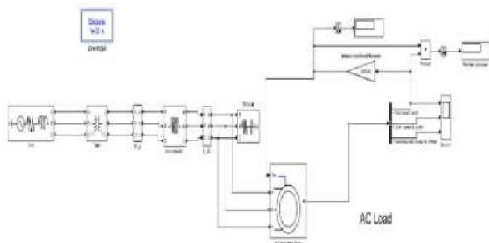


Fig 9 Grid connected Induction motor

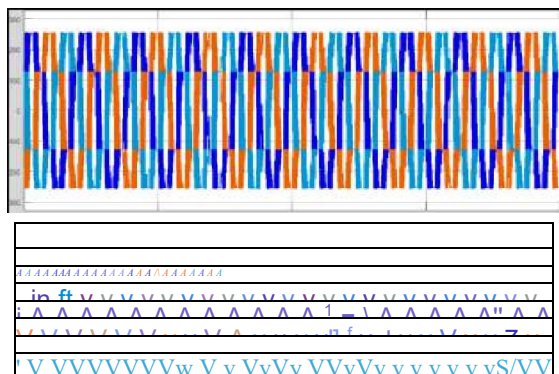


Fig 10 voltage and current profile of grid system at PCC connected with Induction motor

Distortion in voltage profile of the gird is high due to the power electronics switing devices , Harmonics caused by the driver circuit affect the entier gird system which leads to unstability in power system where degree of Quality and safty of power transmitted is also a biggest issue .

a. CASE (iii): PARALLEL CONNECTED 2 kW BRUSHLESS MOTOR AND 12 KVA INDUCTION MOTOR CONNECTED IN GRID SYSTEM

In this case combination of induction motor and brushless motor connected parallel to 33 kW grid system fig 11 voltage profile at Point of Common Coupling (PCC) is shown in fig 12. Harmonic produced is large and this cause serious issues in power system . current profile of the grid system is also highly damaged due to addition of non linear loads .This leads to mal operation of protective device , heating of power system equipment and stablity of the system becomes a big challenge .

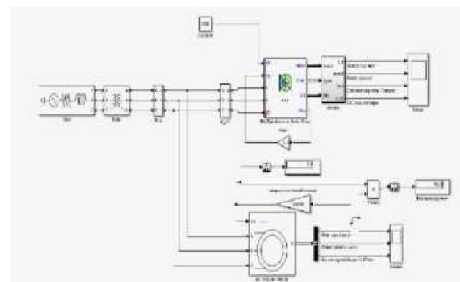


Fig 11 Grid connected induction motor and synchronous motor

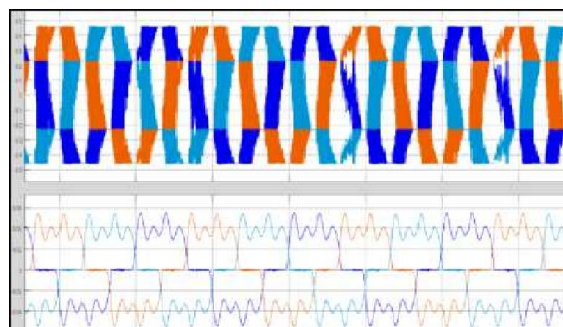


Fig 12 voltage and current profile of grid system at PCC connected with Induction motor and synchronous motor

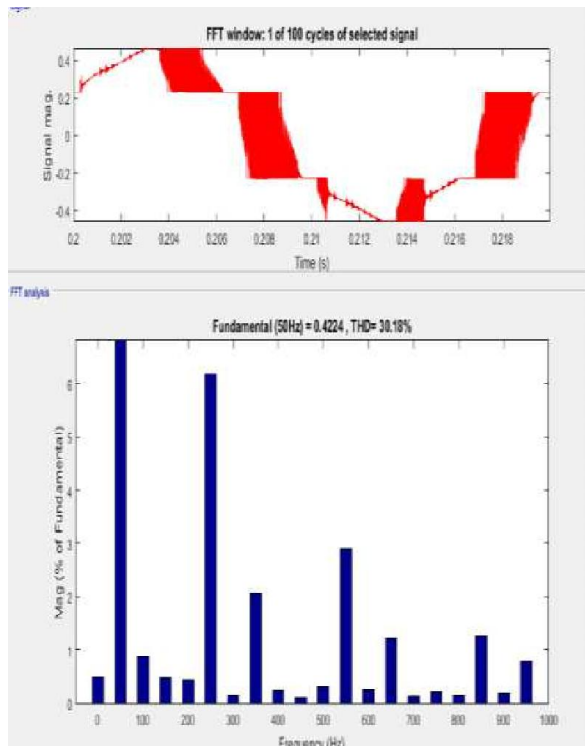
VI. EXPERIMENTAL RESULT

In this analysis experimental result of above three cases are given in the Table 5. which represent the Total Harmonic Distortion(%THD) and harmonic profile of the grid system at PCC .Fig 13 represent the FFT analysis observation it is clear that combination of induction motor load and synchronous motor cause more damage %THD is 30.18 % and the 3rd order harmonics is 3.48% compared to other two cases .This experiment gives a clear view that one system will eventually affect the other system which is connected within it , harmonics should be reduced with the help of

filters providing at the terimals of maximum usage of non linear load area including industries using huge kW of non linear load like induction motor drives .

Table 5 %THD and harmonic profile each cases

S.NO	PARAMETER	CASE I	CASE II	CASE III
1.	%THD	5.56 %	19.38 %	30.18%
2.	3 rd order Harmoics	0.76%	1.01%	3.48 %
3.	5 th order Harmoics	0.56%	1.43 %	6.19 %
4.	7 th order Harmoics	0.26%	9.44%	2.07%
5.	Frequency in P.u	0.6842	0.4362	0.4224

**Fig 12 FFT Window of grid connected induction and synchronous motor drives**

REAL TIME DATA INTERPRETED WITH STANDARD IEEE 14 BUS SYSTEM

The MATLAB Simulink model of IEEE 14 bus system has 14 buses, 5 generators, and 11 loads. Bus 2 of standard 14 bus system is fed by the real time data .Real time data is measured from FLUKE 435 series. Voltage and harmonic profile of the industrial load is taken as input of bus 2 is shown in fig 14

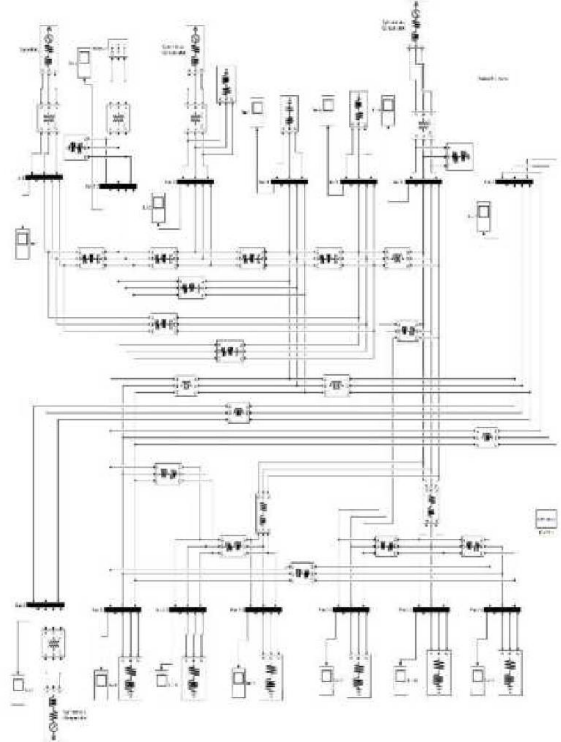
Fig 14 Bus 2 is Fed with real time data

Table 6 explain the THD profile of each buses , hence bus 2 is fed with the real time data which contain more harmonics . %THD of bus 2 is 1.05 % high compared to other buses. Fig 7.9 shows the FFT window of bus 2 .Table 6 also gives information the harmonic produced by bus 2 will affect the neighboring bus like bus 3 and bus 4 .Fig 15 It continuous as a chain an cause mal operation and stability of system get damaged

Table 6 THD profile of all buses

BUS NO	FREQUENCY in P.u	%THD in p.u
1.	1.086	0.82 %
2.	1.1	1.05%
3.	1.054	0.71%
4.	1.061	0.74%
5.	1.051	0.47%
6.	1.052	0.38%
7.	1.039	0.57%
8.	1.031	0.28%
9.	1.04	0.46%
10.	1.036	0.44%
11.	1.034	0.41%
12.	1.035	0.38%
13.	1.029	0.36%
14.	1.044	0.41%

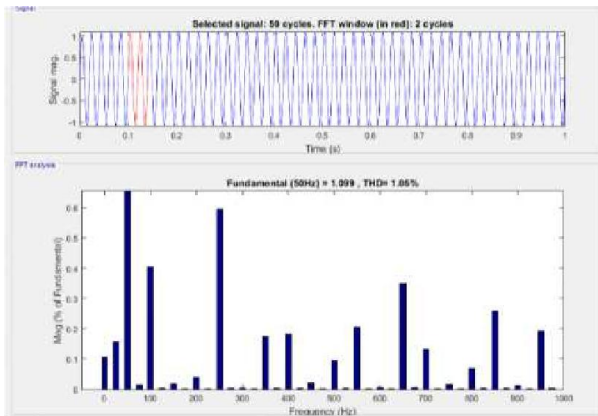


Fig 15 FFT window of bus 2 %THD = 1.05% frequency = 1.099

VII. SIMULATION RESULTS -2

Case (i) The grid connected system is operated with loads without motor drives. This causes less harmonics and small distortion in the grid system. Due to sudden changes distortion is maximum the grid system can be protected by the protective device under control state

Case (ii) The grid system is connected with inductive load with speed control drives. Power Electronic Switching drives are fast in operation and cause harmonics. The 3rd order harmonics is measured as 1.01% in per unit and %THD 19.38%

Case (iii) The grid system is investigated combination of inductive load with driving system and inductive loads without drives. The harmonic profile of the system is maximum, 3rd order harmonic is 3.48% in per unit and %THD 30.18%.

This Paper also investigate the IEEE 14 bus system with real time data. The real time data is collected with the help of FLUKE meter. Bus 2 of IEEE 14 Test bus system is replaced and real time data is fed. The performance of the IEEE 14 bus system is analyzed. The harmonic and voltage profile of the system is also monitored, any changes in the power quality profile of the waveform is analyzed using wavelet transform. Identification of low profile bus are isolated immediately and the harmonic waveform is analyzed to reduce the distortion level. This help in maintain the grid system under balance condition degree of quality and safety is maintained as per IEEE standard 519 -2014 and IEC 61000-4-30.

VIII. CONCLUSION

Simulation result 1 and simulation result 2 clearly shows that integration of PV in a IEEE bus system cause harmonic distortion violation of standards IEC and IEEE. This analysis gives us a strong monitoring of power quality issues and to ensure the system of stability is not affected.

IX. FUTURE WORK

This paper further work on the analysis of harmonic wave forms through wavelet transforms and focus on harmonic reduction in bus system before it affect the neighboring system.

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Automatic Railway Gate Operating System

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Abstract—This paper aims to provide an automatic railway gate at the level crossing replacing the gates operated by the gate keeper by detecting train and stuck on the level crossing, generating corresponding alert signal and controlling the gate. The solution is provided by developing a train detection module, stuck detection module, signal light module, alarm module, railway gate controller and a controller module. There are only four ultrasonic sensors in the train detection module and one ultrasonic sensor in stuck detection module. Both, train detection and stuck detection module generate high frequency signal through the ultrasonic sensors and detect the presence of object if the echo is received back by the sensors. Then the controller unit determines whether the obstacle is train or stuck and takes necessary steps by controlling the gate, alarm generator and signal lights. Experimental studies show that the proposed methodology provides a more cost effective, reliable and simpler railway gate controller than existing dominant work.

Keywords— Ultrasonic Sensor, Train Detection, Stuck Detection, Alarm generator, Level Crossing

I. INTRODUCTION

Railways being one of the safest and cheapest modes of transportation are preferred over all the other means of transport. So, it is essential to maintain and improve the current level of safety. A safe railway is more efficient and also a more attractive transport choice, enabling society to address the environmental and economic challenges of the 21st century. Railway safety is a crucial aspect of rail operation over the world. When we go through newspapers, we come across many railway accidents occurring at different railway level crossings and many people are dying. The place where rail track and highway/road intersects each other at the same level is known as “level crossing”. Bangladesh Railway said at least 201 people were killed and 349 others injured in

seven years till 2013[1]. This is mainly due to the carelessness in manual operations or lack of in the arrival of the train and make the gate pull up and pull down automatically. As a train approaches at the railway crossing from either side, the sensors placed at a certain distance from the gate detect the approaching train and accordingly controls the operation of the gate. To avoid the accidents, sensors placed at some distance from the gate detect the departure of the train. The signal about the departure is sent to the microcontroller, which in turn operates the motor and opens the gate. Thus, the time for which the gate is closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station. Also reliability is high, as it is not subjected to manual errors. For the railway, research on automatic gate controller systems has traditionally focused on two main areas: information transmission and gate controlling. Problems related to information transmission concern train detection and fast transmission of this information to the control unit. Problems those are related to the gate controlling very sophisticated and challenging. They comprise presence of train, immediate closing and opening of gates. The existing solutions have many complexities and require research for supporting railway.

This paper proposes the design and implementation issues of an automated railway gate controlling system. The system detects the train and stuck by analyzing the reflected waves, produces alarm, controls light signal and gate. When the whole train passes the level crossing then the gate is opened, alarm generator stopped and indicator light switched on green signal. If there is a stuck on the level crossing the stuck signal is switched on. The lesser equipment, reduced cost, simpler design and high efficiency of the proposed system prove the effectiveness over existing work.

The organization of this paper is as follows: Section 2 describes the related work of the proposed system. Section 3 explains the construction and operation of the proposed system. The experimental analysis and comparison of specification and accuracy are shown in Section 4. Finally, concluding remarks are drawn in Section 5.

II. RELATEDWORK

Recently, many automatic railway gate controllers with advanced technology are introduced to make the level crossing risk free. Al-Zuhairi et.al concentrated on unmanned level crossing which caused frequent accident[2]. For this, they proposed a Microcontroller based Railway Gate and Crossing Control system. In their system they used IR sensor and Microcontroller. In their system IR sensor sense the presence of train and send the signal to Microcontroller. Based on the signal Microcontroller controls the gate of the crossing. The main limitation of this system is low accuracy. The performance of IR sensor is not adequate at open place and light. Subrata Biswas et.al proposed pressure sensor based swift response anticollision system for an automatic railway gate control system[3]. The pressure switches which have been integrated in this system detect the condition whether any vehicle gets stuck at the level crossing or not. IR sensors have been used to detect the arrival and departure of the train.. The system is little bit complex and due to use of IR sensors performance is not satisfactory. Sandya Goutam et.al concentrated on predicting the major cause of railway accidents that is collision on the same track[4]. For this purpose a technology used to identify train positions, collision detection as well as the points at where collisions may occur has been used. The primary goal of this paper is anti-collision system to identify such collision points and to report the error cases to main control room, nearby station as well as grid control stations. To build this system, advanced sensing technology, long distance communication system (RS 485protocol), microcontroller (8051) and wireless Communication protocol has been used. But this system is not concerned with the collision between the train and vehicles on the road. J. Banuchandar et.al proposed and an automated unmanned railway level crossing system[5]. In this system when the train arrives in a particular direction the transmitter IR senses and generates appropriate signal, then at the same time the receiver IR receives the signal and generates an interrupt. The main problem of this model is low accuracy because the interrupt signal can be generated even if a small object crosses the IR Sensor. Krishna et.al proposed a model to control the railway tracks by using anti-collision techniques[6]. The model of railway track controller is designed by using 8952 microcontroller to avoid railway accidents. When we go through the daily newspapers we come across many railway accidents occurring at unmanned railway crossings. This model is implemented

using sensor technique. They placed the sensors at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. Also an indicator light has been provided to alert the motorists about the approaching train. In their system they have used anti-collision device which uses GPS for preventing collision between two train and IR sensor for gate controlling at level crossing. Sheikh Shanawaz Mostafa et.al proposed “A Radio Based Intelligent Railway Grade Crossing System to Avoid Collision”[7]. Their system offers an intelligent railway crossing control system for multiple tracks that features a controller which receives messages from incoming and outgoing trains by sensors. These messages contain detail information including the direction and identity of a train. Depending on those messages the controller device decides whenever the railroad crossing gate will close or open. This system is also complex and costly. Upon realizing the importance of automatic railway gate controller in India Acy M. Kottalil et.al proposed Automatic Railway Gate Control System gate[8]. The objective of their system is to provide an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper. The system reduces the time for which the gate remains closed. The system works on a microcontroller based control. Their proposed system uses ATmega 16A microcontroller. With the help of IR sensors the arrival and leaving of the system is monitored and the gate is operated accordingly. Anti Collision and Secured Level Crossing System was proposed by K. Vidyasagar et.al[9]. Their proposed model presents an automatic rail gate control system at level crossing positions and accident prevention mechanism. Two vibration sensors are used to control the open and close state of the gate at level crossing position. An ultrasonic sensor is positioned to detect an unauthorized object on the track. Open and Close status of the gate and unauthorized object on the track will be communicated with the central control room using wireless communication protocol. This system is complex, costly and requires a lot of equipments to implement. The complex design, low performance and cost has raised a question on the effectiveness of the approaches.

III. PROPOSED RAILWAY GATE CONTROLLING SYSTEM

The proposed system uses ultrasonic sensors which have very high efficiency. These ultrasonic sensors are placed near the rail line at the both side of the level crossing. These sensors which are placed at certain distance from the level crossing detect the train coming from either direction to the level crossing. Then the information of the train is transferred to the control unit and the control unit switches on the red light, generates alarm and pull down the gate immediately. The sensors of the either side determines whether the train passes a certain distance or not from the level crossing. If passes

the controller switches on the green light, stops generation of alarm and pull the gate up. If any vehicle gets stuck at the level crossing of the rail-line is detected by the sensor placed at the level crossing. Our proposed system is very simple and inexpensive with respect to other system but its performance is very laudable and excellent.

The design methodology of the proposed system is shown as follows.

A. The Design Methodology of the Proposed System

The proposed system consists of three main

Arduino Uno

iii) Alarm Generator iv) Light indicator. The block diagram of the proposed system is shown in Fig. 1.

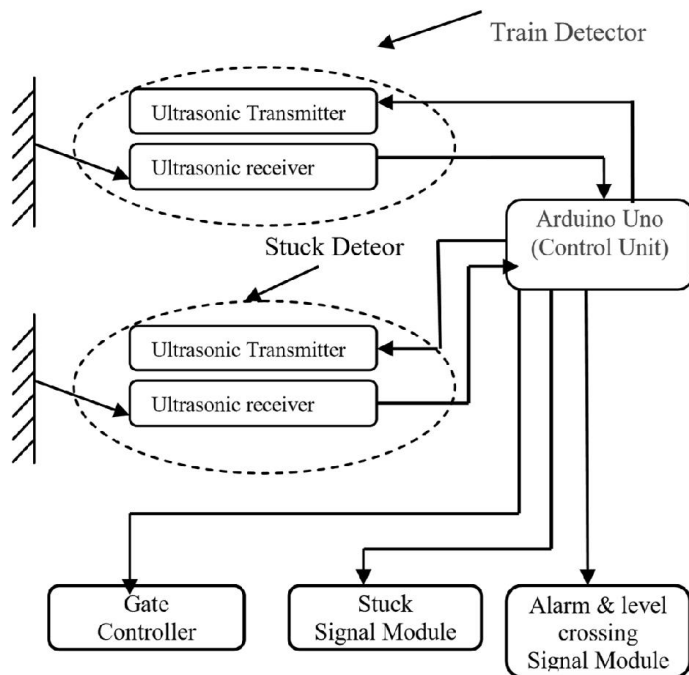
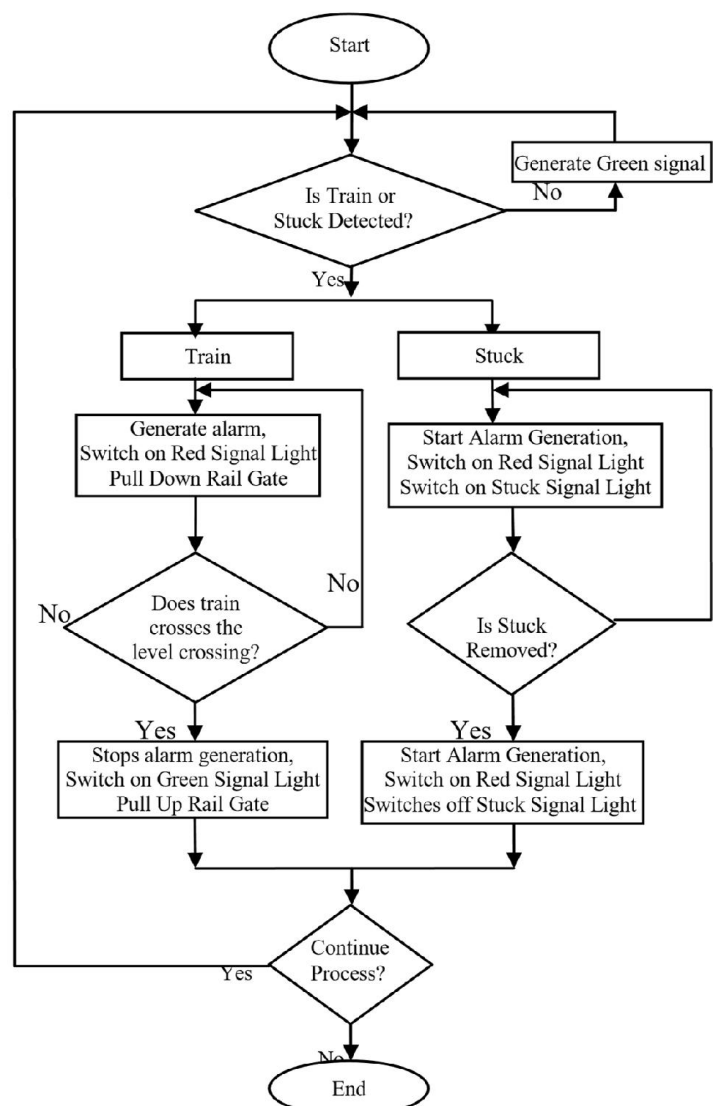


Fig.1. The block diagram of the proposed system

components. These are: i) Ultrasonic sensor ii)

The ultrasonic sensors which are placed at both sides of the level crossing detect the train and another ultrasonic sensor which is placed at the level crossing detects the stuck of vehicle at level crossing. Once the ultrasonic sensors are triggered, the sensors will generate and transmit ultrasound in the forward direction. This ultrasound will be reflected back to the sensor if any object is present within 3 meter range. The ultrasonic sensors are triggered at a regular time interval. If the both ultrasonic sensors of the any side of level crossing receive the reflected sound then the controller unit decides that a train is coming. If the ultrasonic sensor place at the middle of the level crossing receives the reflected sound continuously for a certain period then stuck is detected. If the train is detected, the



controller measures the direction of the train, switches on the red lights, and generates alarm through alarm generator and pull down the gate immediately. This situation remains unchanged until the train passes the both sensors of the other either side. After that the controller pulls up the gate, stops sound generation and switches on the green light

immediately. When the stuck is detected, the controller switches on the stuck signal light of the both side of line crossing so that the train operator can take necessary steps to avoid devastating accident. The flow chart of the proposed system is presented by following figure Fig.2. The flowchart of the proposed system

B. The Train and Stuck detection

The scan angle of the proposed system is set to 0° because the sensors are placed parallel to the train. Ultrasonic signal transmitter and receiver are used for detecting the train and stuck on the level crossing in this system. Two ultrasonic sensors are located at the left and another two sensors are located at right side of the level crossing. The pair of sensors are placed one Km apart from the level crossing and distance between two sensors of a pair is 10m. The transmitter emits the ultrasonic wave simultaneously and the receivers get the reflected wave. By analyzing the reflected wave the object can be detected. In the proposed system if two sensors of either side of the level crossing detects object at a time then it is assumed that a train is coming because 10m long object running through the rail line is generally the train. Obstacle is calculated using TOF (time of flight). In the proposed system The Ultra sonic sensors are place 1.5m apart from the rail line and it is considered that The maximum operating speed of train of Bangladesh is 100 km/h. The time taken to travel 1km, the distance between the sensor meter is 36 seconds. If no obstacle is found then the sensors are triggered at the time interval of 1s seconds. If any obstacle is found by any sensor the system triggers the sensor repeatedly at 0.5s second interval.

C. Detection of Stuck on the level crossing

When there is a stuck on the level crossing the ultrasonic sensor which is place at the middle of the level crossing can detect the stuck. The scan angle of the sensor is set to 60° . The sensor is triggered in every second. The received signal of the receiver is analyzed in every 10 seconds. If all transmitted signals are reflected and received by the receiver then the controller decides that there is a stuck on the level crossing.

D. Warning and light signal generation

When a train is found, the controller starts generating alarm sound, switches off the green signal and switches on the red signal at both side of the road. Drivers stop their vehicles as soon as possible whenever they notice the red signal and alarm sound. When a stuck is detected on the level

crossing the controller switches on the stuck signal lights so that the train operators can take decision to avoid collision.

E. Rail gate controlling

The rail gate at the level crossing is operated according to the train coming towards the level crossing. The gate is always up position and when a train comes towards the level crossing the rail gate is pulled down. When the train passes the train a certain distance from the level crossing then the gate is pulled up. In our proposed model we have used two servo motors. The motor is operated from 0° to 90° . Initially the gate is perpendicular to the ground and when the gate is pulled down then it becomes parallel to the ground. In our proposed system the gate is placed two meters apart from the both side of the level crossing. Gates, signal lights and alarm are synchronised by the control unit. When the train comes towards the level crossing the controller switches on red signal lights, starts alarm generation and pull down the gate at a time. When the controller observes the train passed then the level crossing it immediately switches off the red signal, switches on green signal, stops alarm generation and pull up the gate at a time.

The properties used for the several conditions depending on the presence of train are shown in Table I.

TABLE I. THE PROPERTIES USED FOR THE SEVERAL CONDITIONS DEPENDING ON THE PRESENCE OF TRAIN.

Conditions for signal and alarm generation	Stuck signal	Alarm Generator	Level Crossing signal	Gate Position
Stuck on the level crossing	On	Off	Green	Up
Train coming but distance between level crossing and train > 1km, no stuck on level crossing	Off	Off	Green	Up
Train coming but distance between level crossing and train > 1km but stuck on level crossing	On	Off	Green	Up
Train coming but distance between level crossing and train ≤ 1km but no stuck on level crossing	Off	On	Red	Down
Train passing level crossing	Off	On	Red	Down
Train passed level crossing	Off	Off	Green	Up

Table I. shows that at first stuck on the level crossing is checked and necessary actions are taken. Secondly the position of the train is considered. If the train is more than one kilometre apart from the level crossing, our proposed system does not change any of its status. But when the distance is less than or equal to one kilometre then the gate is pulled down, alarm is generated and red signal of the level crossing is switched on. When the train crosses the level crossing then red signal is switches off, green signal is switched on, alarm is switched on and get is pull on.

System	Proposed System		
Detecting Range	Distance / Angle	Train Detector	Stuck Detector
	Distance(cm)	200cm	300cm
	Angle(°)	0	60
Power Supply	5v DC		
Total Cost	\$50		

IV. EXPERIMENTAL ANALYSIS

This section describes the construction, specification and experimental results of the prototype of the system.

A. The Prototype of the System

The prototype of the system is according to the figure as shown in Fig. 3. According to the specification there are five ultrasonic sensors. At the center point of the road which is two meters apart from the level crossing there is an ultrasonic sensor. This sensor detects stuck on the road. Among the four sensors two sensors are placed at the left side and another two sensors on the right side of the level crossing for train detection. There are two stuck signal lamp near the each pair of ultrasonic sensor. There are also two level crossing signal modules and two alarm modules. One level crossing signal module and alarm module is placed each side of road motorists about the approaching train. Each side of the level crossing there is servo motor to control the gate.

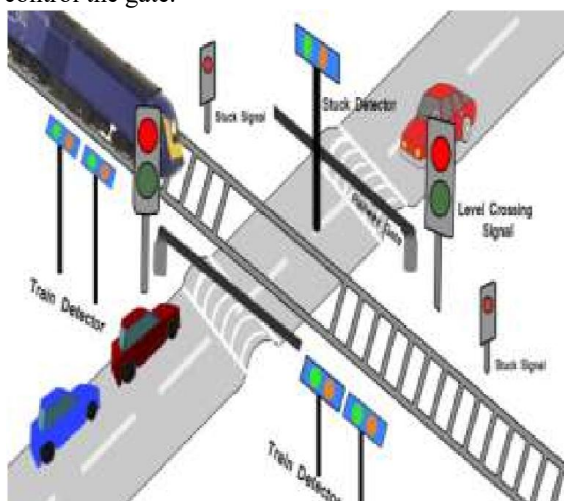


Fig.3. The prototype of the proposed system

TABLE II. THE SPECIFICATION OF THE PROTOTYPE OF THE PROPOSED PROPOSED SYSTEM

B. Experimental Results and Discussion.

To measure the performance of the proposed system we conduct several experiments. We design different cases like stuck on level crossing, train is apart from the train detector sensor with no stuck, train crossing the train detector sensor, train crossing the level crossing, train passed a certain distance from the level crossing. Based on these cases the Almost in every case we get the desired result. The performance of the system does not depend on the speed of the train, temperature and weather. The accuracy of the proposed is very laudable. So our proposed system is very trustworthy.

V. CONCLUSIONS

To save the human life and vehicles from miserable train accidents is a challenge of the era of modern science and technology. The working model was fabricated within the laboratory premises. The results exhibit that it is one of the expedient approach for secure railway system. The ultrasonic sensors detect the train and stuck on the level crossing very quickly and communicate with the control unit. The control unit takes proper steps which lead the train and vehicles movements either to move forward or to stop to avoid collision. Consequently, this is able to play a great contribution to the railway gate automation with reliability and lower cost. In future this developed working model will be equipped with GPS to navigate the position of the train and the track to avoid collision between two trains.

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AUTOMATIC RAIN SENSING CAR WIPER

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Abstract— Today's car wipers are manual systems that work on the principle of manual system. we propose an automatic wiper system that automatically switches ON detecting rain and stops when rain stops. our project brings forward this system to automate the wiper system having no need for manual intervention. in this project, we use microcontroller along with a rain sensor and a servomotor. the moisture is measured via analog output pins which are present in the sensor, the wiper starts rotating when a threshold of moisture is exceeded. the module here is completely based on op-amp. the information sensed by the rain sensor is sent to microcontroller. it consists of an on-board power supply and analyzed by and it further controls the servo motor based on the processed information. the information about the intensity of the rainfall and speed of the wiper. the rain sensor is connected to the motor. the blades of the wiper are connected to the servo motor.

Keywords—Automatic, sensing, rain sensor

I. INTRODUCTION

A car wiper is a device which is used to remove droplets of rainwater from a windscreen. Nowadays, each and every vehicle is provisioned with the wiper to avoid the accidents and to decrease the human intervention in controlling the wiper to ensure luxury. A wiper generally consists of a metal arm and a long rubber blade. In some vehicles, pneumatic power is used. Here, the metal arm gets powered by an electric motor. The blade moves in clock-wise and counter clock-wise direction on the glass, pushing the water from the surface of the glass. Modification of speed is automatically done based on the intensity of the rainfall. Two synchronized radial type arms are used in most of the automobiles, whereas pantograph arms are used in commercial automobiles. A lot of reasons are responsible for accidents but the major reason for the occurrence of accidents during the rainy season is due to a lack of proper vision. The objective is to construct a self-starting car wiper system which starts automatically on sensing the rainfall. Automatic adjustments to the wiper speed are made based on the intensity of rainfall. The project is constructed using microcontroller, Rain sensor, Servo motor. Adjustment to the speed of the wiper is made according to the intensity of rainfall which improves and ensures the safety. This project is a small step towards the comfortable and to save our time.

II. EXISTING SYSTEM

Every year during the rainy season, more than 2 million people die worldwide because of accidents in the rainy season according to world health organization. People end up dying because of small mistakes. Today's car wipers need human intervention to start the wiper and to control its speed. In this type of manual switching, the driver needs to switch on the wiper when needed and need to adjust the speed of the wiper as required. This causes inconvenience to the driver during rainfall. He can neither concentrate on driving nor focus on the adjustment of the speed of the wiper.

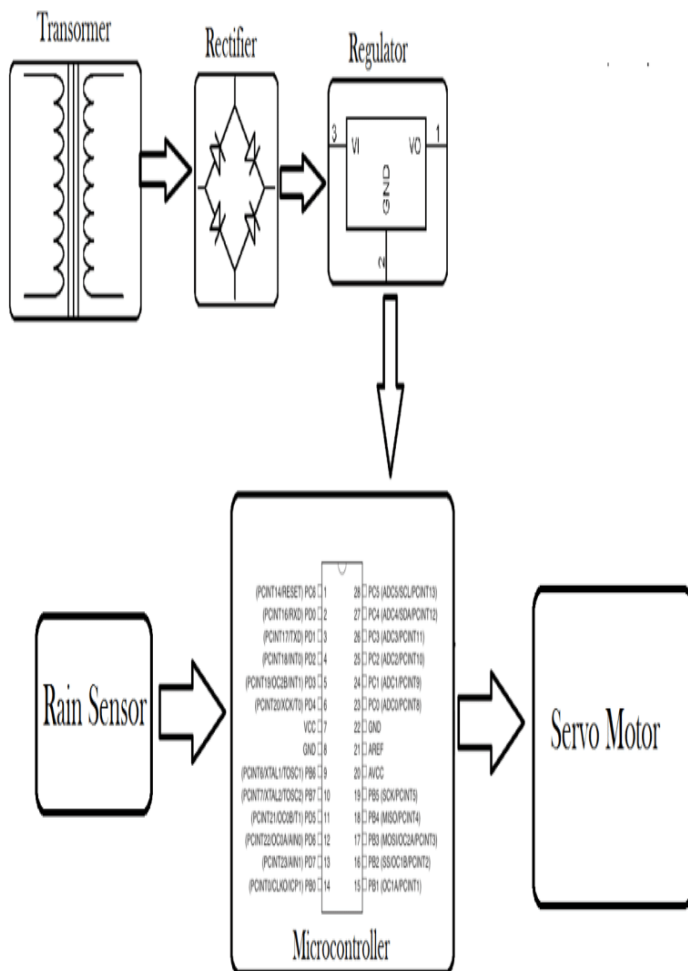
III. LITERATURE SURVEY

Tapan.S Kulkarni, This project deals with the simple and ease design of semiconductor. then, automatic rain wiper system. It is semi because it is implemented 1st time in auto vehicles. This system is developed by using 8051 microprocessor Shantanu Dharmadhik In this project they present automatic rain wiper system used to remove raindrops and activate automobile windshield wipers without driver interactions. Automatic wiper which sense raindrops with an optical rain sensor and controls Hidedki Kajioka, An the wiper interval. This automatic wiper is implemented by combining an existing wiper system with a rain sensor and controller. Mr.Anil, G.Bansode, Automatic windshield Wipers play a key role in assuring the driver's safety during precipitation. The system, requires driver's constant concentration in adjusting the wiper speed.

IV. PROPOSED SYSTEM

In this Project we propose an automatic car wiper system which turns on automatically when the rain starts and stops when the rain stops. In this project there will be no need for physical intervention of man for controlling car wiper. In this Project we use a servo motor, rain sensor microcontroller control in the wiper system. Whenever the rain falls, the rain sensor detects the intensity of the rainfall and sends the information to microcontroller. The information collected by the rain sensor is processed by the microcontroller and send the processed information to the servo motor to take the desired action. The rain sensor consists of digital analog output pins from where the intensity of the rain is calculated. The information which is sent to the microcontroller is responsible for controlling the speed of the wiper and based on the intensity of the rainfall.

BLOCK DIAGRAM



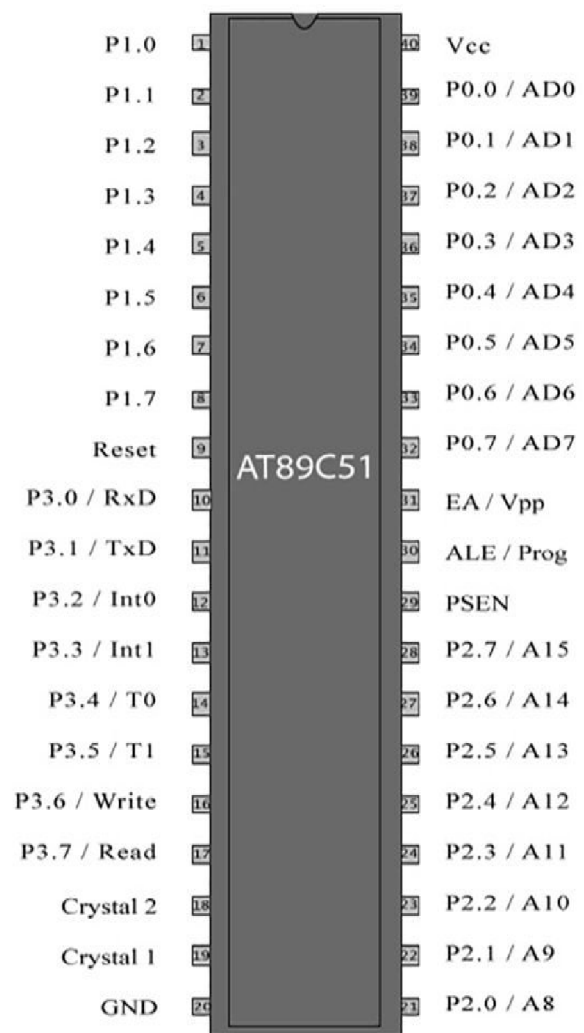
V.SYSTEM SPECIFICATION

- Microcontroller
- Rain sensor
- Servomotor
- Transformer
- Regulator

A. MICROCONTROLLER

The AT89C51 is a low power, high performance CMOS 8 of Flash programmable and erasable read reprogrammed in—system or by a conventional non flexible and cost—only memory. The on bit microcomputer with 4K bytes--volatile memory programmable chip Flash allows the program memory. By combining a versatile 8 bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer that provides a highly effective solution to many embedded control applications .

PIN CONFIGURATION



B. RAIN SENSOR

A rain sensor module is an easy tool for rain detection. It can be used as a switch when a raindrop falls through the raining board and for measuring rainfall intensity. a typical Rain Sensor Module. Due to its compact design and light weight, it can be easily attached into any system. The module features, a rain board, and the control board that is separate for more convenience, and sensitivity adjustable through a potentiometer. A raindrop sensor is a board coated with nickel in the form of lines. It works on the principle of ohms law. When there is no raindrop on board.



Resistance is high so we get high voltage according to $V=IR$. When raindrop present it reduces the resistance because water is a conductor of electricity and the presence of water connects nickel lines in parallel so reduced resistance and the reduced voltage drop across it.

C.SERVOMOTOR

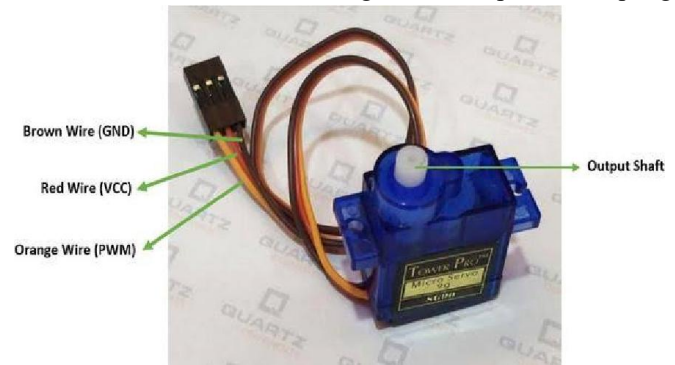
Servo motors are self contained mechanical devices that are used to control the machines with great precision. Usually the servo motor is used to control the angular motion from 0° to 180° and 0° to 90° . The servo motor can be moved to a desired angular position by sending Pulse Width Modulated signals on the control wire. The servo motor understands the language of pulse position modulation. A pulse of width varying from 1 millisecond to 2 milliseconds in a repeated time frame is sent to the servo around 50 times in a second. The width of the pulse determines the angular position. For example, a pulse of 1 millisecond moves the servo towards 0° , while a 2 milliseconds wide pulse would take it to 180° . The pulse width for in positions can be interpolated accordingly. Thus a pulse of width 1.5 milliseconds will between angular hift the servo to 90° . It must be noted that these values are only approximations. The actual behavior of the servos differs based on their manufacturer. A sequence of such pulses (50 in one second) is required to be passed to the servo to sustain a particular angular position.

When the servo receives a pulse, it can retain the corresponding angular position for the next 20 milliseconds. So a pulse in every 20 millisecond time frame must be fed to the servomotor.

D. TRANSFORMER

For simplification or approximate purpose it is very common to analysis the transformer as an ideal transformer model as presented in two image an ideal transformer that is lossless and perfectly coupled that is there are no energy losses and flux is completely

confined with in the magnetic core .perfect coupling



implies infinitely high core magnetic permeability and winding inductances and zero net magneto motive force.is punctuated within the parentheses.

WORKING

The rain sensor is placed on the vehicle front glass. The rain sensor servo motor and other required components get power from the battery. When the rain droplets fall on the rain board, the control board of the rain sensing unit sends the signal to the Microcontroller. The Microcontroller estimates the intensity of rain fall by manipulating the signal given by the rain sensor module and then gives signal to the servo motor according to the rain fall. The servo motor takes the signal in the form of pulse width modulation, which is the representation of the intensity of the rain drops. The servo motor then rotates the wiper in accordance with the signal given by the microcontroller. The wiper rotates in accordance with the intensity of the rain fall. For instance, if the rain fall intensity is very high the pulse width modulation will be high and hence the servo motor will drive the wiper speedily and if the rain fall intensity is low then wiper will rotate slowly. This system avoids the interaction of the vehicle operator to operate the wiper. So, operator will concentrate on the driving

the sensor acts as a variable resistance board. The relationship between rain intensity and resistance has been determined to be inversely proportional to each other. The increase in number of raindrops results into decrease in the resistance of the sensor. The sensor then transmits the signal, the signal is received using microcontroller which determines the intensity and transmits the signal to servo motor in the form of pulse width modulation and the mode of action of wipers is then switched on in accordance with the intensity of the rain falling

the rain sensor is placed over the windshield and the servo motor powers the wiper blades, which are directly connected to the motor. When the signal is received, the microcontroller is attached to all of the three components, namely, the rain sensor, the servo motor and . The microcontroller unit is placed inside the car and is attached to a dc source.

FUTURE SCOPE AND MARKET POTENTIAL

The world will one day move in self driving cars is already evident in a series of functions that today's cars have begun to perform without human intervention. Even in the models sold in India, some cars tell you the route and journey time, park on their own, start the wipers if it is raining, switch on the lights if it gets dark, warn you of moving objects at night the wiper moves at two different speeds. By modifying the code, we can have different speeds for a different amount of rain. Also, we can use this automated car wiper along with other automated features to make a Smart Car.

RESULT AND CONCLUSION

we have implemented a model that senses rains and automatically switches on the wiper and adjusts its speed according to the intensity of the rain. As the intensity of the rain increases, the speed of the wiper increases to a certain level. The microcontroller checks for the digital pin and analog pin inputs of the rain sensor. When there is slight water on the sensor, the digital pin is set to logic '0'. This is used to detect presence of rain water. To the intensity of rain, we the analog pin output of the rain sensor, whose threshold can be adjusted manually through an attached Potentiometer to indicate how much water should be considered as high rain. According to our observations, the wiper takes 2.2 seconds when a drop of water is poured on the sensor, while it takes only 1.4 seconds when the sensor is submerged in a glass of water. We learned how to interface servo motor with AT89C51 Microcontroller and the rain sensor module interfacing with AT89C51 Microcontroller.

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Coating different materials in different layers with the Natural dye

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Abstract— Know a days many people developing third generation solar cells that is necessary because of increase in population, unemployment, utilization of mobile phones and the use of coal is more and going to be end in few years we are responsible for preserve the goal for future generation hence development is needed on other available resources like wind, solar etc, it is under gone its characteristics and found the voltage 0.51mv, Isc as 0.28mA and efficiency 0.132

Keywords— Juli Flora, DSSC, FTO, ITO, Ph, Voc, Isc, GW, JNNSM, DSSC, LUMO, HOMO, CNT

Introduction

The generation of power is required because of development in all sectors where we need of power to run all machine's, Let we focus on the solar power energy because we will get abundant of solar or radiations but we are not utilizing that to full extent hence this is small experiment to utilize the solar cell and also available natural resources like plant leaves fruits roots etc hence we want to use both solar or and natural resources to develop power the device called DSSC.

2 Methodology

2.1 Chemicals Required for DSSC Preparation

The chemicals used for preparation of the DSSC is as follows WO₃, TiO₂, Al₂O₃, Cr₂O₃, CNT

2.2 Preparation of dye & Its analysis

2.2.1 Pomegranate dye preparation

Take the pomegranate wash it thoroughly then

Take the flakes by removing the pulp of the pomegranate after you crush the pomegranate with hands and juice is extracted and stored in a container then add the solvents to it according to

the table given below and air tightened with knob and with aluminium foils the solvents are used in Table no 1 in solvents.

Pomegranate							
S/no		2	3	4	5	6	
Solvents Names	Ethanol	Methanol	Distilled water	DM water	Lined oil	Ethanol	Acetic acid
Quantity in ml	13	18	15	10	15	12	10

Tajale no 1 Solvents

2.2.2 Chromatography & RF Values

Dye Name : Chakotha leaves					
sno	Solvents	A	B	Rf Value A/B	Pigment present
1	Ethanol+ Acetic acid	4.3	2.9	0.67	Carotene
2	DM water	7.3	5.3	0.73	Carotene
3	Lined oil	4.8	2.8	0.58	Carotene
4	Distilled water	5	3.2	0.64	Carotene
5	Ethanol	4.6	3.1	0.67	Carotene
6	Methanol	5	4.1	0.82	Carotene

Table no 2 :RF Value

Take the chromatography paper mark the starting and front point and then with the help of the six beaker which is filled with the ethanol and write down the names of the solvents on the chromatography paper and then dip into it and leave

some time then measure the values by removing the chromatography paper as shown in the below figure and tabulated in the tabular column no 2 and presents of pigments.

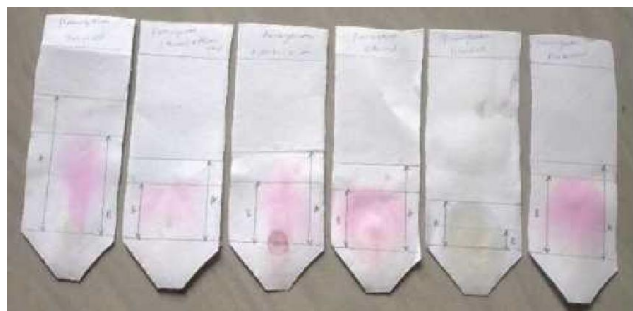
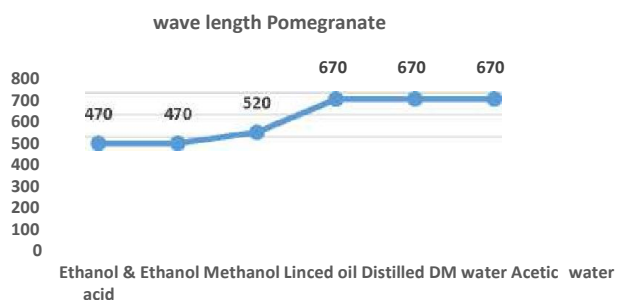


Figure no 1 ; Chromatography images

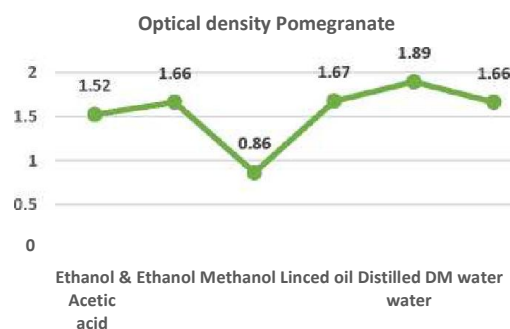
2.3 Chromatography & RF Values

Colorimeter : Filter selection for maximum optical density Pomegranate			
Slno	Particulars	wave length	Optical density
1	Ethanol & Acetic acid	470	1.52
2	Ethanol	470	1.66
3	Methanol	520	0.86
4	Lined oil	670	1.67
5	Distilled water	670	1.89
6	DM water	670	1.66

Table no 3 :Colorimeter



Graph no 1 : wavelength



Graph no 2: Optical density

2.4 Preparation of Electrolytes

Preparation of electrolyte Pomegranate fruit		
Slno	Particulars	Weight in grams
1	Weight of empty Beaker	51.411 g
2	Weight of I2	0.416 g
3	Weight of KI	0.313 g
4	Total weight of empty beaker, KI & I2	52.140 g
5	Acetonitrile	10MI

Table no 4 :Electrolyte

2.5 Construction of counter electrode



Figure no 2 : Preparation of the counter electrode

Take the CNT powder weigh In the weighing balance the weighted CNT is taken in a beaker and then it is few liquor ammonia is added then made the paste, taken one conductive glass which is having the specification as 10ohm then checked for conductive side and made up the conductive surface and applied the scotch tape on four sides and then applied the solution which is prepared as shown in the figure 2A ,then left some time and then removed the tape as shown in the figure2B and the it is heated in a hot plate with the temperature 27°C for 5-10mint then cooled. And it is under gone the optical images as shown in the figure no 6 and then it is undergone for SEM Images as shown in the figure (3 & 4).chemicals used for counter electrode is shown in the table no 6.

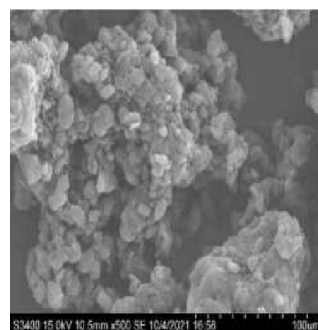


Figure no 3

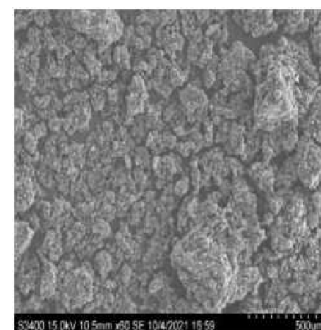


Figure no 4

2.6 Construction of photo anode

Glass used for Congress for Pomagranate fruit		
S/no	Particulars	
1	Type	FTO Coated
2	Dimensions	25mm*25mm*2.2mm
3	Resistivity	< 15ohms/sq
4	Transmittance	>85%
5	product code	FTO15Y1
6	HSN/SAC	7020019
7	Brand	Shilpent

Table no 5 :Glass Properties

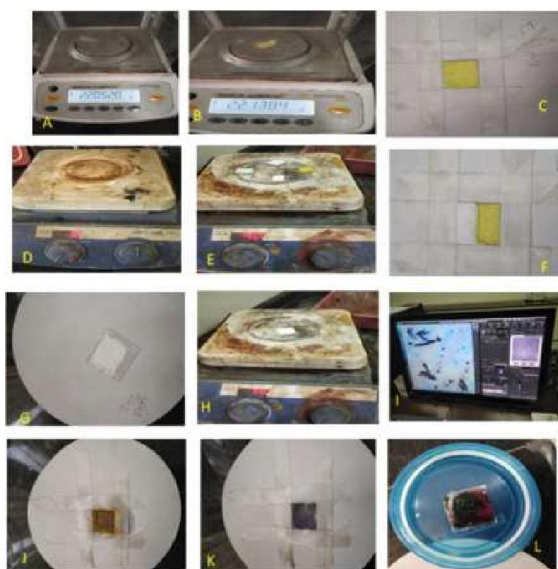


Figure no 5 :Steps for preparation Photo anode

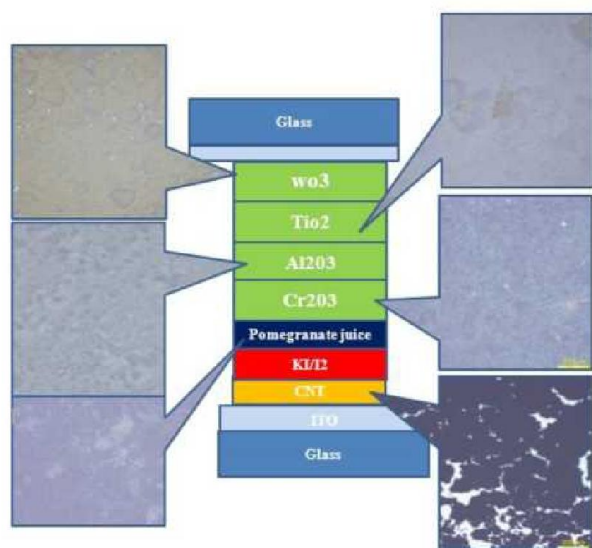


Figure no 6 :Optical images

Take the different type of the semi conductive materials and weighed the weighing is as shown in the figure 5(A&B) , it should be weighed for each material and same is tabulated in the tabular column below. Apply the scotch tape to the glass after checking the conductivity of the glass (Conductive side to be apply the scotch tape) then with the help of the doctor blade method we have to apply the coating on the glass substrate, the glass substrate specification is as shown in the tabular column no

5 ,after applying the coating (1st layer with wo3) it is left for few minutes at room temperature as shown in the figure 5C, it is made sintered by placing on the hot plate as shown in the figure 5(D& E) at 30oc for fifteen minutes (the layer thickness is maintained by the scotch tape layer how many layers is used), then it is undergone the optical image for studying the structure like this each layer with different semi conductive material is coated and optical images are taken which is shown in the figure 6 below and how many layers and material sequences are shown in the figure no 6 ,then final layers will as shown in the figure 5J &5 K then it is dipped in a dye for 5 - 10 minutes till it absorbs the dye as shown in the figure 5L . chemicals used as tabulated in the tabular column no 6.

Layer	Material	Empty beaker	Empty beaker with material	Total grams Taken	Solvents Used in ml	
Photo anode						
1	WO3	12.4904	14.1974	1.707	Ethanol	0.5
2	TiO2	12.4904	13.0074	0.517	Ethanol	0.5
3	Al2O3	12.4904	13.5004	1.01	Ethanol	1
4	Cr2O3	12.4904	13.0014	0.511	Ethanol	0.5
counter Electrode						
1	CNT	22.0686	23.0000	0.9314	Ethanol	0.25

Table no 6 :Chemicals used

2.7 Assembling the DSSC

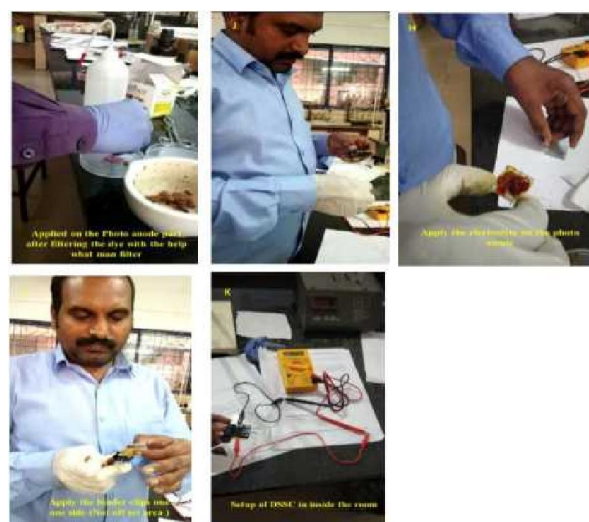


Figure no 7 :Glass Propertie

Take the both photo anode and counter electrode then face them both the coated side and then bind them with the help of the binder clips on either side ensuring that both are offset and gap should be maintained for measure IV characteristics and then add the electrolyte and then with the multimeter and alligator clips connect as shown in the figure and above figure shows the steps of assembly.

3 .SEM images and EDS OF the DSSC

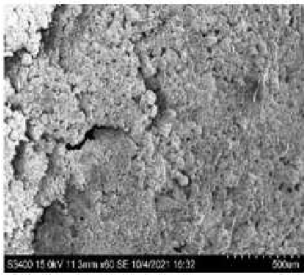


Figure no 8

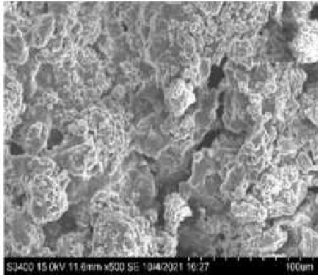


Figure no 9

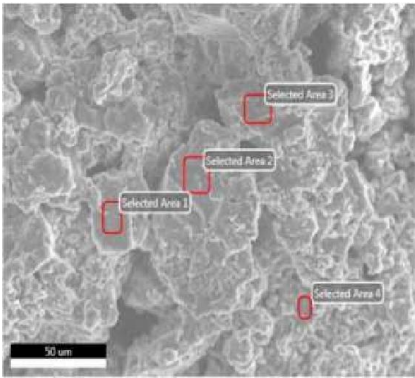
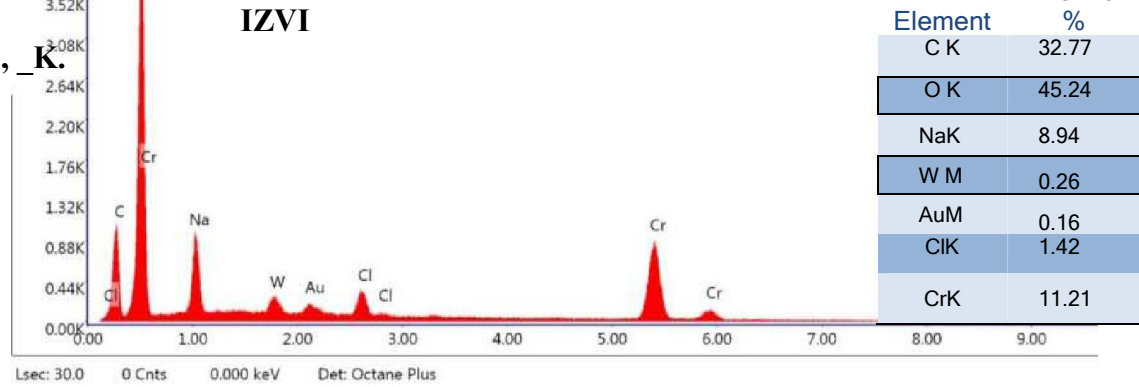


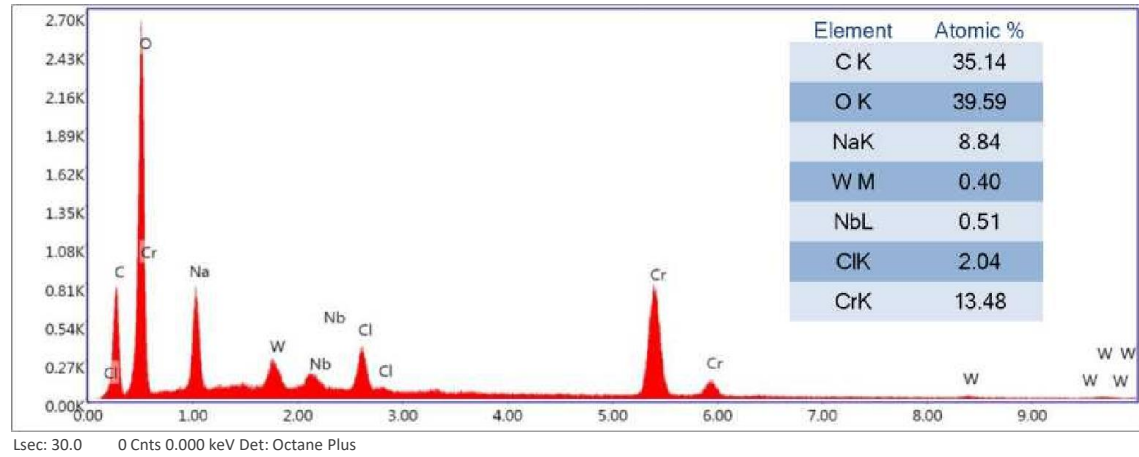
Figure no 10 : Selected area

Selected Area 1 - Det 1
kJ VIVV *7 yll J MB
V/CB 1

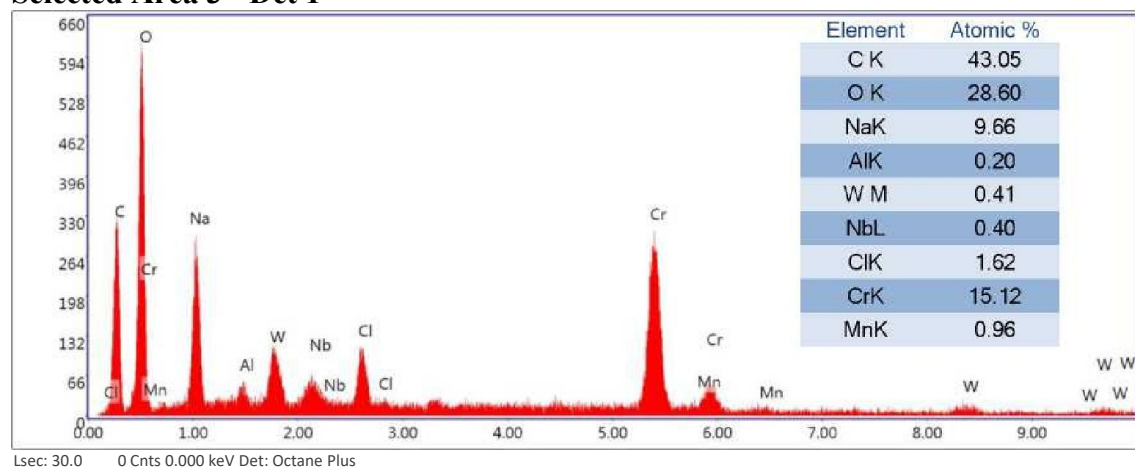
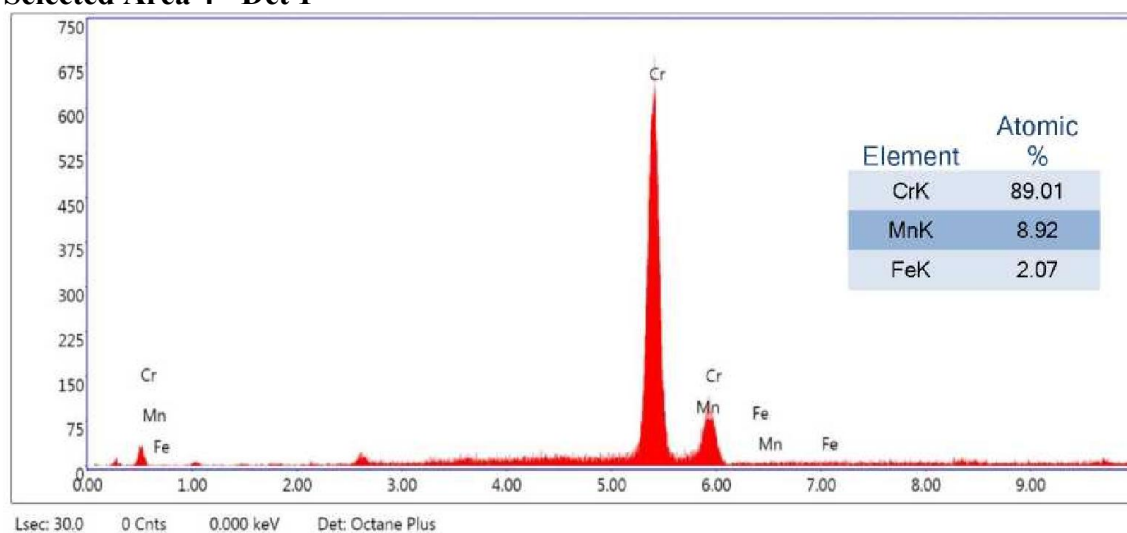


Graph no 3 : EDS for area 1 det 1

Selected Area 2 - Det 1



Graph no 4 : EDS for area 2 det 1

Selected Area 3 - Det 1**Graph no 5 : EDS for area 2 det 1****Selected Area 4 - Det 1****Graph no 6 : EDS for area 2 det 1****4 .Readingsof the DSSC tabulated**

Readings Taken from the DSSC					
Slno	Description	VOC	ISC	FF	Efficiency
1	Pomegranate	0.51	0.28	0.926	0.132

Table no 7 :DSSC Reading

Conclusion

- 1) From the efficiency table no 7 we can see that Pomegranate with Multiple layer with multiple material is having the efficiency 0.132 %.
- 2) Pomegranate more suitable and can be used for preparation of Dye in the preparation of the DSSC.

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CONVERSION OF CONVENTIONAL BIKE INTO ELECTRICAL BIKE

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Abstract—We have done market research of currently available options and their shortcomings. We have Analyzed that options present are not up to the mark as per requirements of the users. So we have come with ideas for the betterment of this section of vehicle so that the use of Electrical Energy for personal transportation can be realized in a more Acceptable way. We have Managed to deliver a product which is successfully operating and can be used for personal and commercially produced and will deliver as an outstanding electric bike and an alternative to present 100CC Internal Combination (IC) engine Motorcycle.

Keywords—Pollution free, environmental friendly, easy to use

I. INTRODUCTION

We have done market research of currently available options and their shortcomings. We have Analyzed that options present are not up to the mark as per requirements of the users. So we have come with ideas for the betterment of this section of vehicle so that the use of Electrical Energy for personal transportation can be realized in a more Acceptable way. We have Managed to deliver a product which is successfully operating and can be used for personal and commercially produced and will deliver as an outstanding electric bike and an alternative to present 100CC Internal Combination (IC) engine Motorcycle.

II. CONTROLLER

The controller is the brain of the bike. It controls the drive operation. It regulates the speed, provides the interconnection circuit for feedback and has the power modulator for the BLDC motor drive. The sensing unit is also within this controller itself. The throttle is connected to this controller which ultimately controls the speed of the motor. The rider operates the throttle which sends electric feedback to the controller which in turn regulates the speed of the motor as required. The controller is specially designed for every type of use of the drive. Here we have used the BLDC motor used in electric rickshaws and that's why the controller for this motor is from the same manufacturer.

SPECIFICATIONS OF CONTROLLER USED Max Current – 35 A under Voltage 42 + OR – 0.5 % Phase Angle - 120 degree

III. CHAIN SYSTEM

We have used a chain driven rear wheel mechanism as we are not having any hub motor as conventionally used in electric scooters. Just similar to conventional petrol bike, its chain system is simple and single gear operated. We choose to make a single gear system as it suits best with electric motors which already have a high starting torque as compared to IC's and it also avoids complexity of gears and clutch. Including gears would have created space problems for special setup and complex mechanism. Thus we used a single gear system of which the gear were of sizes 15 spokes and 47 spokes on motor shaft and rear tyre respectively. We got the original RX 100 15 spoke gear wielded by bronze weld on the shaft of the motor and used a customized 47 spoke gear on the rear wheel to increase the starting pick up of the bike. A suitable customized chain was used for the system.

IV. BATTERIES

WE HAVE USED FOUR USED BATTERIES FROM THE MANUFACTURER - AMPTEC. EACH BATTERY IS WITH RATED VOLTAGE OF 12V AND 24 AMPERE-HOURS. THUS THOSE FOUR BATTERIES CONNECTED IN SERIES GIVE US A TOTAL OF 48V. THE BATTERIES ARE DRY LEAD BATTERIES AND TOGETHER WEIGH 30 KILOGRAMS. THEY HAVE A FULL CHARGING TIME OF 6 HOURS AND GIVE US A RANGE OF 40 – 45 KMS ON A FULL CHARGE. IN THIS PROJECT WE ARE USING SLA BATTERY.

The current supplied to batteries at the time of charging is 3 A and we have used a Hero Electric scooter charger for Charging

The advantages of SLA batteries are mentioned below:

a) Sealed/Maintenance-Free The valve regulated, spill-proof construction of these batteries allows trouble-free and safe operation in any position. There is no need to add electrolyte, as gases generated during overcharge are recombined in a unique "oxygen cycle."

b) Design Flexibility Batteries may be used in series and/or parallel to obtain choice of voltage and capacity. Due to recent design breakthroughs, the same battery may be used in either cyclic or standby applications.

c) Deep Discharge Recovery Special separators, advanced plate composition, and a carefully balanced electrolyte system have greatly improved the ability of recovering from excessively deep discharge.

d) Economical SLA batteries are economical in their class.

e) Easy Handling No special handling precautions are required due to the leak-proof construction. Those batteries are classified as non-hazardous commodity. f) Compact-The high energy density results in superior power/volume and power/weight ratios. g) High Discharge Rate Low internal resistance allows discharge currents of up to ten times the rated capacity of the battery. Relatively small batteries may thus be specified in applications requiring high peak currents.

h) Wide Operating Temperature Range These batteries may be discharged over a temperature range of -40°C to $+60^{\circ}\text{C}$ (-40°F to $+140^{\circ}\text{F}$) and charged at temperatures ranging from -20°C to $+50^{\circ}\text{C}$ (4°F to $+122^{\circ}\text{F}$). i) Rugged Construction: The high impact resistant battery case is made either of nonconductive ABS plastic or styrene. Large capacity batteries frequently have polypropylene cases. All of these case materials impart great resistance to shock, vibration, chemicals and heat. j) Long Service Life: Under normal operating conditions, four or five years of dependable service life can be expected in stand-by applications, or between 200-1000 charge/discharge cycles depending on average depth of discharge.

V. WIRING AND PROTECTION SWITCH

We have used a standard 1 sq. mm wire for signal connections of controller and for power connections we have used a 1.5 sq mm wire made by “Finolex”. All batteries are connected in series and then to the motor.

A 48 V dc to 12 V dc converters is also attached to supply power to all the 12 V system like the head light, indicator switch, speedometer connections etc. We have connected a 20 A MCB in series with the 48 V circuit to provide protection in case of any short circuit. This MCB also is used as a ON / OFF switch the whole circuit. There is a 5A fuse in the lightning wiring for the protection of lightning and converter circuit.

VI. INSULATION

For providing insulation to the body from batteries and any other electrical connections we have used rubber sheets to cover the batteries and have covered the body panel with bubble wrap. Every connection is properly insulated from other conductors and the body of the bike. In order to ensure further safety of electric safety we have used MCB

and fuse which will prevent any damage in case of insulation breakdown or short circuit.

BACKGROUND:

Present 100 CC motorcycle market situations This is the time when big players like Mahindra , Honda , Bajaj are betting high on the Indian 100 CC motorcycle segment, this clearly shows the potential of this segment that it has in the Indian market. It is clearly the most difficult section for a electric motorcycle to compete due to a lot of factors and we believe that after successfully managing in making a mark in this segment, all other segments will be much easier to conquer. Present 100 CC motorcycle market facts.

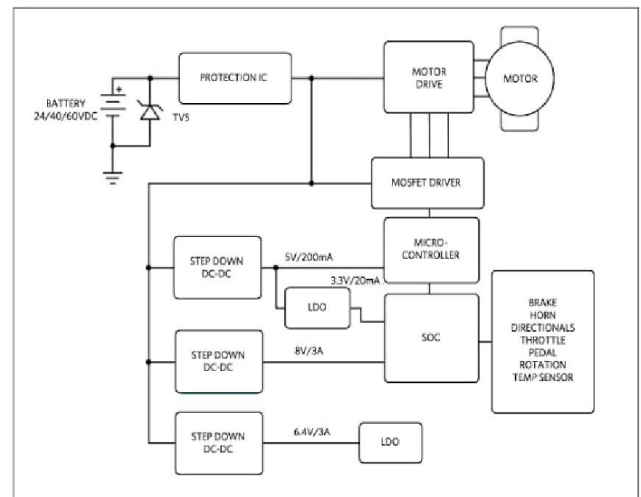
1) Big players like Honda are adding 100 CC bikes into this segment, betting high on the market potential.

2) Most number of bikes models are available in this section.

3) Almost 62 models are available in this section, which is far greater than models in any other section.

4) The 100 cc gasoline running bikes has the greatest mileage as compared to any other segment bikes. Generally due to the small size and light weight of the motorcycle.

BLOCK DIAGRAM:



CONSTRUCTION Components Required:

- 1) Chassis of a 100 cc motorcycle
- 2) A.C servo/ Brushless d.c motor
- 3) Dry lead batteries
- 4) A chain system
- 5) Insulation
- 6) Wiring and protection system
- 7) Controller
- 8) Converter

9) Bulbs, indicator and speedometer and other electrical components of a bike.

POWER AND WORKING PRINCIPLE OF ELECTRIC BIKE MOTOR:

Motors are a device that converts electrical energy into mechanical energy. The principle of electric bikes motor is to generate the rotating magnetic field by using the electrified coil (that is, the stator winding) and act on the rotor squirrel-cage closed aluminum frame to form the magneto electric rotating torque. The motor is divided into DC motor and AC motor according to the power supply. Most of the motors in the power system are AC motors. Can be synchronous motor or asynchronous motor (motor stator magnetic speed and rotor rotation speed do not maintain synchronous speed).

The motor is mainly composed of the stator and the rotor. The direction of the force motion of the electric wire in the magnetic field is related to the direction of the current and the direction of the magnetic sense (the direction of the magnetic field). The working principle of the motor is the effect of magnetic field on the current force, which makes the motor rotate. Electric bikes motor power is different, such as the general assembly of 12AH battery four blocks of motor power is 350 W, this refers to the internal gear of the high speed motor. In the case of a brushless toothless motor, the actual power is 250 W.

The production cost of the electric bike accessory is higher and higher, the competition of the market environment of the electric bike is increasingly excited, and an electric vehicle accessory without cost advantage cannot survive. The production cost of the best front wheel electric bike conversion kit is higher and higher, the competition of the market environment of the electric bike is increasingly excited, and an electric vehicle accessory without cost advantage cannot survive. It can be said that an electric bike accessories manufacturer appears a concept in the short term can get the attention of the market, but in a long time can be recognized by the market consumers? Only if your business quality is good, then consumers will always remember you.

For electric bike accessories manufacturers, the products produced have always been able to adhere to the quality is the most important. Electric bike accessories manufacturers have good quality and good service, and the brand effect will be better and better.

SUGGESTIONS:

1. Awareness needs to be created among people regarding the use and benefits of electric bike.
2. There are only few advertisements in newspapers and TVs. Thus maximum

advertisements need to be put up in these Medias so that they reach wider audience.

3. The price of the electric bikes needs to be decreased. It can be done by adopting sophisticated technologies and carrying out mass productions or some discounts on price or offers should be given in order to increase the sales.
4. More number of service centers need to be opened at least in major areas to cater to the problems & needs of the customers when needed.
5. As most of the people prefer high speed, the speed of the electric bikes needs to be improved so as to increase the sales of the E-Bikes.
6. We need to have more number of dealers covering major urban areas and the distribution network should be made strong.

CONCLUSION

Through the experience gained by this project we can now say that a lot of work has been done in this field and still there is lot more to be done. For various causes well understood like environment concerns, deteriorating fuel reservoirs and need to conserve fuel for future those areas must be explored and developed. Steps should be taken to achieve mentioned targets and analyze present situation. Here we have shown a small step to do the same and mentioned the futuristic improvements possible. This is a demonstration of what the pace of time requires and if we as students can do a bit along that way then a lot more can be expected from the industries and thinkers. With more contribution and emphasis on research and development by the industry this seems to be a possible endeavor in near future.

GENERATION OF ELECTRICITY USING HUMAN WALKING PRESSURE IN FLOOR TILES

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Abstract :

Energy is the basic need for the development of the modern world. For meeting up the regular demand of energy we need to design a system that will produce electricity without destroying the nature. Fossil fuels pollute the environment. Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shifting more and more towards the renewable sources of energy, which are essentially, non-polluting. By this method, energy can be produced, stored and used using the human walking through floor tiles or any kind of pressure. There is possibility of tapping the energy and generating power by making the floor tiles as a power generating unit. The generated power can be used for the lamps for rooms.

Keywords: Generate power from human footsteps, non polluting fixed floor tiles, kinetic energy into electric energy

I. INTRODUCTION

Energy is nothing but the capability to do the work. In today life, Electricity is most commonly used energy resource. Now-a-days energy claim is increasing and which is lifeline for persons. Due to this amount of energy resources are generated and wasted. Electricity can be generated from properties like water, wind etc. to produce the electricity from these sources development of large plants is needed having high maintenance cost. Some other energy resources are also inflated and cause pollution. Electricity has become significant resources for human being hence, it is desirable that wasted energy must have to exploit, walking is the most common movement done by human being although walking energy is wasted in the form of shuddering to the surface. Piezoelectric effect is the consequence in which mechanical vibrations. Pressure or stress applied to piezoelectric material is transformed into electrical form. This project gives idea about how energy is used stepping on stair. The use of stairways in every building is increasing day by day even trivial building has some floors

when we are stepping amount of this wasted energy is utilized and converted to electricity by Piezoelectric effect to generate an electric charge in response to applied mechanical stress.

II. ABOUT THE PROPOSED WORK

2.1. Literature Survey

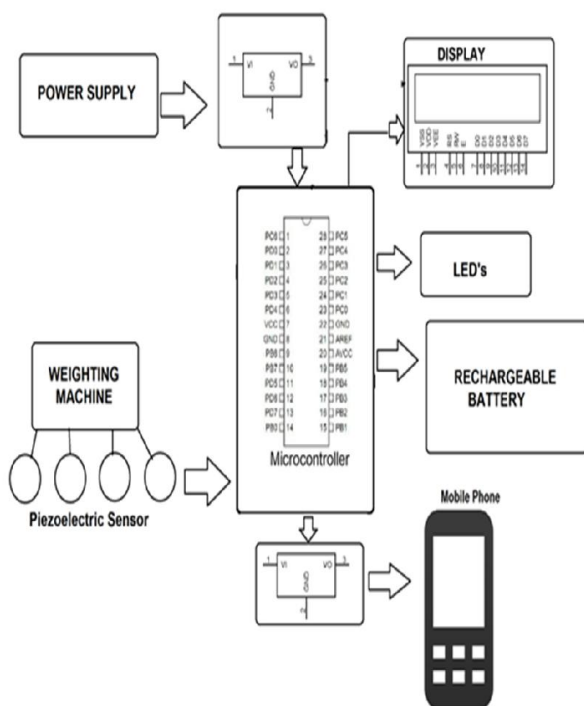
According to this paper deals with design and modeling of parts of the model of the foot step power generation system using assemblage of gearbox with sprocket. When a person jumps, he drops energy to the ground surface in the form of impact, vibration, sound etc., due to the transfer of his weight on to the ground surface, through feet falls on the ground during every leap. This energy can be tapped and transformed into usable electric form. This motion is then transported to the output gear through the in-between gears and the sprocket. Thus, both the motion of the rack is utilized that is upward and downward. The motion at the output gear causes the dynamo to generate electricity [1]. This Paper states that the most suitable method for obtaining the energy surrounding a system is achieved by using piezoelectric crystals. Piezoelectric quartzes are one of small-scale energy sources. The piezoelectric crystals are exposed to vibration they generate a very slight voltage, commonly known as piezoelectricity. It has a crystalline formation that translates an applied vibration into an electrical energy. The piezoelectric effect exists in two properties the first is the direct piezoelectric effect that defines the materials ability to convert mechanical strain into electrical charge. The second form is the opposing effect, which is the capability to convert an applied electrical potential into mechanical strain energy. These properties allow the material to function as a power harvesting medium. This statement of Albert Einstein is true "Energy can neither be formed nor be ruined it can be transferred from one form to another." This method of generating electricity by the usage of piezoelectric material has already existence in progress in numerous countries viz Japan, Israel, Netherlands. Usage of piezoelectric material is eco- friendly causes no contamination. It is an reasonable way of generating electricity and is easy to mount. In future this

technique will be a promising method for producing eco-friendly electricity. We also contribute this process at public places like home entrance gates, parking area, bus stands etc. This method will exploit different areas of electricity generation.

2.2. Proposed Work

The system generates voltage using footstep force. The system serves as a medium to generate electricity using non conventional sources (force) and /store/use it. The project is designed to be useful at public places like railway stations where a lot of people keep walking through all day. At such places these systems are to be placed at any entry points where people travel through entrance or exits and they have to step on this device to get through. These devices may then generate a voltage on every footstep and when mounted in series they will produce a sizeable amount of electricity. For this purpose we here use piezoelectric sensors that use piezoelectric effect in order to measure acceleration, force, pressure by its conversion into electric signals.

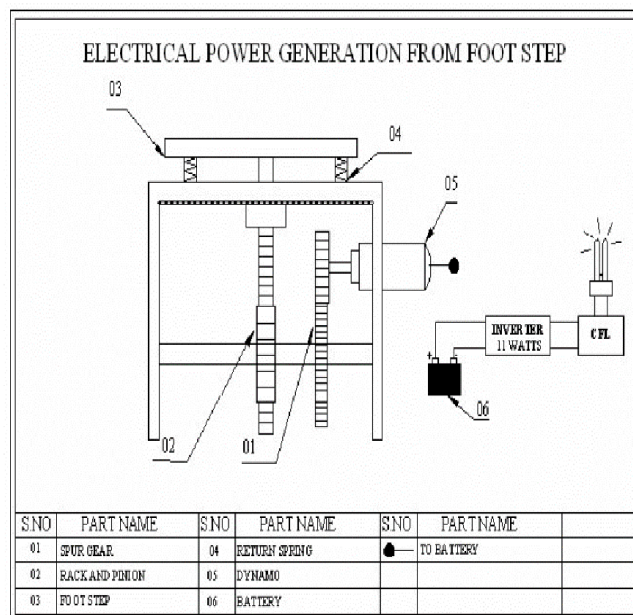
II. EXISTING SYSTEM



III. COMPONENTS USED

- SPUR GEAR
- RACK AND PINION GEAR
- SPRING
- BATTERY
- BULB

IV. BLOCK DIAGRAM



V. ADVANTAGES AND DISADVANTAGES

A. Advantages

- Power generation is simply to walk on step.
- No need of fuel input.
- Eco friendly.
- Less maintenance cost.
- This is nonconventional system.
- No moving parts – long service life.
- Compact highly sensitive.
- An alternative way for power generation.

B. Disadvantages

- Only applicable for the particular place.
 - Initial cost of this arrangement is high.
- Care should be taken for batteries in case of website and app failure

VI. CONCLUSION

Footstep arrangement is used to generate the electric power. As the power demand is increasing, this arrangement is used to generate the electrical power in order to meet the large energy demand. In this arrangement the mechanical energy is converted into electrical energy. The project "FOOT STEP POWER GENERATION" is an afford-able energy solution to common people. This can be used for many applications in rural areas where power availability is less or totally absence As India is a developing country where energy management is a big challenge for a huge population. By using this project we can drive both AC and DC loads according to the force we applied on the piezoelectric sensor to charge electronic vehicles and reduce the amount of pollutants which cause a negative impact on the environment.

VII. FUTURE SCOPE

Footstep arrangement is used to generate the electric power. As the power demand is increasing, this arrangement is used to generate the electrical power in order to meet the large energy demand. In this arrangement the mechanical energy is converted into electrical energy.

VIII. ACKNOWLEDGMENT

We are thankful to all the members of our project team and for all the people who have been a great support for making this project happen.

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Homology modeling and structural refinement of Banana Bunchy Top Virus

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ABSTRACT

BBTV is one of the most serious viral infections that affects bananas. The prevalence is rather high in Africa and Asia. The *Pentalonia nigronervosa*, which has a global distribution is responsible for the transmission. The virus spread through contaminated planting material, and virtually all banana cultivation were vulnerable due to a lack of known resistance sources. The symptoms of bunchy top of banana are unique and easily recognised from those produced by other banana viruses. Plants that have been infected have a "bunchy top" look. Plants that have been affected do not recover. The virus has a multi-component genome made up of at least six circular DNA segments, single-stranded DNA (ssDNA) components ranging in length from 1000 to 1100 nucleotides. Because the 3D structure of the proteins linked with BBTV has yet to be established by experimental approaches, we projected the protein structure using comparative modelling. The research focuses on protein homology modelling and structural refinement in relation to BBTV.

Keywords- BBTV, *Pentalonia nigronervosa*, Homology modeling and structural refinement.

I. INTRODUCTION

Banana (*Musa sp.*) is a major fruit and also it is cultivated for two main reasons: 1. Food, 2. Fibre for Textile industry. The major, and not curable and not controllable virus is BBTV. Once after it gets infested in the field, the plant won't grow well and it will express rosette appearance (Figure 1). Main reason for the transmission of the virus is Banana Aphid, *Pentalonia nigronervosa*. So the control of aphids is also a control. But this is only a preventive measure. Focussing on protein homology modelling and structural refinement in relation to BBTV is very important because the attack of BBTV causes more

economical loss to the farmer and there is no chance for the crop to get revived to normal stage after infection.

ROSETTE APPEARANCE



II. BBTV TAXONOMIC TREE

- Domain: Virus
- Group: "ssDNA viruses"
- Family: Nanoviridae
- Genus: Babuvirus
- Species: Banana bunchy top virus

III. METHODOLOGY

A. Protein Modeling:

Template-based modeling (TBM) is a structure prediction approach that uses homologous proteins as templates in this context.

B. Computational Screening of Leads:

The web server MTiOpen Screen comprises two services, MTiAutoDock and MTiOpen Screen.

MTiAutoDock supports docking compounds into a pre-determined or a user-defined binding site and a rigid docking with Autodock 4.2. MTiOpen Screen automates virtual screening by docking with Autodock Vina.

IV. PROCESS

- STEP 1: Finding details for Banana Bunchy Top Virus in NCBI.
- STEP 2: Search for FASTA Sequence of protein.
- STEP 3: Copy the FASTA Sequence.
- STEP 4: Paste the FASTA Sequence in SWISS MODEL to develop a model for the sequence identified.
- STEP 5: Download the predicted models from SWISS MODEL.
- STEP 6: View the downloaded structures in RasMol.
- STEP 7: Check the quality of the structures in Ramachandran Plot.
- STEP 8: Perform docking using MTiOpen Screen

V. RESULTS

The Rampage server's target protein quality provided knowledge of non-bonding interactions between the protein and the ligands (Figure - 2, 3, 4) to determine their binding free energy. This MTi automated docking research identified 7176 compounds in the drug library and the best fit of 1500 molecules. The protein had the most excellent relationship for the Mk3207 chemical, with a -11.3Kcal/mol binding energy. Because of the reduced binding energy, the ligand is more stable than another molecule. Figure 5 gives the details regarding the DNA Sequence of BBTV. Figure 6 showcases the test results made on the transmission of BBTV through Aphids.

PREDICTED STRUCTURE OF REPLICATION INITIATION PROTEIN

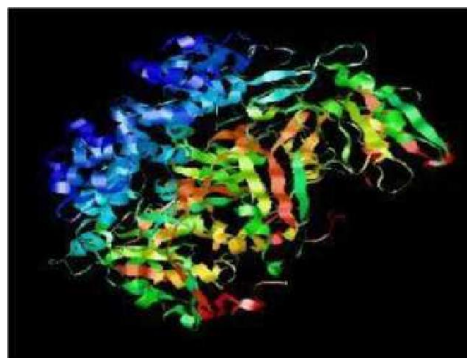


FIGURE 2



FIGURE 3

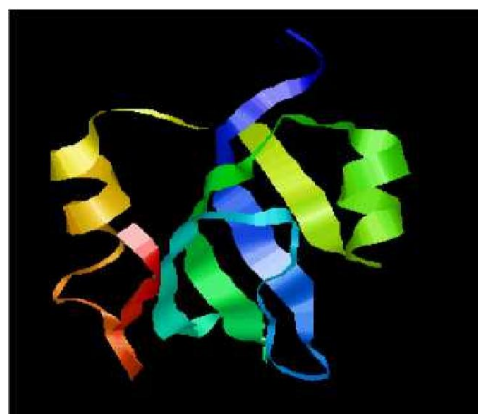


FIGURE 4

BBTV DNA- Primer name Sequence		Location
S' GATGGCGGATATGTGG 3'	129-144	
BTIRepEx	5' GAGCTCTCAGCAAGAAACCAAC 3'	989-974
BTIRepFD	5' CCTAATCTGTCAAGGA 3'	266-282
BT2R3	5' CGTTAGTATACGTTCCG 3'	574-558
BT2F3	5' TAGATCCATGGTC AG ACA AG AA 3'	206-229
BT3V.Exp	5' ATAAAGCTTTCAAAACATGATATGT 3'	749-726
BT3C.Exp	5' ATGGCATTAAACAACAGA 3'	279-295
BT4V.V3	5' GAACATAGGTCCAGCGT 3'	629-613
BT4C.C2	5' AAGAGCATGGAGTTCTGGGAATC 3'	233-256
BTsV.Exp	5' GATATAAGCTTAGAGTTAATGTTAC 3'	734-711
BTsC.Exp	5' GATCI ATTGAAGC1GTG 3'	426-442
BTP2B2.17	5' CTAACCTCCATGTCTCT 3'	666-651
BTP2R1.17		

FIGURE 5

No. Infective aphids*1	No. plants tested (n)	No. plants infected	Mean % transmission
0	52	4	13.5
1	9	3	33.3
2	11	4	36.1
3	6	4	66.7
4	31	23	74.2
5	72	60	83.3

* At the end of the IAP. One aphid per group were tested for BBIA. This represents the number of aphids that tested positive for BBTV

FIGURE 6

VI. CONCLUSION

Banana is a high yielding crop and brings profit to the farmer cultivating it. If this BBTV attacks one crop, it will spread quickly to the whole field and there is no management to control the spread. So finding the replication initiation protein and identification of the structure is very important for silencing it.

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HYBRID ELECTRIC CYCLE

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Abstract— The hybrid powered electric bicycle is a system that involves three different ways of charging a battery: solar power Dynamo and 230V Ac wall charge. The power from these three modes is used to charge an electric Permanent magnet DC motor (PMDC) running a bicycle. The hybrid powered bicycle is designed in such a way that the rider can have to modes of operating bicycle that is he can choose the bicycle to be driven completely with the electric PMDC motor or it can be driven manually by himself.

I. INTRODUCTION

The term "hybrid" usually implies that more than one energy source. There are of bicycle in the world such as normal bicycle that people need to paddle for it to move, motorized bicycle that uses fuel as its prime power and electric bicycle that can only be sufficient for an hour. Because of some weaknesses in the existence system, the idea of a solar bicycle came in mind. The idea is to make the bicycle last longer and can be automatically recharge when the bicycle is not in use by the renewable solar energy. The concept of the solar energy is that a high torque motor will be put on the bicycle which will be generated by the solar energy. The solar energy will be absorbed by the portable solar panel to generate the power. The power that had been absorbed by the panel can be used directly by the motor if the power matches the power requirement. If not, the motor will use the power from a battery. When the bicycle was not in use during the day, the solar panel will charge the battery. The system will make bicycle to operate more efficiently. Rechargeable battery is used with long life for charging. The hybrid bicycle is a project that can promote both cleaner technology as well as a lesser dependence on oil. It will run on clean electric power with the ability to recharge the battery 3 separate ways: through the 230 V AC wall source, by solar-cell generative power and by dynamo which is attached to bicycle wheel. Poles are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

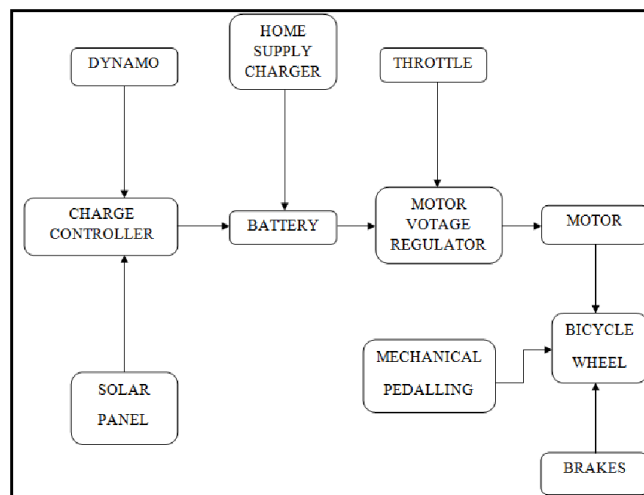
II. EXISTING SYSTEM

In General There is a separate system of Cycle which only manually pedaled for travelling. And it Has a drawback of that it becomes more difficult to the Aged persons and people's have disabilities or When we move to buy electric bike it requires More initial cost and also the above electric bike and Vehicles using fuel as prime both has only one method To run the engine this is also a drawback so that we Proposed the concept of Hybrid Electric cycle (HEV's). It becomes affordable and the freedom to drive in the Multiple modes by pedaling or by running motor.

III. PROPOSED SYSTEM

In this paper, we propose an Hybrid Electric cycle (HEV's) system which runs automatically when the throttle is Applied. In this Cycle, there will be no need of pedaling when Throttle is applied. In this paper, we use a Brush type PMDC Motor, Solar Panel and an Charge controller for control in the Charging system, Dynamo, Voltage Regulator and Throttle. Whenever the we need to activate the Electric bi cycle just Apply throttle then battery will give the enough power Required to run the bi cycle. In this cycle we attached the Three charging system that are charging via solar panel and Home supply charging and also batteries is charging from also The rotation of the bicycle

IV. BLOCK DIAGRAM



SYSTEM SPECIFICATION

A. Brush Type PMDC Motor

In this project 12v, 80W brush type permanent magnet dc motor is used which is shown below.



B. Solar Panel

Solar power is the generation of electricity from sunlight. Solar power is the conversion of sunlight to electricity. EESunlight can be converted directly into electricity using photo voltaic (PV) panel.

C. Charge Controller

C. It is essential to regulate the voltage output from the solar panel before it is supplied to the battery. A charge controller is a power converter with an output DC voltage greater than the input DC voltage. This is used to regulate an input voltage to a higher regulated voltage.

D. Dynamo

Dynamo for generation the electric power. A dynamo is electrical generator that produce power with use of a commutator. Dynamo is placed on front wheel of the bicycle and dynamo commutator is connected with front wheel of bicycle.



E. Voltage Regulator

Voltage regulator controls the voltage level as per requirement. The voltage regulator used in this project acts as a tapping switch. In our project two voltage levels are used.as per required voltage levels regulator can be adjusted.

F. Throttle

This solar electric bicycle thumb throttle is easy to use and great for those that want to keep their original handlebar grip. Typically the thumb throttle is used on bikes that have a twist gear changing system. Thumb throttle that said it comes down to personal choice as the thumb throttle can also be used on a bike that has a thumb gear changing system. A "Thumb Throttle" refers to a method of controlling the speed of an engine or motor.



WORKING

The block diagram hybrid bicycle driven by DC motor fitted on Middle shaft of bicycle & operated by battery energy. The solar panel Mounted on carriage. Solar panel generates 12v power when sun light falls On it and its terminals are connected to charge controller. Dynamo is Mounted on side shaft of bicycle, supports in such a manner that dynamo Shaft is touching the back wheel tyre. As wheel rotates dynamo shaft Rotates and generates 12V power. Its terminals are also connected to charge Controller. When the bicycle is idle in day time, the solar panel will charge The battery. Due to non-uniform sunlight and varying in wheel speed, output Voltage from both solar panel and dynamo is varying in nature. Charge Controller adjusts the constant voltage of 12 volt and charges the battery. The power flow acts in parallel with the power delivered by the rider via the Pedaling the rider of an solar bicycle can opt the motor completely or Pedaling (as in conventional bicycle).

RESULT AND CONCLUSION

Our hybrid bicycle total weight including battery, motor and solar panel is 25kg. When battery is fully charged the maximum travelling distance at plain road is 25km. Hybrid bicycle can attain a maximum speed of 15 km/hour. Compared to already existing E bikes travelling distance and maximum speed is small but considering the cost our hybrid bicycle is around 8000 Rupees and E-bikes cost is 30000 Rupees. Our hybrid bicycle cost is 73% less than presently existing E-bikes. Hybrid bicycle power can be increased by replacing

existing motor and battery to higher ratings as per needed. combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.

FUTURE SCOPE AND MARKET POTENTIAL

In present project, Hybrid powered electric bicycle uses solar power as one of the energy source. In future wind can also be used as a one of energy source by placing wind turbine at convenient place. Hybrid bicycle can be modified further and make it to use for physically disabled people. Even Bicycle can be digitalized by fitting indicators, advance sensors, digital display, Navigation system etc. Gear variation system can also be implemented to increase torque and control speed.

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IMPACT OF NANOTECHNOLOGY IN PHARMACEUTICALS

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ABSTRACT:

Nanotechnology is the utilization of matter in size range of 1-100 nm in industrial applications. Nanotechnology has pierced through almost every primary technological domain and has contributed to several novel tools and applications. The pharmaceutical industry also doesn't appear as an exception to the employment of nanotechnology. Nano-pharmaceuticals have offered the technological community new horizons to explore in targeted drug delivery in nanomedicine. The prospect of targeted drug delivery using nano-pharmaceuticals in the treatment of non-contagious diseases and disorders, such as cancer, cardiovascular diseases, diabetes, and even genetic disorders, has increased the interest for research in nano-pharmaceuticals. In such cases, nanomedicine has also been efficient in treating contagious diseases, like the

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novel Coronavirus. Several novel nanoparticles, such as Carbon Nanotubes, Quantum dots, and even nanorobots, have contributed their opportunities in nanomedicine. This revolutionary technology of the quantum scale can allow us to reach greater heights since the investigation of these nano-devices is continually progressing. This presentation attempts to understand where this technology lies under the present circumstances, what it is offering us, and what significant impacts it will have in the future.

Keywords: Nanotechnology, Nano-pharmaceuticals, Targeted Drug Delivery, Nanomedicine, Carbon Nanotubes.

INTRODUCTION:

Nanotechnology is the application of devices that are present only at the nano level. Its contributions to the scientific

field are immense. One of the applications of Nanotechnology is the design and utilization of nanomedicine. Nanomedicine or nano-pharmaceuticals refers to the advent of nanodevices in the field of Medicine. Using these novel devices, delivery of pharmaceutical drugs at the molecular level has become possible. Different types of nanoparticles platforms have been discovered to make this technology possible, such as, Carbon Nanotubes, Quantum dots, and Nanorobots. The prospect of treating different types of diseases and disorders at the molecular level using this technology has stirred up interest in this field, and research has given us a lot of insights about what nanotechnology is all about. This review article is an attempt to briefly discuss what has been happening in this scientific domain, and what it has to offer us in the near future.

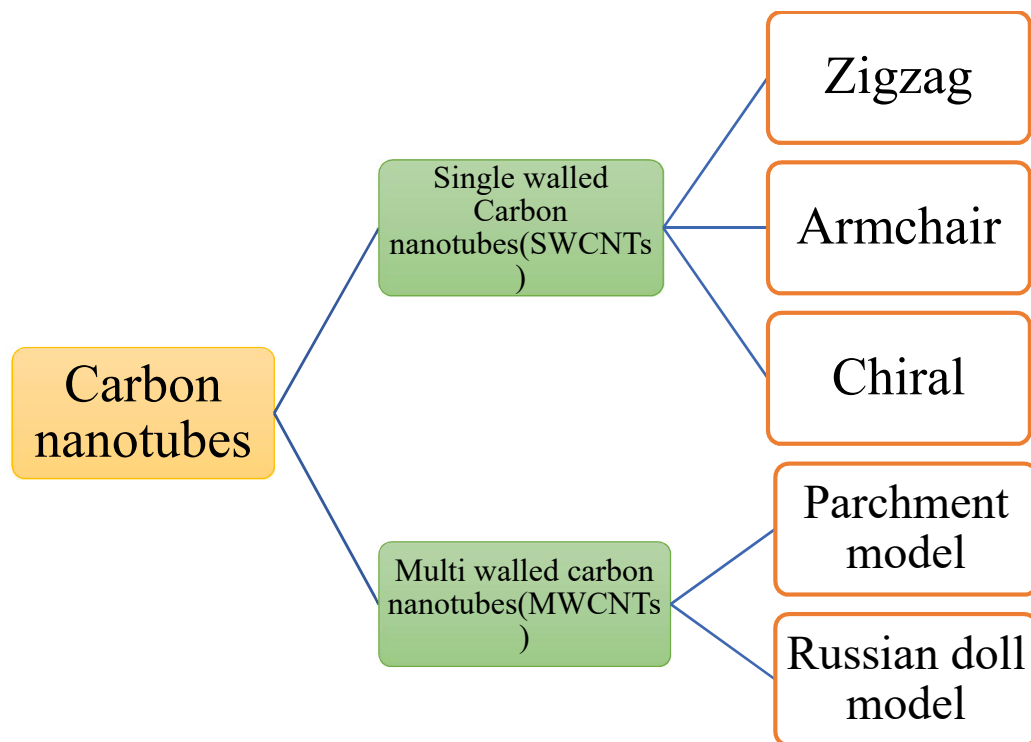
NANODEVICES:

Nanodevices are devices those which have its overall dimensions in nanoscale and comprises of components with nanoscale for their functions. They

are mainly created for the need of interacting with cells and tissues of an individuals' body and to perform the specific tasks. Highly used nanodevices includes pill cam, carbon nanotubes, quantum dots, nano robots and nano-capsules. These nanodevices are highly applied in imaging techniques, therapeutics, diagnostic area and even in tissue regeneration. Thus, in the upcoming years nanodevices will make the medicines more portable along with the potential to make a healthier world.

CARBON NANOTUBES:

Carbon nanotubes (CNTs) are produced from graphites and designed as cylindrical nanotubes with nanometer diameters and millimetres in length. They possess remarkable mechanical strength and has high electrical and thermal conductivity. CNTs are capable to conjugate with various molecules such as DNA, proteins, enzymes, antibodies and even drugs. They have been revealed to be a excellent drug delivery system, immunotherapy, tissue regeneration and in diagnosis of various diseases.



Classification of CNTs

CNT-based chemical and biological sensors have sparked the interest of contemporary researchers due to the increased detection effectiveness of sensors when CNTs are present, as well as the various ways in which they may be functionalized. Wang *et al.*, in his study used CNTs and other carbon nanomaterials for the manufacture of electrochemical aptasensors, i.e. sensors whose transduction is carried out by aptamers and revealed the advantage of using CNTs which is based on either the exceptional adsorption of molecules on the surface of functionalized nanotubes and the acceleration of electronic conversion.

CNTs are successfully being applied in Gene delivery systems. A

research has been conducted in which CNTs use polyethylenimine (PEI) and polyamidoamine (PAMAM) polymers for miRNA delivery to endothelial cells in order to control a target gene CDC25A, which is involved in cell proliferation and in vitro angiogenesis. This study suggest that PEI and PAMAM polymers along with CNTs are a good option for gene delivery system.

In a plant research, a genetic engineering procedure was proposed, using SWCNTs to transport plasmid DNA into chloroplasts of diverse plant species without the requirement for chemical or biochemical assistance. (Kwak *et al.*,2019)

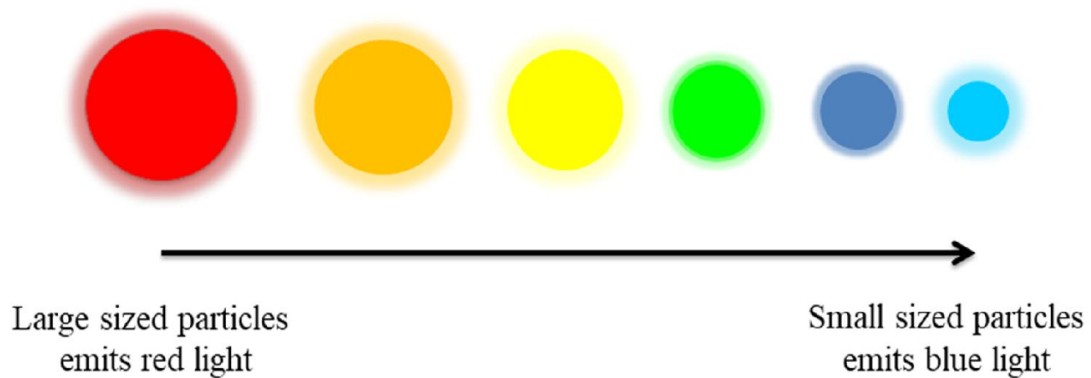
Some example for CNTs applied in Cancer therapy:

CNTs	TYPE OF CANCER	OUTCOME
CNTs-loaded Rg3 (Rg3-CNT)	Triple negative breast cancer	<ul style="list-style-type: none"> Cell viability of TNBC cells has been inhibited, the treatment of Rg3 induced apoptosis of TNBC cells
Multiwalled carbon nanotubes co-delivering sorafenib (Sor) and epidermal growth factor receptor (EGFR) siRNA (MWNT/Sor/siRNA)	Hepatocarcinoma	<ul style="list-style-type: none"> MWNT treatment has few effects on cell proliferation and apoptosis in HepG2 cells. MWNT/Sor/siRNA treatment significantly inhibited clone number and induced cell apoptosis
Recombinant fragment of human surfactant protein D (rfhSP-D) coupled with carboxymethyl-cellulose (CMC) CNTs	Leukemia	<ul style="list-style-type: none"> CNT + rfhSP-D treated leukemic cells also showed higher mRNA expression of p53 and cell cycle inhibitors
Platinum nanoparticles (Pt-NPs) supported on polybenzimidazole (PBI)-functionalized polymers and multiwalled carbon nanotubes (MWCNT)	Breast cancer	<ul style="list-style-type: none"> CSCs' proliferation rate has been dramatically reduced, but not that of bone marrow mesenchymal stem cells (BM-MSCs). MWCNT/PBI/Pt shown a cytotoxic effect on breast CSCs
Polypyrrole-coated multi-walled carbon nanotubes composite (PPy@MWCNTs)	Melanoma	<ul style="list-style-type: none"> On multi-step ultrasound irradiation, in vitro studies revealed that PPy@MWCNTs exhibited concentration-dependent cytotoxicity. Histologic analyses revealed detrimental effects of PPy@MWCNTs on tumors
Gemcitabine (GEM) loaded hyaluronic acid (HA) conjugated PEGylated multi-walled carbon nanotubes (GEM/HA-PEG-MWCNTs)	Colon cancer	<ul style="list-style-type: none"> Demonstrated increased cytotoxicity against the HT-29 colon cancer cell line.
Epirubicin (EPI)-loaded magnetic multi-walled carbon nanotube (mMWCNTs-EPI)	Bladder cancer	<ul style="list-style-type: none"> Revealed better antitumor activity than free EPI. Had higher efficiency in enhancing cytotoxicity and inhibiting proliferation in vitro and in vivo
Multi-walled carbon nanotube linked with iRGD peptide connected to polyethyleneimine along with candesartan	Lung cancer	<ul style="list-style-type: none"> CD as chemotherapy showed synergistic downregulation of VEGF when combining of pAT₂ and efficiently inhibited angiogenesis. In A549 xenograft nude mice, iRGD-PEI-MWNT-SS-CD/pAT₂ complexes greatly appreciated drug activities by varying drug distribution and indicated notable tumour growth suppression.

QUANTUM DOTS:

Quantum dots are actually nanometre sized crystals usually in the size of around 2-20 nm. They emit radiations of specific intensities which vary based on the size of the quantum dots. Quantum dots have been reported to be excellent candidates as biosensors and in biological labelling, according to a study done by K.E. Sapsford et al. In a study done by Murcia M.J et al, it was reported that the dimension of the core determines the bandgap and hence the colour of emission.

This, in turn, directly corresponds to the size of the particle and the colour emitted by the quantum dot. Even though, quantum dots represent a wide range of applications, it's applications in the medical field have been quite speculative. This is due to their toxicity, which indicates a dangerous prospect. Its prospects in the medical field, are concerning and further research needs to take place to the address the issues reported by previous research ventures (Jana Drbohlovova et al).



The fluorescence emission of quantum dots decreases and possess higher radiation intensity with reduction in size

NANO ROBOTS:

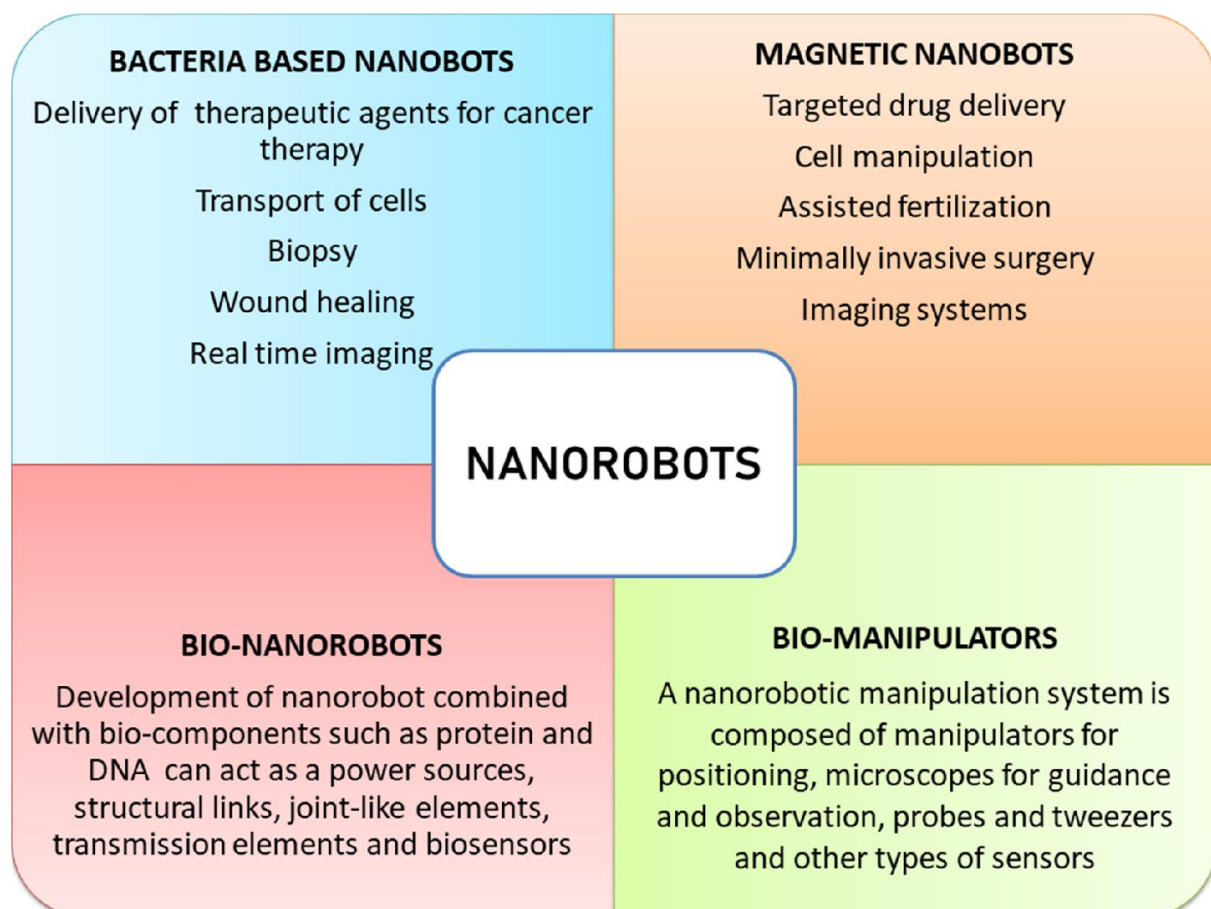
Nanorobotics is the technology of designing robots which have a diameter of

less than 100 nanometres (Armin Grunwald et al). They have been specifically designed for the purpose of

drug delivery. The bots do not resemble conventional robots, but are a collection of atoms that are activated by a particular signal that can be either light or even electric signals. Nanorobots represent a new type of opportunity in the realm of drug delivery, due to their properties which are non-lethal to the human internal environment. Properties such as non-toxicity, dissolvability, specificity, compatibility, uncomplicated removal of the tech via excretion and much more, are the reasons why these nanorobots have

gained much interest. M. Mehta et al, have revealed these studies and have reported their findings to be encouraging.

Using this technology, the drug can be targeted towards a particular location and the drug can be delivered without any hindrances. This type of delivery would also decrease the possibility of potential side effects emanating from the drug. M. Mehta et al, have also collected data on the future possibilities of nanorobots in treating actual affected cells at the site of the damage.



Types of Nanorobots

DISCUSSION:

Nano-pharmaceuticals have offered the technological community a new horizons to explore in targeted drug delivery in nano medicine . The prospect of targeted drug delivery using nano-pharmaceuticals in the treatment of non-contagious diseases and disorders, such as cancer, cardiovascular diseases, diabetes, and even genetic disorders, has increased the interest for research in nano-pharmaceuticals. In such cases, nano medicine has been efficient in treating contagious diseases, like the novel Coronavirus. Several novel nanoparticles, such as Carbon Nanotubes, Quantum dots, and even nano robots, have contributed their opportunities in nano medicine.

Nano robots have been specifically designed for the purpose of drug delivery. The bots are a collection of atoms that are activated by a particular signal that can be either light or even electric signals. Nano robots represent a new type of opportunity in the realm of drug delivery, due to their properties which are non-lethal to the human internal environment. Nano robots have gained much interest as they possess properties such as non-toxicity, solubility, specificity, compatibility, uncomplicated removal of the tech via excretion and much more.

Carbon nanotubes(CNTs) are cylindrical nanotubes with nanometer diameters and millimetres in length which are made of graphites . They possess remarkable mechanical strength and has high electrical and thermal conductivity. CNTs are capable to conjugate with various molecules such as DNA, proteins, enzymes, antibodies and even drugs. The drug delivery system, immunotherapy, tissue regeneration and in diagnosis of various diseases are impractical without CNTs.

CONCLUSION:

Nanotechnology is foreordained to become the core technology underlying all of 21st century medicine. Within 10–20 years nanotechnology should become possible to construct machines on the micrometer scale made up of parts on the nanometer scale. nano medicine has been efficient in treating contagious diseases, like the novel Coronavirus. Nanoparticles hold prodigious potential to be as an effective drug delivery system. There is increasing optimism that nanotechnology applied to medicine will bring significant advancement in the diagnosis, treatment, and prevention of disease. nano adjuvants with immuno modulatory properties used to deliver vaccine antigens. The nano-knife, an almost non-invasive method of

destroying cancer cells with high voltage electricity. Hereby we conclude that the augmenting interest in the field of medical applications of nanotechnology is leading to the emergence of a new field called nano medicine.

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Light Fidelity (Li-Fi)

The Future Technology in Wireless Communication

THE PATH OF NEW WAY OF COMMUNICATION

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ABSTRACT

*In this modern world a new technology implemented called LIFI, **Light Fidelity** (LiFi) is a Visible Light Communication based technology that making a light as a media of communication replacing the cable wire communication. In this we are going to see how the technology are going to work in future and their implementation and the process and how they are going to save future and other resources and more over upgrades. More expensive than Wi-Fi because of electromagnetic waves to transmit the data. Li-Fi gives upto 500 mbps which is 5 times faster than optic fiber used by Wi-Fi. It is uses solid state lighting such as LED blubs.*

LIFI STRUCTURE



What is LIFI ?

It is a wireless technology connecting us to the internet. They are similar to wifi technology, both transmits the data electromagnetically. Here WIFI uses radio waves and LIFI uses visible light to transmit the data. LIFI is more reliable and unique and more secure than WIFI.

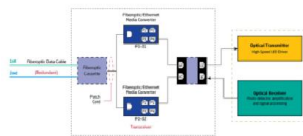
INTRODUCTION

LIFI technology is a high speed and fully networked subsets of visual light communication systems and they uses visible light communication instead of radio frequency which they can carry more information than normal one. They are also called as visible light communication system. It is the transmission of data through illumination by taking fiber out of fiber optics by sending data through a LED light bulb that varies intensity faster than the human eye. It is cheap and it is basically wireless and the faster data resources and this light signal is then converted back then converted back into data formats for output from the computers and other devices. The LED intensity is modulated so rapidly that human eye cannot notice.

IMPLEMENTATION of LIFI

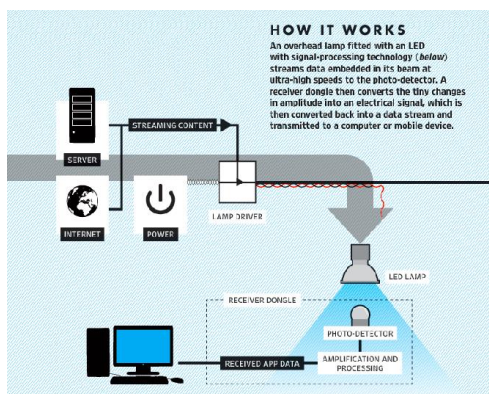
The product contains 3 primary sub assemblies:

- Emitter
- RF driver
- Power supply



LIFI is high speed, bidirectional and it is wireless communication of data using by light. They construst of several light bulbs form of wireless network.

- When an electrical current is applied to a LED light bulb a stream of light is emitted from bulb.
- LED bulbs are semiconductors, which means that the brightness of the light flowing through them can change them at extremely high speed of network.
- Thus the signal can be sent by the modulating the light at the different rates.
- Then, the signal can be received by a detector which interrupts the change in light intensity as data.
- Also when the LED is ON, you transmit 1 and when it is off you transmit as 0.



ADVANTAGES

1. It has less interface.
2. Li-Fi can pass through salty seawater as light can travel through the water content.
3. It can work in the dense region.
4. They have Larger bandwidth.
5. High efficiency.
6. No licenses needed
7. Green information technology basis.
8. High security.

APPLICATION

It is used in airlines and it is used in the undersea explorations as light can travel through water. And they are used in Operation theatres in the hospitals as light waves and also used in office and homes for data transmission and browsing.

LiFi applications are varied as a result of its key features, such as **directional lighting**, **energy efficiency**, intrinsic security, high data rate capability, signal blocking by walls and integrated networking capability.

Security

In a meeting room environment, the access area of each channel is the width of the light pool, and can be accessed by multiple users. Each user can receive higher data rates than would be the case for an equivalent Wi-Fi channel. In the Wi-Fi case, each user or group of users directly competes for access to bandwidth. The net result is that the more connections there are, the slower the download speeds are for all. By contrast, in the case of LiFi, with its greater number of available access points, each pool of light provides full channel data rates with fewer simultaneous users. The overall net benefit to each user is up to 1000 times greater speeds. In addition, and in contrast to radio waves, the light does not pass through the walls. Therefore, with minimal precautions to avoid leakage from windows, etc., security is fundamentally enhanced as compared with Wi-Fi.

Connectivity

Our homes already have lighting widely installed. The use of LiFi enabled lighting will transform the applications that can be envisaged, not only the interconnection of devices, such as televisions, computers and Hi-Fi, but also connecting ordinary domestic appliances, such as fridges, washing

machines, microwaves and vacuums. The “internet of everything”.

Sensitive data

Hospitals are a specific case of an environment where both EMI sensitivity and security of data are issues. LiFi can enable the better deployment of secure networked medical instruments, patient records, etc.

Indoor navigation

By identifying each light (for example, through the use of the widely used MAC codes used by data routers and computers) it is possible to provide a smart means of navigating through urban environments. The identification of each code would be linked to a specific location. For example, light received from the closest fixture can indicate to a mobile user their exact position as they travel along a corridor.

LIMITATIONS:

1. **Restricted Range and Connectivity** – The impediments of the noticeable light furnish Li-Fi with a security advantage over Wi-Fi. Be that as it may, these constraints likewise make burdens. Actual boundaries.
2. **Inaccessibility of Compatible Technologies** – It will take a long time for Li-Fi to turn out to be more reasonable than Wi-Fi. Current gadgets
3. **Light Interference and Light Pollution** – Different burdens of Li-Fi are powerlessness to light obstruction and advancement of light contamination. Observe that despite fact that this innovation is invulnerable to electromagnetic impedances, different wellsprings of light may meddle with sign.
4. **Conceivable Cost Implications** – Sending Li-Fi is hypothetically reasonable due to the little expense related with creation of LED lights. In any case, establishment cost can be more costly than Wi-Fi sending due to innovation is generally new and the interest stays low and concentrated experts are as yet not many

Why do we need LIFI?

LiFi can enable secure wireless communications, connectivity in RF hostile environments such as petrochemical plants and hospitals. LiFi also provides high speed, dense and reliable networks for enterprise environments and a pathway to enable smart buildings, transport, cities, and nations.

Principle of the technology: LiFi is **high speed bidirectional networked and mobile communication of data using light**. LiFi comprises of multiple light bulbs that form a wireless network. When an electrical current is applied to a LED light bulb a stream of light (photons) is emitted from the bulb.

Transmitter and receiver:



IMPORTANCE OF LIFI

More over year there is consumption of wires increasing by 60%. By means lack of wireless frequency is increasing nowadays to impacting the speed of internet usage.

They can be applied in the traffic control system using car headlights and also in chemical manufacturing plants where radio frequency is too dangerous.

With LIFI, the spectrum can be utilized more than 1000 times greater than entire spectrum used in radio frequency.



WIFI, LIFI is also known as the world's fastest wireless network system. They contain two parts called : Transmitter and receiver

BENEFITS OF LIFI OVER WIFI

There are many benefits over LIFI data transmission technology .

- They are high speed data than wifi almost 224Gigabits/sec
- Almost fastest network than others
- Hacking is not possible in lifi technology because they have highest security compared to others.
- Light of lifi doesn't work through partition and also they are protected from hackers and also not possible to hack the devices.
- They emit almost 500-1000 times the radio frequency spectrum.
- The speed of LIFI is very high we can also stream the high quality videos without any bufferings.
- More secure compare to wifi.
- They does not cause any trouble in sensitive areas such as Hospitals and aircrafts.
- They are more valuable compare to other network devices .

DIFFERENCE BETWEEN LIFI AND WIFI

Pointers	Wi-Fi Fidelity) (Wireless	Li-Fi (Light Fidelity)
Application	Internet browsing with the help of Wi-Fi hotspots.	Airlines, undersea explorations, operation theatres, offices and homes.
Coverage Distance	32 meters (varies based on transmit power and antenna type)	10 metres
Data Density	Less dense environments	High dense environments
Operation	Uses radio waves	Uses light sources
Privacy	Less secure	More secure
bandwidth	Unlimited	Limited

WORKING OF LIFI TECHNOLOGY

LIFI is a visible light communication system and also speed of the light is very high. They uses normal LED lights to allow the data to transfer and the speed of the network is about 224 Gigabits/sec. The transmission of the technology will done by illumination. The main things for this are light emitting diodes

They work under the principle of a visible light communication system that transmit wireless data at very high speed. The technology creates an LED light bulb emitting pulses of light that are undesirable to the human eye and can travel to and from the data receiver, within those emitted pulses.

Then, receivers collect information and send the transmitted data. **LiFi transmission speeds can exceed 100-300 Gbps, which is 14 times faster than**

SECURITY

Everyone needs security and privacy for their personal things in this technology we don't need to worry about the things because they have high security rather than others. Lifi implements some security policy.

They had an advantage over wifi network. Since the light is blocked by walls so the data transfer by this method provides more security and since wifi is a network they have radio frequency operation and they cannot block.

LIFI is blocked by walls and also provides more security compare to others and it also send the data fast.

LIFI FOR IOT

They have great impact on Internet of Things, They travel higher level even more, Internet enabled devices will be able to connect to each other with great speed and ease.

LIFI for IOT has great ability to transport data to different terminals without humans and humans or humans and computers. Their level of interaction with internal, as well as external, environments has been increased drastically over a period of time.

LIFI IN HOSPITALS

Nowadays hospitals are using the technology because lifi is safely used in many hospitals. For examples, in operation theatres, patient room and waiting rooms etc. They allow only light communication network which will remove electromagnetic interferences, and for medical workers LIFI will enable he tracking and relocation of the positions of critical medical devices, mainly for regularly shared by different hospitals and cases. More about this technology is updating in various industries and robotic sections.



LIFI IN DISASTER MANAGERMENTS

LIFI can be used as a powerful means of communication in times of disaster such as earthquake or hurricanes. Subway stations and tunnels are common dead zones for most emergency communications. Pure LIFI demonstrated that lifi solutions could perform under real life operations and enable critical communication during response missions. They provide uniquely reliable wireless communication in unpredictable conditions such as disasters. LIFI will provide the connections for homes, offices, public spaces etc.

The lifi range:

Li-Fi is known as Light Fidelity. Simply it transmits data by visible light. According to recent research Li-Fi has a range of **approximately 10 meters**. Also, it cannot pass through wall or any solid object.

USAGES OF THE TECHNOLOGY:

- Underwater applications
- Navy purpose
- Military industry
- In Airport
- Augmented Reality (AR)
- Industry 4.0
- Disaster management
- Airplanes
- In Retail
- In Schools and working areas
- In Pharmacies and pharmaceutical industry
- In Hospitals
- Live streaming
- Underwater applications

LIMITATIONS:

1. LIFI doesn't work in the dark.
2. Lights can't pass through the objects.
3. High installation cost of the VLC systems.

4. Major challenge facing LIFI is how receiving device will transmit back to transmitter.
5. Compared to wifi they have big drawback, Unlike wifi we cannot move to another rooms unless there are wired bulbs.



CONCLUSION

Li-Fi has great potential in wireless data transmission field. Overcomes the limitation of radio spectrum. high speed of 10 Gbs can be achieved. The possibilities are numerous and can be explored further. This may solve the issues such as shortage of radio frequency bands. Allows the internet where traditional radio based wireless isn't allowed such as aircrafts or hospitals. Li-Fi is the future technology of data transmission. Since it is easy to generate light waves, it is very advantageous and easily implementable in various fields. Hence the future application can be extended to the various fields like Traffic. Since it is easy to generate light waves, it is very advantageous and easily implementable in various fields. Optical cell networks based on Li-Fi are the link between future energy efficient illumination and cellular communications. They can also harness unregulated, unused and vast amount of electromagnetic spectrum and can even enable ever smaller cells without the need for new infrastructure. The issues of shortage of radio frequency can be tackled easily with only limitation being that it works in direct line of sight of light. There are no dead ends to technology and science. Now both light and radio waves can be used simultaneously to transfer data and signals.

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Liver Lesion Detection and Classification in 3D CT image using DNN based on Watershed and Gaussian Mixture Model

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Abstract- One of the most widely recognized reasons for malignant growth mortality on the planet is liver disease. Discovering disease tissue by hand is a difficult and tedious interaction. Along these lines, a PC helped analytic (CAD) is utilized in the dynamic cycle to guarantee exact distinguishing proof of the appropriate course of therapy, the essential objective of this exploration is to foster a computerized procedure for recognizing liver malignant growth dependably. X-ray liver images were broke down utilizing an original methodology named watershed Gaussian-based profound learning (WGDL). The recommended model was created utilizing 500 images altogether. A first division strategy utilized markers to manage watersheds, and afterward a Gaussian blend model (GMM) procedure to section the malignancy influenced sore was utilized. The sectioned cancer region was utilized to separate a few textural attributes. Three types of liver disease haemangioma (HEM), hepatocellular carcinoma (HCC), and metastatic carcinoma(MC) were naturally grouped utilizing a profound neural organization (DNN) classifier provided with these division attributes (MET). Therefore, we had the option to get a 98 percent grouping precision using a Deep Neural Network classifier. It is fit to be tried with an enormous information base and can help radiologists in distinguishing liver malignant growth utilizing MR images as indicated by our recommended procedure.

Index Terms: Liver Lesion, Classification, DNN, Watershed

I. INTRODUCTION

Around the world, liver malignant growth is a main source of mortality. Figured tomography (CT) checks empower the exact identification of threatening tissue [1]. Utilizing image preparing, PC helped determination (CAD) can uphold the doctor in settling on choices by arranging liver malignant growth [2]. Scientific techniques dependent on image handling and man-made reasoning give guarantee to better portrayal of liver malignancy in clinical preliminaries. There are a few procedures for distinguishing liver cancers, including locale based methodologies, watershed changes, and AI strategies. Utilizing GLCM-based qualities and a robotized strategy dependent on CAD, it has been feasible to group liver cancers with high precision [3].

Huang et al. [4] depicted a non-upgraded CT image division and arrangement procedure dependent on PC helped plan (CAD). They utilized auto-covariance surface qualities in their augmentation work to precisely arrange the growth with an exactness of 81.7%.

Huang YL, Chen JH, Shen WC et.al [5] differentiate malignant and hemangiomas in CT images using support vector machine(SVM). Texture features with autocovariance characters are extracted and used in SVM.

Optimization by particle swarm was utilized by Zhiwei Ji et al. [6] to foster a PC model for the clinical determination of hepatocellular malignant growth. The discovery of liver malignancy with higher precision has been accounted for utilizing an imaginative and compelling enhanced strategy dependent on instant optimization (IO) and SVM [7].

Chunming Li et al. [8] had the option to isolate blisters, growths, calculi, and typical liver from one another in CT Images. A formulation of new level-set variation method was used. During the evolution of level-set, the levelset regularity were maintained intrinsically.

A multichannel fully convolution neural network (MC-FCN) model developed by Changjian Sun et.al. [9]works on the exactness of CT images fragmenting liver diseases. The data enhanced using contrast in every phase gives unique information on affected area. One among network for every phase were trained and merged their features of higher-layer together.

An important feature used to find out objects is texture feature. Robert M. Haralick et.al. [10] describes texture feature that are easy to compute which is spatial dependent of gray tone and demonstrate the application in classification.

Hu Zilong, Tang Jinshan et.al. made a survey about the deep learning applications [11] for the detection of cancer. Four leading algorithms : Convolution neural network(CNN), Fully Convolution neural network, deep-belief network and auto encoders were surveyed. Watershed segmentation and ANN were used by Hassan Masoumi et.al. for the segmentation of liver in MR images[12]. The model extracts liver area in one slice among several slices of MR images. Boundary-tracking technique was employed to separate the liver area of other MRI slices

An assortment of division calculations utilizing clinical liver images are talked about in this review. There are various division and arrangement moves toward that have been created to analyze different liver issues, and this review centres around their working also [14].

II. METHODS

Watershed Gaussian-based Deep learning (WGDL) approach is another CAD model that utilizes force based division to all the more likely describe liver disease injuries in registered tomography (CT) checks. At the point when it came time to portion the liver from other stomach organs, we utilized the Gaussian mixture model (GMM) and watershed division to take care of segmentation. To recognize HEM, HCC, and MET sorts of liver growths, measurable, textural, and mathematical attributes were dispensed with and arranged utilizing a DNN classifier. In the first step pre-processing is carried out and then Liver extraction is done using watershed method. The lesion is segmented using Gaussian Mixture model giving the extracted liver image as input. After that the features are extracted and given as input to DNN model for the classification process.

III. DATASET

Dataset of 500 3D CT Liver images are used . The dataset is splitup in to trainset and testset in 70:30 ratio. Among 500 dataset 350 are trainset and 150 are testset. Further, 210 images are haemangioma (HEM), 150 are hepatocellular carcinoma (HCC) and 140 are metastatic carcinoma (MC) - as a total of 500. The execution is carried out in Python on an Intel (R) centre based PC with 8 GB of RAM. The data splitup is shown in table 1.

TABLE-1
Data split-up

Class	Train set	Test set	Total
HEM	150	60	210
HCC	100	50	150
MC	100	40	140
	350	150	500

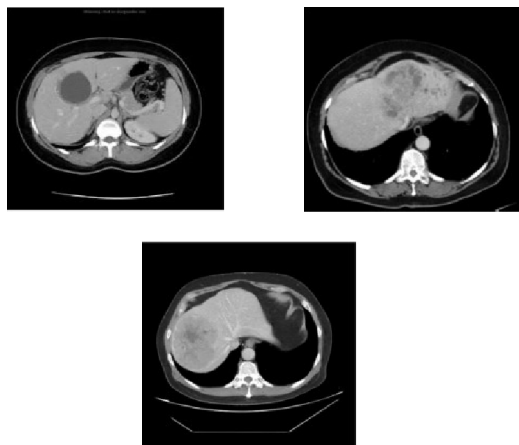


Fig.1
Sample input images

IV. PROPOSED MODEL

The architecture of the proposed model is shown in fig.2.

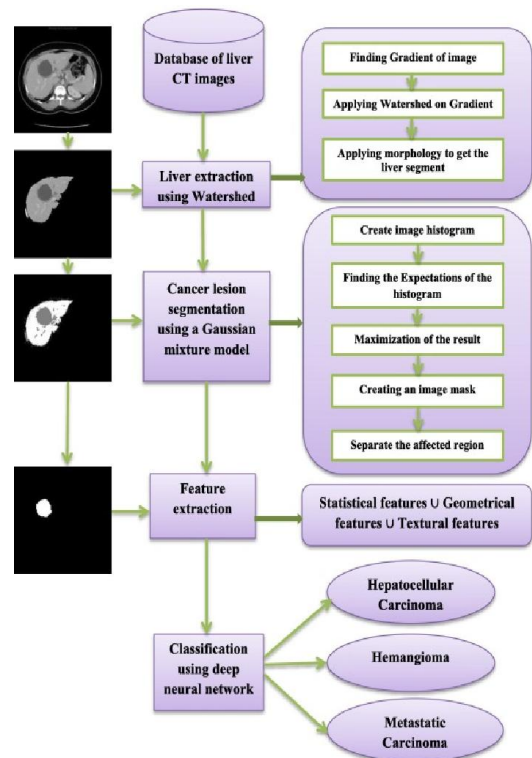


Fig 2. Flow chart

A. Liver Extraction

Watershed algorithm is performed on the dataset to extract the liver area. As per topography, the Watershed change is a district based division technique. Greyscale images are utilized as geological alleviation in this strategy, and a neighbourhood least is alluded to as a Catchment Basin. Flooding makes a watershed since it makes an obstruction. This technique brought about a totally separated image. The image structure is gotten by the morphological interaction. By playing out this cycle, the grayscale image is regularly liberated from framework commotion and different irregularities. This was accomplished by utilizing the watershed change on the angle image.

B. Segmentation of Lesion

Gaussian mixture model is employed to segment the lesion part from the liver. The image is displayed as a pixel grid, with each line and section signifying a solitary pixel. GMM [13] utilizes the image pixels as an arbitrary variable and indicates it with x , where x is a three-dimensional variable with RGB esteems. According to a weighted amount of Gaussian conveyances by (5), the likelihood of an image is communicated as follows: A Gaussian dispersion with a mean and standard deviation is addressed by the word. To apply GMM, we should initially gauge the model's boundaries. Greatest probability assessment is the procedure regularly utilized to appraise a GMM boundary. Streamline the probability of the GMM dataset in the gauge. Assessment is performed utilizing the assumption augmentation (EM) strategy.

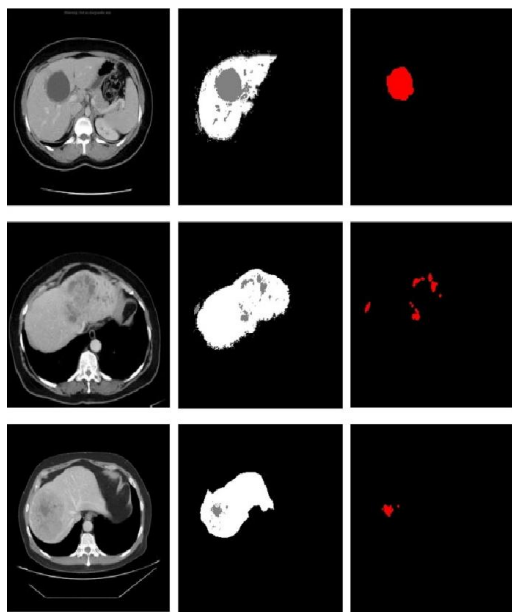


Fig 3.
Deep learning-based Liver cancer detection

C. Feature extraction

In this phase statistical features, Geometrical features and the textural features are extracted. GLRLM(Gray-Level-Run-Length-Matrix) is employed to extract the features of the segmented lesion area. This is executed using python packages.

D. Classification - DNN

The affected parts are sectioned utilizing a division approach dependent on area. Independently, 3D-CNN is used to organize and group Liver 3-D CT and 3-D CUS images. From that point forward, the information is assessed to check whether 3D-CT is better than 3D-US as far as precision. Python's Tensor Flow and Keras are utilized to execute the recommended model [15]. Deep neural network can work on data n more complex paths by applying many math model. More than one hidden layer is applied in DNN model to get more accurate result. In this work two hidden layer is utilised. ReLu activation function is employed.

V. RESULT AND DISCUSSION

The Result of the liver extraction and the lesion segmentation is shown in fig 3. The classification is done for three classes namely haemangioma (HEM), metastatic carcinoma(HCC), and metastatic carcinoma(MC). Since the extraction of liver followed by the segmentation of lesion is carried out, the feature extraction-statistical, geometrical and textural features makes the classification more accurate. The model is tested with 150 test images. In that the model predicts 59 correct HEM and one is wrongly predicted as HCC. Similarly among 50 HCC images, 49 are correctly predicted and one is misclassified as MC. For 40 MC images, 39 are correctly classified and one is misclassified as HEM. It gives an overall accuracy of 98 percentage.

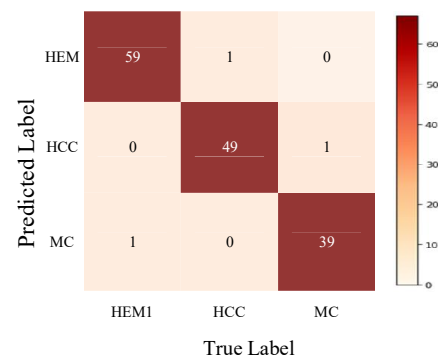


Fig 3 Confusion Matrix

$$\text{Accuracy} = \text{Sum of Diaoganal values} / \text{Total test set} \\ = 147/150 = 98 \text{ Percent.}$$

TABLE-2. Individual accuracy and misclassification rate

Total Test dataset = 150				
Liver Lesion	Correct classification	Wrong classification	Accuracy %	Misclassification Rate %
HEM	59	1	98.33	1.66
HCC	49	1	98.00	2.00
MC	39	1	97.50	2.50

The individual classification accuracy for three classes and the misclassification rate is given in table-2. The misclassification rate for metastatic carcinoma (MC) is high compared to the haemangioma (HEM) and hepatocellular carcinoma (HCC).

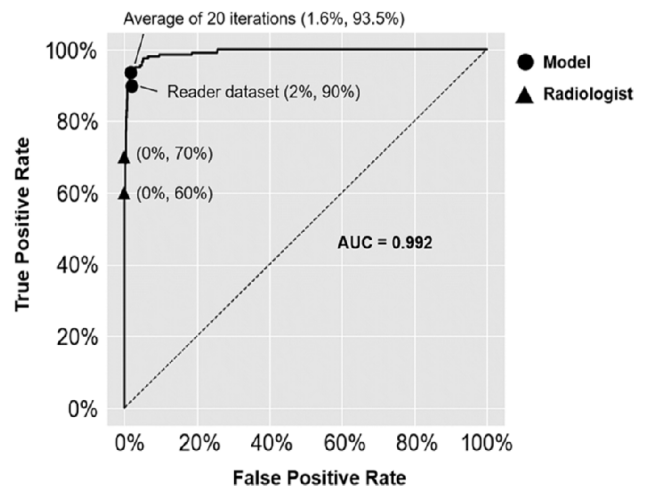


Fig 4. Deep Learning For Liver Tumor Diagnosis

VI. CONCLUSION

Interestingly, another methodology for consequently distinguishing liver diseases in CT filters has been introduced in this paper. A marker-controlled watershed change and a Gaussian combination model are utilized related to this method to precisely analyze a destructive injury. In view of ongoing clinical datasets assembled from different patients,

the proposed technique has been totally tried. The essential advantage of utilizing a profound neural organization classifier to robotize recognition is that it accomplished the most noteworthy exactness of 98% with little approval misfortune. Whenever the DNN first model has been utilized to distinguish a liver growth is in the location technique. Along these lines, the proposed approach gives a productive procedure to track down the carcinogenic liver sores on CT checks, which will support early analysis and treatment arranging. The work's essential limitation is computing the sore's volumetric size, which might be refined by making a 3dimensional cross section structure from a few image cuts.

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Supervisory Control and Monitoring of IoT Enabled Optimized MPPT in Mass Solar Power Plant

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Abstract - A substantial technological growth of the photovoltaic systems has occurred around the world during the recent years enhancing the availability of electric energy in an environment friendly way. The coordination of Internet of Things (IoT) in solar measurement system permits the remote monitoring and controlling of mass solar power plant, upgrading the performance and maintenance of Solar Power Plant. Maximum power generation is a main consider in solar power plant. The maximum power point tracking is optimized with interfacing of IoT enabled Supervisory Control system. The WSN is used to collect the data in autonomously to feed the data to IoT enabled SCADA system. Google weather forecasting data and field wireless sensor data is used to better decision making inputs in MPPT in mass solar power plant. This article proposed a novel idea of interfacing Supervisory Control and Monitoring of IOT system with PV cell applied MPPT method to improve their performance features.

Keywords : IoT, SCADA , Wireless Sensor Network(WSN), MPPT

I. INTRODUCTION

Meeting the expanding energy demand is one of the world's most pressing concerns today, owing to the world's ever-increasing population. In comparison to earlier decades, total energy consumption on the planet is skyrocketing. The rate at which fossil fuels are consumed is inversely related to their life expectancy. Due to the scarcity of fossil fuels, an alternative must be found to meet the load requirement. Renewable energy sources have evolved as an alternate source of electricity production over the last few decades all over the world. Solar PV (photovoltaic) technology, in particular, has gotten a lot of interest because it is non-polluting, has a lot of availability, and has a lot of potential[4].

A wireless sensor networks node can be defined as a system that combines sensing, computation and communication into a single tiny device. Through a mesh of autonomous sensors, they have the capability to monitor real-time environmental parameters, such as temperature, humidity, pressure, irradiance level, and even radioactive reading. The sensor nodes connect to a network and route the data packet via available network be it intranet or the internet[1]. The wireless sensors used to collect the temperature and solar irradiation level, these values inputs to the MPPT algorithm based on that algorithm Solar power plant give the efficient power generation.

SCADA is used by power companies in Energy Management Systems (EMS) and Distribution Management Systems (DMS) to optimise transmission and distribution network performance and protect the grid network. Railways also employ SCADA to manage communication, electrical, and mechanical assets at stations, as well as to control traction power supply, implement train control automation, and regulate traction power supply. Although the Internet of Things is a newer technology than SCADA and PLC, its capabilities are naturally suited to modern business demands. SCADA, on the other hand, allowed manufacturers' systems to communicate in real time, much like IoT does now. As a result, it's clear that the first is the most important.

SCADA, on the other hand, is still restricted to the plant floor. Only the data collected from industrial devices is viewable inside the plant. IoT, on the other hand, takes that data, provides insights to the user, and makes it accessible anywhere, at any time. As a result, new business models can be developed.

Collect data from a Data Acquisition Systems (DAS) machine by integrating the IoT solution with the SCADA system. You may use collected data to create a variety of reports, including overall equipment effectiveness reports, production data reports, and utility reports, by utilising the power and scalability of IoT.

SCADA systems will be transformed into IoT systems in this article. Equipment and PLCs are becoming increasingly sophisticated and capable of integrating several cloud platforms. This will enable new security systems to further safeguard any recorded data. This implies that cost-cutting improvements are possible. As a result, an IoT-enabled SCADA system is installed in a mass solar power plant's MPPT to boost the plant's efficiency.

The suggested hedging method heavily relies on IoT-based data obtained from solar power facilities. Each solar-power plant equipped sensor on a specific solar panel is employed to collect information on generated electricity and received solar-radiation in the planned IoT-based data collection.[5] In addition, meteorological data from selfbuilt weather sensors in solar power plants (or external weather stations) is gathered. This data is acquired physically via sensor

networks, which will be combined as IoT-based data and delivered to the edge-based predictive mode.[5]

Received solar radiation (SRad) is collected from sensors on solar panels in each solar-power plant, and this is the forecast and hedging aim of the proposed system. Then, as forecast features, collect meteorological information such as temperature (Temp), humidity (RH), and wind (Wind) (CA). In conclusion, the IoT-based data is composed of meteorological information and solar radiation labeling.[5]

We use the weather forecast supplied by the Norwegian Meteorological Institute's public application programming interface (API). Weather forecasts are often released three times per day, every 5 to 8 hours. Each issue includes a 60-hour forecast with hourly resolution for the next 60 hours. The publication and forecast timestamps, temperature, humidity, pressure, precipitation, and the amount of clouds covering the sky are all extracted for each hour. The meteorological data for three sample days is depicted. There are numerous levels of cloudiness. [2]

The weather model calculates the amount of clouds at 65 different vertical elevations in the atmosphere on the inside. We use cloudiness at four different aggregation levels in the forecast: low clouds (below 2.5 km), medium clouds (2.5-5 km), high clouds (above 5 km), and a total cloudiness percentage, which is determined from the full stack of cloud levels. [2]

We combine the solar data acquired every minute with the weather forecast's hourly slots. We sanitise the data by removing a small number of days where the weather forecast was unavailable or the solar panel was malfunctioning. We add the solar angles zenith and azimuth for our location based on the timestamp. [2]

II. MPPT TECHNIQUES

Maximum Power Point Tracking for Solar Photovoltaic System because of the earth's rotation and revolution, changing climatic conditions, and nonlinear I-V characteristics, power tracking is required in SPV. Mechanical and electrical tracking systems are used. Due to the rotation and revolution of the planet, SPV panels are constructed to follow the movement of the earth with relation to the sun through mechanical tracking to ensure maximum insolation is received by PV systems. Trackers can be two-axis or single-axis. Two-axis trackers watch the sun in both azimuth and altitude angles, ensuring that the PV module is always pointed directly at the sun. Single-axis trackers track only one angle. The MPP P2 can be obtained if the MPPT controller is used in conjunction with the PV system. As a result, the power converter adjusts the load with the PV array in order to attain an operating point near the maximum power point and extract maximum output power from the PV array. Also, the duty cycle (D) of the converter is adjusted till the time maximum power point is reached.

III. SCADA SYSTEM

Data Acquisition:

SCADA data collecting typically necessitates some form of

analogue to digital conversion. Degrees Celsius are used to convert temperatures. The dBm value of the transmit signal is transformed. The quality of a channel is measured in errored seconds.

Networked Data Communication:

The acquired data is sent to an upstream consolidator or master either on its own or in response to a request for data. Analog (T202, POTS) or digital (RS485, TCP/IP) communication channels are available. In addition to content certification, most SCADA network topologies contain some form of transit validation.

Data Presentation:

Data is collected, structured, and presented to system operators so they can make appropriate response and control decisions. The format of the presentation might range from a tabular display of logged events to a graphical display against a mapping or picture background.

Control:

If particular operational or configuration modifications are required and the system allows output, relevant instructions can be despatched. RTUs and PLCs handle the majority of the control functions.

IV. WIRELESS SENSOR NETWORKS

Wireless Sensor Networks (WSNs) are a type of network that consists of interconnected sensor nodes that communicate wirelessly in order to collect data about the environment. Nodes are often low-power and distributed ad hoc and decentralised. Although WSNs have grown in popularity, resource constraints in memory, compute, battery life, and bandwidth pose severe challenges when it comes to establishing security. Attacks on privacy, control, and availability can all be targets. The needs for encryption, authentication, lightweight public key infrastructure proposals, and key management in WSNs. The issue of new WSN routing methods that consider energy consumption is discussed. The chapter then goes on to describe WSN as a key technology that enables the Internet of Things (IoT). Because of the large number of "things" and the system's openness, security is projected to be a big concern for IoT. The IoT should be intrusion tolerant and self-healing, in addition to the normal security goals (privacy, authentication, and access control). The WSN is used to collect the data reduce the human intervention in the plant. Produce the best result to provide the MPPT.

A solar photovoltaic module monitoring and control system has been developed that combines the usage of a non-linear MPPT with a bespoke wireless sensor network (WSN). A wireless smart photovoltaic system (WSPS) and a wireless centralised control system make up the infrastructure (WCC). Sensing, coordination, and control data are handled by a WSN based on IEEE 802.15.4 technology in beacon enable mode with a guaranteed time slot. This ensures data transmission and synchronised acquisition, both of which are key components of a solar monitoring system that is wireless. An autonomous, compact, and low-cost s collects all measured data.

V. SUPERVISORY CONTROL OF IOT ENABLED MPPT

In this proposed system in solar power plant MPPT done with help of PLC, SCADA, IoT Devices and WSN. In PLC S7-1200 are connected in field equipment's to collect the information of weather and Electrical parameters based on these data's to MPPT algorithms to control the MPPT axial movement. SCADA is implement to control the entire plant in single screen. Wincc SCADA is used. Simatic IoT 2000 device is used to interface the plant in IoT system. Advent of IoT in SCADA system to improve the automation, predictive analysis and sustainable solutions in Solar Power Plant. To implement the Google weather forecasting data and real time field sensor data used better decision making inputs for MPPT Algorithm. Historical and Real time trend data are created for further improving of MPPT in solar plant. Multiple control in single user interfacing and able to control in remote areas.

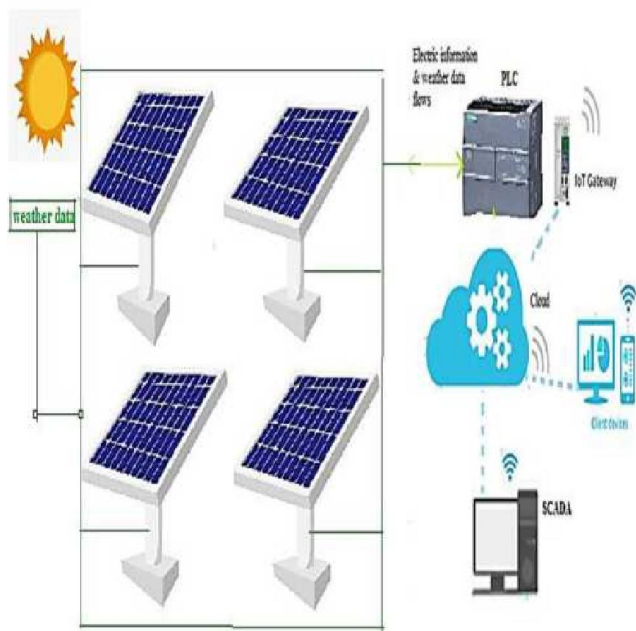


Fig 1. The Proposed Supervisory Control IoT enabled MPPT Solar Power Plant

The proposed and implemented an Supervisory control of IOT based MPPT techniques to get better efficiency and more power from the PV Solar module.

IoT enabled MPPT

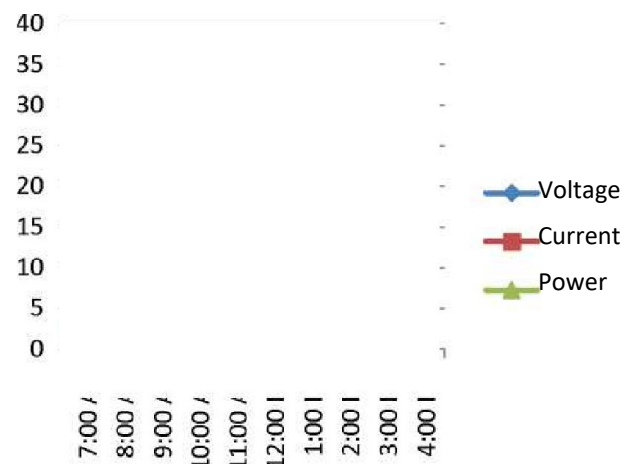


Fig 2. Data analysis of IoT enabled MPPT system

CONCLUSION

Renewable energy sources, also known as non-conventional energy sources, are constantly replenished by natural processes. The system is the best option for producing clean energy. This paper discusses a novel supervisory control of IoT enabled MPPT techniques for solar PV applications. This entire system is the most efficient way to extract and utilise all of the desired solar power. This IoT-based system can fully utilise the characteristics of the proposed MPPT method for PV panels in plant to extract the maximum power from solar energy sources. This approach can track the maximum power output of a PV cell system fast and precisely. It is offered a comparative analysis based on real-time data. All of these characteristics are necessary for picking the best MPPT for a certain application. The overall system's efficiency is determined by the algorithm that runs on the server. The PV grid can give consumers with more stable, high-quality, and efficient power.

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BIOPLASTIC FROM MUSA ACUMINATE

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Abstract— Plastics have become an essential part of our daily lives and have varied application. The production, use and disposal of the plastics emerged as a persistent and potential environmental nuisance. Due to their function and safety aspect nowadays, antimicrobial and biodegradable films have been used in many fields. The main target of this project is replacement of plastics to bioplastics. With increasing demand for global plastic consumption, a lot of products is dedicated towards green materials as new to process them. This will help you to coordinate human activities with natural environment. *Musa acuminata* were collected and turn into small pieces by the help of knife. Then leaves are dipped in sodium monosulphate solution for 30 minutes. It is used as antioxidant and preservative. *Musa acuminata* are boiled in distilled water for about 20 minutes. The water is removed from the beaker and the leaves are allowed to dry by using the filter paper. After the leaves are dried, they are placed in a beaker and using a hand blender, the leaves are pureed until a uniform paste is formed. *Musa acuminata* are boiled in distilled water for about 30 minutes. For the Production of Plastic 30 g of *Musa acuminata* paste is placed in a beaker. 4 ml of (0.5 N) Hydro Chloric Acid is added to this mixture and agitated using glass rod. 3 ml Plasticizer (Glycerol) is added and agitated. Sodium Hydroxide is added according to pH desired, after a desired residence time. The mixture is layout on a ceramic tile and is dried using the sunlight. After this process film is scraped off from the surface. After the production of bioplastics several test have been done such as degradation test, elongation test, molding test, biodegradability test and mechanical property test.

Keywords— *bioplastics, Musa acuminata, sodium metabisulphite, Hydro Chloric Acid, Glycerol, sunlight.*

I. INTRODUCTION

Plastics is the term generally used to describe a wide range of synthetic or semi-synthetic accoutrements that are used in a huge and growing range of operations. Plastics affect mortal health which contains Poisonous chemicals strain out of plastic and are plant in the blood and towel of nearly all of us. Exposure to them is linked to cancers, birth blights, bloodied impunity, endocrine dislocation and other disease Plastic spoils our groundwater. there are thousands of tips. Buried beneath each one of them, poisonous chemicals from plastics drain out and transude into groundwater, flowing downstream into lakes and gutters. Currently, antimicrobial and biodegradable flicks have been used in numerous fields due to their function and safety aspect. Bioplastics presently make up an insignificant portion of total world product of plastics. Marketable manufacturing processes are agonized by low yields and are precious. Bioplastics play major part in future. Thus, bioplastics are

sustainable, largely biodegradable, and biocompatible. Moment bioplastics come necessity in food packaging, agrarian, and horticulture, composing bags and hygiene. With adding demand for global plastic consumption, a lot of products is devoted towards green accoutrements as new to reuse them.

To develop bioplastics from *Musa acuminata*. Which is getting wasted more in our granges. This product is biodegradable and will be used as an volition for plastics. *Musa acuminata* are usually used for food packaging. But they quickly deteriorate. they have been overtaken by plastics, which now shackle the waterways like sea, ocean and pollute the oceans. *Musa acuminata* as a packaging material that keeps it properties for three years this process is managed by a young Indian inventor . And it is perfectly biodegradable. both have a major downside which is preferred packaging materials of the industrialized society. mankind cuts down billons of trees annually for paper. in a result of world-wide pollution with unknown effects plastic disposables thrown away. To create the sustainable civilisation Nature and mankind should coexist in every aspect . Nutritional Value. *Musa acuminata* are naturally antioxidants because of polyphenols in *Musa acuminata*.

Harmful effects are due to the use of plastics and so it takes around 500 years to degrade and will be toxic after decomposition. starch in the *Musa acuminata* is used to make plastics to avoid using conventional plastics. To find the strength of the plastic, elongation test is carried out. soil burial degradation test is carried out for finding intensity of degradation.it is observed that biodegradable plastic degraded at faster rate than conventional plastic. owing to these advantages, *Musa acuminata* biodegradable plastic is recommended compared to other plastics. The industrial use of these biodegradable plastic is such packing ,moulding etc.

TABLE I. COMPARISON OF BIOPLASTIC AND PLASTIC

BIOPLASTICS	PLASTIC
<ul style="list-style-type: none"> These are the products made up of plastic which are labelled as Compostable also referred as edible 	<ul style="list-style-type: none"> Most plastic products are made from petroleum. These include polyethylene, PVC, polypropylene, polystyrene, polyester, nylon and acrylic.
<ul style="list-style-type: none"> Less usage of energy 	<ul style="list-style-type: none"> More energy usage during production (about 65%)
<ul style="list-style-type: none"> Eco friendly 	<ul style="list-style-type: none"> Increase global warming
<ul style="list-style-type: none"> Increases soil fertility 	<ul style="list-style-type: none"> Reduces soil fertility
<ul style="list-style-type: none"> More sustainable 	<ul style="list-style-type: none"> Unsustainable
<ul style="list-style-type: none"> Degradation period 	<ul style="list-style-type: none"> Approximately about

about 6 months or less than 6 months	450 years to decompose in landfill.
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II. MATERIALS

A. *Musa acuminata*

plastics, that now constantly clog the courses and pollute the environment. as a new idea a development managed to exercise *Musa acuminata* to a packaging material that keeps it parcels for times better than other. And it's perfectly biodegradable. favored packaging property of the industrialized society, both have a major strike. For paper, humanity cuts down billions of trees annually. And plastic disposables thrown down affect in a world-wide pollution with unknown goods. So it's up to humankind to make the right choice. 'Nature and humanity should attend in every aspect to produce the sustainable civilisation.



Fig. 1. *Musa acuminata*

B. Hydrochloric Acid

Plastic contains some contents which are considered as a resistance for the hydrochloric acid, so due to this reason hydrochloric acid doesn't dissolve plastic. Hydrochloric acid is a strong acid and is largely reactive with essence, essence oxides and skin. Proper storehouse of hydrochloric acid is important because the acid can reply with the storehouse vessel and the spillage can affect in acid becks, substantially if the acid is extremely concentrated. Hydrochloric acid reacts with numerous essence producing hydrogen gas which can come an explosion hazard. Plastics generally don't reply with acids and the plastics which are used for acid storehouse are especially unreactive. Glass also doesn't reply with hydrochloric acid. Essence reply readily with hydrochloric acid, so they aren't used to store this acid. Thus, hydrochloric acid doesn't dissolve plastic.

C. Glycerol

Glycerol is used as a plasticiser to produce bounce-grounded biodegradable flicks. Bounce and glycerol melt and inflow at temperatures between 90 °C and 180 °C and under shear stress, producing thermoplastic bounce that, allowing their use injection, extrusion and blowing outfit. Plasticisers produce lesser inflexibility in the polymer structure by reducing the intermolecular forces and the glass transition temperature of the material, which increases the mobility of the polymer chains in the bounce flicks. The needed proportion of bounce and glycerol depends on the type of bounce used.

D. Sodium Hydroxide

Plastic is inert to Sodium Hydroxide result so it can safely stored in plastic holders whereas Sodium Hydroxide reacts with glass Silica that results impurity with Silica. Also known as acidulous pop or liquid lye, sodium hydroxide is used to acclimate pH in water and wastewater treatment and in the manufacture of chemicals, rayon, cellophane, pulp and paper, aluminium, cleansers, detergents and a wide range of other products. As for storehouse Sodium hydroxide is a "slippery" chemical that tries to find leak paths. This chemical is extremely sharp to towel. It's also largely poisonous if ingested. Still, it'll solidify and go solid, If sodium hydroxide isn't kept at a specific temperature. A tank system and proper fittings from Poly Processing can reduce your threat with this dangerous chemical.

E. Filter Paper

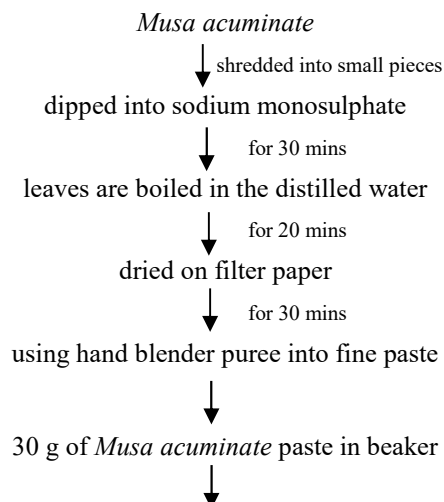
Across many different fields filter papers are widely used in laboratory experiments, from chemistry to biology. According to the purpose of the procedure and the chemicals involved different types of filter papers are used. Generally, gravity or vacuum filtration techniques are used by the filter papers.

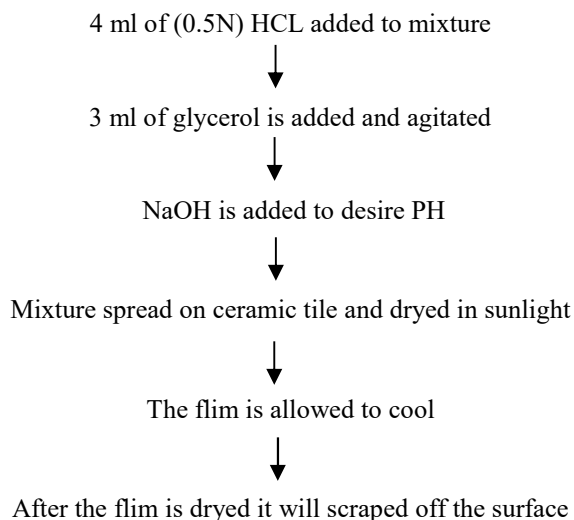
III. METHODOLOGY

A. Test for starch in leaf

- keep a leaf on a sunny window sill and another in a dark room for 1 day
- After 1 day, fill a beaker with C_2H_5OH and place it in a pan full of water
- Continue warming the vessel until ethyl alcohol starts boiling and also take it off from the heat
- dip each of the leaves in hot water for a 60 seconds
- Now, dip the leaves in the beaker holding ethyl alcohol for 2 minutes or till they change their color to nearly white
- Place each of them in a shallow dish
- with some drops of iodine solution cover the leaf and then observe it

B. Flow Sheet





IV. PROCEDURE

- *Musa acuminata* are converted into small pieces and then the leaves are dipped into sodium monosulphate (0.2M) solution for 45 minutes.
- *Musa acuminata* are boiled in the distilled water for 20 minutes and allowed to dry on filter paper for about 30 minutes.
- After the leaves are dried, using a hand blender the leaves are pureed until the paste is formed.
- 30 g of *Musa acuminata* paste is taken in a beaker.
- Add 4 ml of (0.5N) of Hydrochloric Acid is added in the mixture and agitated using glass rod.
- 3 ml of glycerol is added and then the mixture is agitated.
- Add sodium hydroxide to a desired PH .
- After the addition of sodium hydroxide, the mixture is allowed to spread on a ceramic tile and are dried in sunlight.
- Then the tile is allowed to cool.
- After the film gets dried, the film is scraped off the surface.

V. RESULT AND DISCUSSION

In this project, the experiment conducted in order to form biodegradable plastic from *Musa acuminata*. The plastic was formed after several experiment was made. The plastic sample produced might not achieving the perfect characteristic of a plastic but it's good in biodegradability because it are often composted in only 6 days. To prove that we made the biodegradable plastic moulding process was administered where the biodegradable plastic was moulded into several shape and dried until to urge the moisture out and become hard. These results supported my hypothesis, meaning that we succeeded and made biodegradable plastic from *Musa acuminata*.

A. Degradation Test

The amount of glycerine and the mass of the biodegradable plastic mould was recorded by the biodegradation test.

The degradation of plastic is quicker as the increase in the amount of glycerine. From the graph the initial weight is 100g and the amount of glycerine is taken as 20 ml, 25 ml and 30 ml.

The next day weight has been reduced as 0.05g for 20 ml, 0.1g for 25 ml, 0.15g for 30 ml of glycerine. On the fourth day it has been reduced to 2.45g for 20 ml, 3.19g for 25 ml, 3.99g for 30 ml. The last day it was noted that the wait of biodegradable was reduced to 3.56g for 20 ml, 5.14g for 25 ml, 6.62 for 30 ml of glycerine. 30 ml glycerine decades faster than 25 ml and 20 ml.

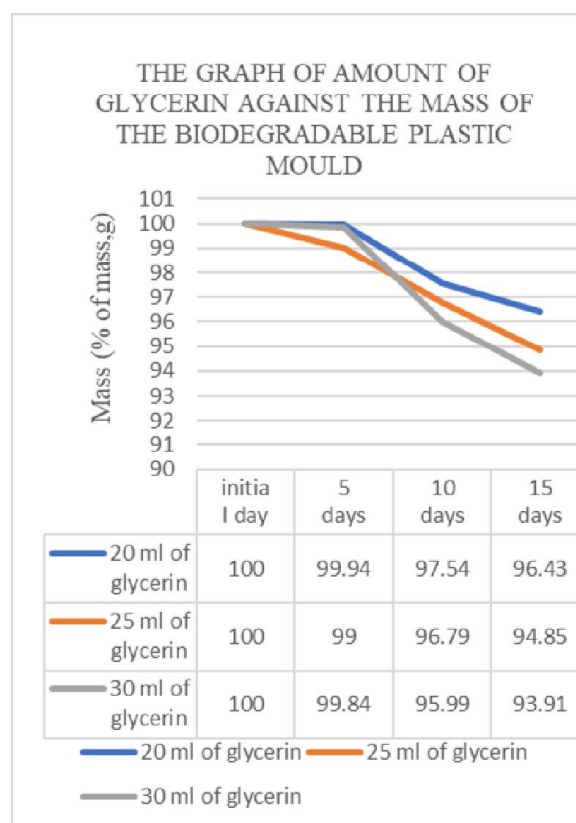


Fig. 2. The amount of glycerine against the mass of the biodegradable plastic mould

B. Elongation Test

The elongation test on biodegradable plastic is shown in the figure 3. The initial length of biodegradable plastic is 4.5cm and after stretching it becomes 6.5cm by which the biodegradable plastic reaches maximum strength. The strength of the plastic strip is considered by the force it can bear under tension per unit cross sectional area of the flim without breaking. By making the plastic thicker the strength of the plastic is increased which would allow the plastic to bear a greater load under tension without breaking. The technical property does not change with the change in size and shape of the plastic. Tensile testing determines the amount of stress each material can sustain prior to failure As well as the amount of elongation at time of failure



Fig. 3. Elongation test on biodegradable plastic

C. Moulding Test

Moulding is a manufacturing process which involves in shaping a liquid or pliable raw material by using a fixed frame known as mold or matrix.

The final objects pattern or mould is used for mold or matrix. The melted plastic is forced in to a mould cavity, later once when the plastic has been cooled, the part can be ejected, this is the process of moulding. Figure 3 shows the biodegradable plastic is mouldable into various shapes.

Biodegradable plastic is also known to be conventional plastic because it replaces the petroleum based plastic which is most popular among plastic moulding.



Fig. 4. Biodegradable plastic mould

D. Biodegradability test

Biodegradability test or soil burial test (known as soil burial method) which loaded environment where humidity of soil, temperature and amount of micro organisms and its types were less in control and changed with season controlled and it is less it keep on changing with Seasons.

The shape and Site of all the tested films are same because it can avoid the effects of films shape on biodegradability.

At a particular time interval sample & collected from the soil where the loss of weight of the films can be detected or observed. The sample of was removed for evaluation at a time Interval of 2 days.

from the that buried films. This was noticed that the degradation rate of *Musa acuminata* starch films continuously increasing along with increasing in the number of days.

By the result, come to know that film degrades completely with 15 days by the other side biodegradable bin – composite film degradation done within 90 days.

E. Mechanical Property Test

Normal stress must be encountered by the bio composite film. Stretch and flexibility is determined by elongation at break and the composite film breaks at certain break.

When the amount of starch increases, elongation at break increases and also due to decrease in the *Musa acuminata* starch crystallinity. By decreasing the intermolecular attractive forces by plasticizers which helps in the Film flexibility.

VI. CONCLUSION

Bioplastic film has sufficient tensile strength and it can sustain the weight almost 2 kg. The *Musa acuminata* that is used for bioplastic manufacturing is likely used for packaging material or a carrying tag. To increase the flexibility glycerol is put on as plasticizer. Sodium meta sulphite is used since it prevents growth of bacterial and fungi. Only after 3 to 4 months from the manufacturing date the degradation of bioplastic begins. The atmospheric condition also can be a main cause on degradation period of bioplastic. These creates many environmental problem from conventional petroleum related plastics which need more focus were it completely degrade. After specific time interval in environment mainly by microbial action. One of the major advantages of plastics over conventional plastic is there will not be pollution when degrade in the environment. Bioplastic is the best replacement over conventional plastic. The use of *Musa acuminata* as a raw material can bring a good quality bioplastic which has good long life.

The biodegradable plastic becomes a promising result to break all this problems. The ideal of this study is to produce biodegradable plastic from *Musa acuminata* puree act as a cover for the conventional plastic and to prove that the bounce in the *Musa acuminata* could be used in the product of the biodegradable plastic. The strength of the film was determined using the extension test by comparing the biodegradable film with a control film and a synthetic plastic. In the soil burial declination test, the intensity of declination was tested for all three types of film and the biodegradable film degraded at a rapid-fire rate compared to control film while the synthetic plastic didn't degrade at all. Grounded on all the testing that was carried out, the biodegradable film from *Musa acuminata* puree. The bioplastic were prepared successfully by the mixing and casting system. The characteristics of the bioplastic with different glycerine content (20 ml, 25 ml, and 30 ml).were estimated using soil burial declination test and primer. In soil burial declination test, the conciseness of biodegradable compound flicks was destroyed as the declination time increases. A rapid-fire declination passed for all the bioplastic in the original 15 days, followed by 100 composting within anticipated 90days. As conclusion the bioplastic produced from *Musa acuminata* had implicit operation to be used as food packaging because it can enhance the food quality.

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DEVELOPMENT OF EDIBLE COATING FROM *SARGASSAM TENERRIMUM* AND *SARGASSUM CRISTAEOFOLIUM* AND ANALYSING THE SHELF LIFE OF FRUITS AND VEGETABLES

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Abstract—Food preservation is the oldest technique to prevent foods from spoilage. It can extend the shelf life and protect it from deterioration. Many fruits and vegetables are degraded during the post-harvest period. To overcome this food spoilage many artificial and synthetic preservatives were used and it results in several side effects in humans. Seaweeds are natural source which possess several properties to extend the shelf life of food. Seaweeds are abundantly available in Indian coastal areas. The present topic is about extending the shelf life of fruits and vegetables using seaweeds namely *Sargassum tennerimum* (brown algae) and *sargassum cristaeofolium* (brown algae). These were selected due to their gelling property. The selected seaweeds were collected from Rameshvaram (Mandabam), Tamil Nadu, India. In this study the seaweeds are dried and powdered and the coating gel will be extracted from the powdered seaweeds using hot water extraction method. Then extracted gel was coated on selected fruits and vegetables and the shelf life was observed.

Keywords— Preservation, Spoilage, Seaweeds, Preservatives, Extraction, fruits, vegetables, deterioration

I. INTRODUCTION

Food preservation is the earliest form to preserve the fruits and vegetables. It extends the shelf life of fruits and vegetables. It helps to prevent the food from spoilage and deterioration. Usually fruits and vegetables have quality factors such as texture, color, appearance, flavor, nutritional value. But due to external factors such as atmosphere, oxygen, carbon dioxide, ethylene ratios, temperature and internal factors such as growth, maturation, biochemical deterioration, water activity causes contamination in fruits and vegetables. But nowadays preservation is mainly from artificial source because it reduces the use of natural sources and also gives longer shelf life than natural preservatives. Many fruits and vegetables is degraded during this the post-harvesting period. To overcome this and improve quality chemical and artificial preservatives were used and it leads to several health hazards to humans. Artificial or chemical preservatives commonly used are sodium benzoate, benzoic acid, sodium nitrate, potassium, sodium and sulphur dioxide which can cause high blood pressure, increase cholesterol level and also affects the kidney and liver function. Edible

coating has been made a good choice in recent times. In 1922 it is commercially applied on fruits and vegetables. This can be eaten with the product as an part and it doesn't cause any effect to humans. And also they do not add any kind of unflavourable property to the foods that have been coated. They mainly concentrate on preventing firmness loss and moisture loss. Even they control activities such as respiratory rate, development and maturation. They decrease the growth of microorangnism and prevent oxidative browning and reduce physiological disorders. They are high potential to control browning, discolor activity, off flavor, microbial activity of fruits and vegetables. The edible coatings contain antimicrobial, antifungal, anti-browning and texture enhancing properties. It is a thin layer of coating at maximum of 0.33mm. they form barrier against oxygen, moisture, UV-light. It extend the life of fruits and vegetables during the post-harvest period. These can be obtained from many main sources such as polysaccharides, lipids, proteins, plants, algae. And coating gel was obtained from several bases such as pectin, starches, alginates, cellulose, carrageenan, wheat gluten, gelatin, casein, keratin etc... These protect the foods from contamination and hazards. Among natural preservatives seaweed coating is one of the best and effective choice to have. Usually seaweeds contain 90% of moisture, 8% minerals, 3% lipds and good content of essential amino acids. So, Natural preservation with seaweed gel coating was found to be a good choice. It has abundant availability, cost effective, lesser or no side effects and ability to increase the shelf life of fruits and vegetables, with this state the present study was undertaken to analyze the phytonutrient, flavonoid, antimicrobial activity of the two selected seaweed and to study the shelf life of fruits and vegetables using seaweed gel coating. The present topic is about extending the shelf life using marine algae seaweeds. Here brown algae is chosen they belongs to phylum phaeophyta. The seaweeds namely *sargassum tenerrimum* and *sargassum christaeofolium* were taken here to extend the shelf life of fruits and vegetables. These were selected due to their gelling property. Initially they were dried and powdered. Then the coating gel would be extracted from hot water extraction method. Several test would be taken to analyze the properties.

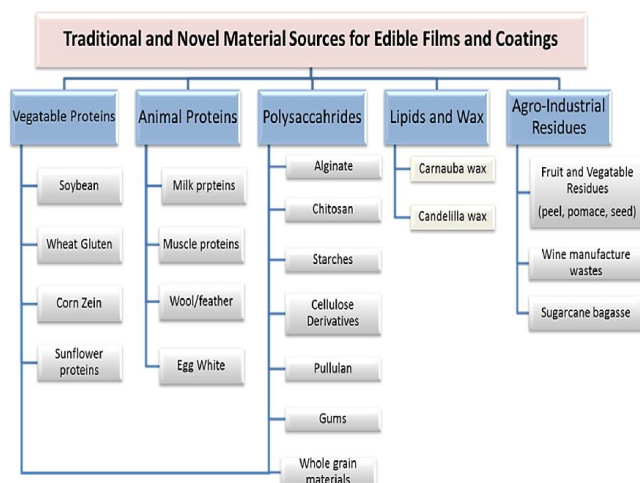


Fig. 1. EDIBLE COATING SOURCES

SELECTED SEAWEEDS

Fig. 2. *Sargassum tenerrimum* (brown algae)Fig. 3. *Sargassum cristaeifolium* (brown algae)

II. MATERIALS

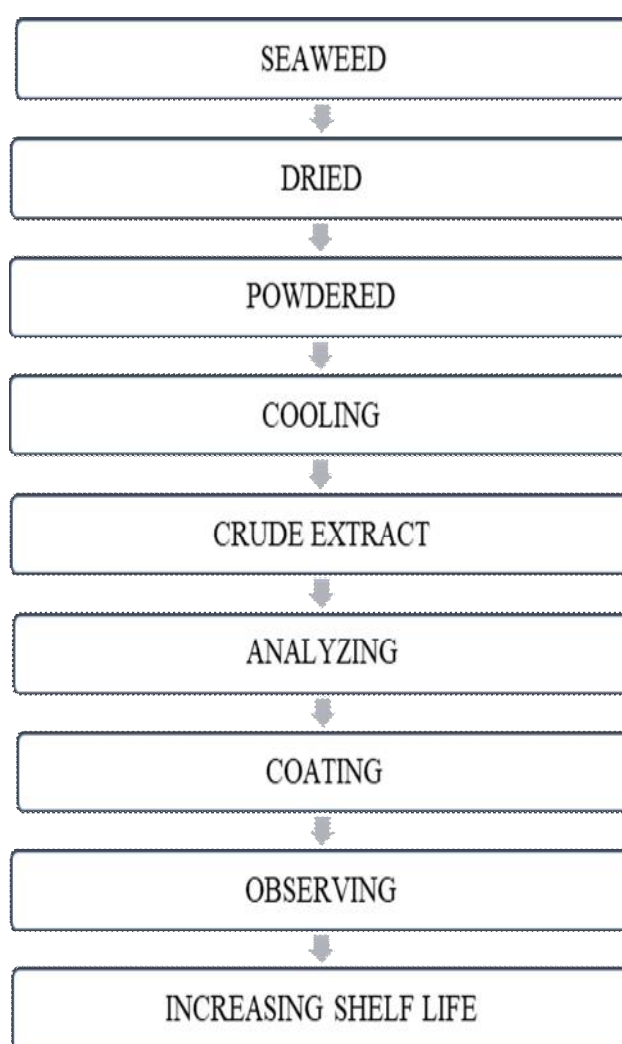
A. Selection of materials

Two seaweeds namely *Sargassum tenerrimum* and *Sargassum cristaeifolium* were taken. Washed with distilled water. Weighing the amount of algae is subjected to hot water extraction method. After dried it is powdered with an blender finely. The powder is pored in boiling water to extract the crude extract that is coating gel.

B. Chemicals and apparatus required

A boiling vessel, burner, water and gelatin are required to extract the coating gel.

III. METHODOLOGY FLOW



IV. PREPARATION OF COATING GEL

The collected sea weeds were washed in distilled water to remove the foreign matter and particles and they were made to dry effectively. The dried seaweed is powdered finely. The hot water extraction method is used to extraction the gel from the powder. For that initially 5 gms of seaweed is taken and immersed in 500 ml of water and boiled for 15 mins at 100°C. The powder gets through the water and mixes well.

Now it is set to cool and filtered. Then the extract is allowed to set at room temperature. Now the gel will be obtained after its cooled. This crude extract is used to coat the selected fruits and vegetables. The one set fruits and vegetables will be coated and one set of fruits and vegetables will be uncoated. The coated fruits and vegetables will be at different concentration (eg: 1%, 2%, 3%). To observe the higher amount of shelf-life extension.

V. METHODOLOGY

A. Applying methods of edible coating

Edible coatings can be applied in fruits and vegetables by different methods. It also depends upon the fruits and vegetables we select to coat. Usually, it is applied on the surface of the fruits and vegetables are commonly on foods.

- Dipping
- Brushing
- Extrusion
- Spraying
- Solvent casing

Among these methods dipping is used widely for fruits and vegetables. Dipping method is said to very effective and carried out easily to ensure and extend the shelf life. Dipping the fruit or vegetable for 5-30 secs results in good coating. After the coating process the fruits and vegetables were categorized into two coated and uncoated and were observed for shelflife studies. And different concentration of coatings were carried out to observe efficiently. Here the two seaweed such as *sargassum tenerrimum* and *sargassum cristaefolium* were used as coating material.

B. Determination of phytonutrient

It is a natural substance that present in fruit and vegetables. The preliminary analysis was done such as steroids, tannins, saponins, flavonoids, terpenoids, phlorotannis. The crude extract will be tested for quantitative phytonutrients such as total flavonoid (TFC), Total phenolic content (TPC). Here the total sugar will be done with phenol sulphuric method.

C. Determination of Total flavonoid content

It is one of the important quality Index. They are abundant in fruits and vegetables and natural substance which has been present. The extract from two seaweeds namely *Sargassum tennerimum* and *Sargassum cristaefolium* flavonoid content is analysed by colorimetric method. Using vortex mixture will be mixed well. And the extract absorbance was measured with spectrophotometer.

D. Determination of total phenolic content

Phenolic content has important plant constituents with redox property and it is responsible for antioxidant activity. The selected seaweeds Total phenolic content was measured by folin-ciocalteu reagent. This is followed by colorimetric method. The TPC is calculated and expressed in terms of gallic acid equivalent per gram of dry weight based on standard curve.

E. Determination of antimicrobial activity of seaweeds

Usually, antimicrobial activity prevents the formation of microorganisms. The selected two seaweeds were allowed to antimicrobial activity by diffusion method and the microorganisms that inhibit spoilage were identified then the antibacterial activity of extract to those microorganisms is observed. Atlast zone of inhibition is determined. By agar diffusion bioassay was carried out. After 24 h of incubation zone of inhibition is measured.

F. Determination of antifungal assay

It is carried out by disk diffusion and agar dilution and also by bio-autographic methods. It kills the fungal cells and preventing it. It prevents the growth and reproducing of the fungal cells in the fruits and vegetables. Here the cultures were incubated in room temperature for 2-3 days. And using Sboudraux Dextrose Agar (SDA) plates culture is seeded in it by agar diffusion method.

TABLE I. CHARACTERISATION ANALYSIS

S.No	FACTORS	Kappaphycus alvarezii (RED ALGAE)	Sargassum tenerrimum (BROWN ALGAE)
1.	FLAVONOID	LOW	HIGH
2.	PHENOLIC CONTENT	LOW	HIGH
3.	ANTIBACTERIAL	HIGH inhibition zone	MODERATE inhibition zone
4.	ANTIFUNGAL	HIGH inhibition zone	LOW inhibition zone
5.	TOTAL ACIDITY	1%- LOW acidity 3%- HIGH acidity	1%- LOW acidity 3%- HIGH acidity
6.	TSS	1% - LOW TSS 3% - HIGH TSS	1% - LOW TSS 3% - HIGH TSS

VI. EVALUATION OF SEAWEED COATING ON SHELF LIFE

A. Weight loss

Usually, fruits and vegetables when kept at atmospheric air the weight of the particular sample will be reduced. Here the weight is compared between the coated and uncoated fruits to study the amount of weight reduced. The coating gel will be coated at different concentrations. The loss of weight can be calculated from the difference between the initial and final weight and expressed as zero percent of fresh weight.

B. Texture

Usually, texture can be determined by two factors such as firmness and whole shape. Texture can be changed due to metabolic content and water content. Here the selected fruits and vegetables were coated with crude extract. And the fruits and vegetables were observed individually as coated and uncoated and compared between them to observed the texture. Changes in size of tomato, change in firmness and textural can be determined by difference between the initial and final weight and expressed as zero percent of fresh weight.

C. Total soluble solids

It is usually described as percentage of fresh matter mass. It has high correlation with sugar content and it is also a important quality traits of fruits. TSS measures the density of the liquid. Here the TSS is determined by hand refractometer instrone. And the brix range should be between 0%-40%.

D. Total acidity

In total acid the citric acid is the primary content. It is determined in the coated and uncoated vegetables. The crude extract of selected two seaweeds were coated in set of fruits and kept as it is as uncoated ones. The fruits were coated at different concentrations. And the total acidity will be measured between those two set of fruits and vegetables and separately indicating the concentration.

E. Ascorbic acid content

It is said to be vitamin C content. By using 2,6-dichlorophenol indophenols dye titration method is carried out to determine the ascorbic acid content.

F. Juice percentage(%)

Juice was extracted by blending it and analysing the content of fruit juice compared to whole fruit weight.

$$\text{Juice percentage} = \frac{\text{Total wt of juice (g)} - \text{beaker wt (g)}}{\text{Total weight of fruit (g)}} \times 100$$

Using the above formula, the fruit juice content and the percentage can be calculated.

G. Statistical analysis

Here it is all about analysing the quantitative data. It will be taken for individual kind of fruit and vegetables undergone coating. All the measures were taken at triplicate manner and data have been collected. And standard deviation have been calculated.

TABLE II. SHELF LIFE ANALYSIS

S.No	FACTORS	<i>Kappaphycus alvarezii</i> (RED ALGAE)	<i>Sargassum tenerrimum</i> (BROWN ALGAE)
1.	WEIGHT LOSS	LOW loss (effective one)	LOW loss
2.	TEXTURE	3% - BEST TO MAINTAIN	NOT good at any conc
3.	ASCORBIC ACID	3% - GOOD	3% - GOOD
4.	JUICE PERCENTAGE	3% - HIGH	NOT good at any conc

VII. CONCLUSION

Edible coatings are the best method to prevent fruits and vegetables from spoilage and it will not affect anyone and can be effectively ensure its quality characters. As per the

observation and analysis the estimation of extended shelf life is studied. The two seaweeds characteristics and shelf life analyzing have been determined here. The selected seaweeds were good at their gelling property so it can withstand even at minimum concentration. The selected seaweeds have been tested for various parameters to determine the qualitative and quantitative phytonutrients such as total flavonoid content, total sugar content, total phenolic content, antimicrobial activity, antifungal activity. And the shelf-life analysis was based on the parameters such as weight loss, texture, total soluble solids, total acidity, respiratory action, ascorbic acid content, juice percentage (%), and statistical analysis were made. After that all the parameters were compared between control with coated and uncoated fruits and vegetables. With reference to this study the shelf-life period of fruits and vegetables will be increased.

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INVESTIGATION OF SEAWEED-MIXED FRUIT JUICE BY USING EXTRACTION METHOD

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Abstract: Seaweed mixed fruit juice is a beverage made using seaweed kombu and fruit concentrate. Kombu made using seaweed - kombu and fruit concentrate. Kombu has all essential nutrients needs as per RDI. Banana has a natural sweetener in it which gives the juice the needed flavor and taste. People are becoming more conscious on health these days and seaweed mixed fruit juice is a boon for them especially for people with diabetes, gastric diseases and heart problems. Recently diffusion extraction technique has been explored and have been exploited commercially to a limited extent. Diffusion extraction is capable of removing 90 to 94 percent of soluble solids from properly prepared slices, but the resulting juice is diluted with extraction water and is high in extracted tannins. Concentration is necessary to obtain juice solids equivalency the resulting juice must be removed with tannins absorbents to provide acceptable flavor.

Keywords— Nutrient juice, Strawberry, Banana, Seaweed, Extraction, Tannins.

INTRODUCTION

Seaweed constitute one of the commercially important marine living renewable resource. They are the only source of the production of phyto-chemicals such as agar, agarose, carrageenan, and algin which are widely used in various industries as gelling, stabilizing and thickening agents. Seaweeds are good sources of food and medicine. Food products like jelly, jam, pickle can be prepared from seaweeds. Seaweeds plays a major role in marine eco system. They have the potential to be used as a source of long and short chain chemicals with medicinal and industrial uses. Marine algae are also be used as energy-collectors and potentially useful substances could be extracted. Seaweed extract is prepared from either hot or cold water extracts of either the dried or wet seaweed. Extraction refers to transference of compounds from solid or liquid into different solvent or phase Bananas have enormous health benefits for both animals and humans. Even from ancient times it is predominantly used to treat pathological and gastro intestinal diseases. When comes to health benefits it is highly used to treat diseases like diabetes, also ulcers, blood pressure and diarrhea. Incorporating banana with seaweed provides a tremendous health benefits, as flavonoids present in banana is used to reduce higher rates of cholesterol. Finally

consumption of banana shows anti-atherosclerotic activity. Resulting in reducing blood pressure in human. Bananas are extracted with pectinase ultra-SP-L for 50°C for 2 hours. The pure fruit juice is extracted during enzymatic fruit extraction method, which contains higher soluble solids fructose, nitrogen and potassium. Strawberry is one of the most popular fruit in worldwide, consumed both fresh and in processed products. In addition, strawberry colorings and flavorings are popular in food additives. Strawberry fruits are also rich in anthocyanin, flavonoids and phenolic compounds. Strawberry is a refreshing fresh fruit that is full of vitamin C and anti-oxidants and lot of invigorating flavor. Strawberries are sodium free, fat-free, and also a good source of manganese and potassium.

NUTRITIONAL CONTENT

Seaweed

Seaweed contains Iodine and Tyrosine, which supports thyroid function. It is a good source of vitamins and minerals. It contains a variety of protective antioxidants. It provides fiber and polysaccharides that can support the gut. It may helps to lose weight by delaying hunger and reducing weight. It may reduce the risk of heart disease. It helps to reduce the type II diabetes by improving the blood sugar control.

Banana and Strawberry

The banana and strawberry mix are known to help support weight loss, chronic diseases, nerve function and muscle concentration. It's got a load of antioxidants, which fights against oxidizing agent in our body. The powerful antioxidants in strawberries may work against free radicals that inhibit tumor growth and decrease inflammation in the body. Banana is a good source of vitamin C, vitaminB6, potassium.

MATERIALS AND METHODS

SEAWEED PROCESSING METHOD

Seaweed has harvested from sea and then the seaweed is washed by the fresh water. Then it is gone under the process of chopping, it is cut into pieces. Seaweed is dried with tray dryer at 40°C, 50°C, 60°C, and 70°C for 2, 3 and 4 hours. Water content in seaweed is measured every 30 minutes. And the seaweed (Kombu) is soaked in hot water to desalt (removal of salt). Soaked kombu is grinded into paste then it is clarified and filtered.

FRUITS PROCESSING METHOD

The good quality of fruits is selected. The fruits Banana and Strawberry is properly washed, cleaned and properly sorted. The extract is prepared by the process of heating enzyme extraction treatment. The banana is extracted using enzyme extraction method. The enzyme extracted from banana is pectinase. Then the fruits gone under for decantation process through that process the insoluble solids are removed from the juice. The cloudy juice is formed then it will be filtered by coarse filtering (or) centrifugation. Centrifugation may be used for a variety of tasks in fruit juice processing. Then it undergoes for pasteurization to inactivate the pathogens. The pasteurization is commonly done at 95°C-98 °C for 10-30 seconds and it is immediately cooled.

SEAWEED – MIXED FRUIT PROCESIING

Fruit extract which consist of banana and strawberry are taken from their respective extracting sources. Next process done is mixing of sugar, citric acid and water with mix of seaweed extract and fruit extract. In this process, through mixing of citric acid and sugar, the sucrose gets broken into fructose and glucose. As citric acid is soluble in water, it enhances flavors, and because of citric acids anti microbial properties it prevents growth of microorganisms. Due to the property of acidulation, it catalyse oxidation in fruit juice.

Another important process is done is homogenization, this help in the proper release of pectin into fruit juice, hence the proper release of pectin into fruit juice, hence the viscosity and solubility is improved. Further process involves pasteurization of the juice at 90 degree for 20 minutes to disinfectant and sterilize the juice from microbes. Juice is then cooled immediately and stored in an optimum position.

FLOW SHEET



Fig 1: Seaweed processing method

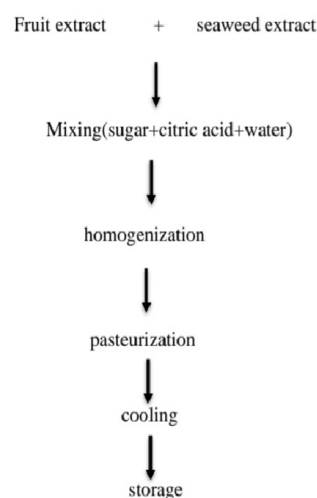


Fig 2 : Processing method

ANALYSIS METHODS

ANTIBACTERIAL ASSAY

Kirby-Bauer method is followed for disc diffusion assay. In vitro antibacterial activity is screened by using MHA. The MHA plates are prepared by pouring 25ml of molten media into sterile petriplates. The plates are allowed to solidify for 20minutes and inoculum of each bacterial cultures is swabbed uniformly and the inoculums is allowed to dry for 5minutes. The wells of 6mm diameter are made on the plates using sterile tips. The different concentrations of samples are

loaded on wells in the petriplates. The sample is allowed to diffuse for 5 minutes and the plates were kept for incubation at 37°C for 24 hours. Microbial growth is determined by measuring the diameter of the zone of inhibition around each well. At the end of incubation, inhibition zones formed around the sample wells measured with transparent ruler in millimeter.

PHYTOCHEMICAL ANALYSIS

Freshly prepared extracts are subjected to standard phytochemical constituents like phenols, flavanoids, alkaloids, glycosides, tannins, saponins and steroids.

SENSORY ANALYSIS

The consumer acceptance of the fresh and concentrated juice was evaluated using a 9- points hedonic scale. The consumers (n=25) individually examined the samples in testing booths.

S.No	Characteristics	Sensory Analysis
1.	Taste	9
2.	Colour	8
3.	Flavour	8
4.	Mouth feel	9
5.	Aroma	8
6.	Appearance	8
7.	Texture	7
8.	Overall acceptance	8

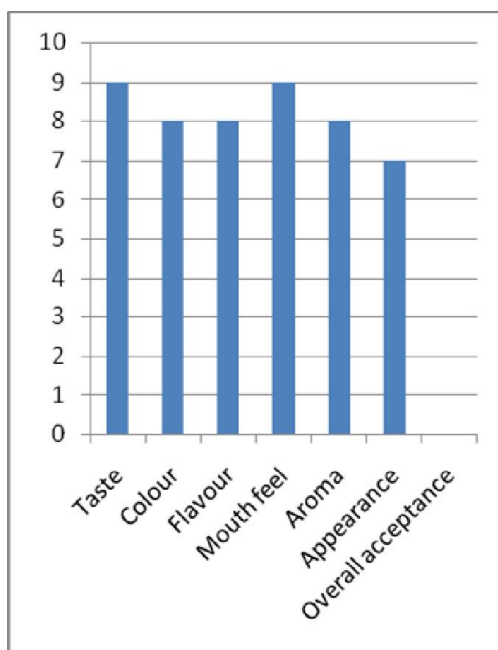


Fig 3: Sensory analysis chart

RESULT AND DISCUSSION

BASE FORMULATION

Ingredients	Quantity	Percentage
Fruit extract	70ml	
Seaweed extract	30ml	6.5%
Sugar	7 gm	0.002804%
Citric acid	0.03g	84.109%

RESULT

Approximate analysis	Calculation	Value
Juice content	Required juice content is 10%	Fruit extract=70ml Seaweed extract=30ml
pH		6.05±0.26
Total soluble solids	Juice extract TSS 13%	Final TSS =12±0.16%
Titrateable acidity		0.7±0.86% citric acid equivalent

OUTCOME

- Nutrient dense beverage
- Easy to come
- Suitable for large scale production
- High nutraceutical
- Versatile and delicious

VI. CONCLUSION

Seaweed (Kombu algae) consist of High values of essential amino acid ratios except tryptophan, the first limiting amino acid in both analyzed algae, reveal a good protein quality. Daily intake of seaweed consist of enough vitamins such as beta-carotene and vitamin B2. . Seaweeds are excellent source of iodine so consumption of seaweed is an excellent way of having non toxic way of meet daily requirement of iodine in the diet. A mix of banana and strawberry will result in a highly nutritional drink which is very useful for diabetic patients and people with heart related problems. Vitamin C provided in strawberries are proven to increase the health benefits. Nutrients from bananas give a much better results in maintaining a good health. On consumption of this healthy drink will provide a total healthy diet with almost every kind of vitamin, protein and minerals.

The review focuses on various technologies used for the production and isolation of the nutrients from the seaweed and mixed fruits. Seaweeds are widely used in the food and

pharmaceutical industries .It is used in various categories as antibiotic, antimicrobial and anti cancer.

As consumers become more health conscious and interested in concentrated and nutritious beverages is increasing, and its market share is growing.

The results of study indicate the demand and consumption of RTS beverages are now going on increasing due to safety, therapeutic efficacy, stability of formulations gives the ultimate health benefits to mankind.

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MULTIFUNCTIONAL EDIBLE STRAW

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Abstract—Plastics a major problem in our environment, though we ban plastics in current scenario. Straws account for roughly 0.03% of plastic waste in the ocean. Worldwide more than 1000 million plastic straws are used to serve environmental issues. This project is concerned with replacement of plastic straws with natural edible straw. The main objective of this project is to extract starch from *Dioscorea alata* by sedimentation method, the starch extracted from this method is subjected to optimization and production of edible straw. The selected ingredients are *Dioscorea alata*, gelatin, icing sugar, carboxymethyl cellulose and glycerin. The paste preparation was the process where specific amount of stabilizer, gelling agent and humectant were mixed through kneader. The paste being shaped through a straw shaping mold process before placing them in to drying oven. This edible straw is now analysed for its stability, nutrition analysis, antioxidant content, DPPH Bio degradability test, Moisture absorption test, Toxicity test. These edible straws are flavored and designed for the sustainability of the future. It can be used as post snacks. Their powerful antioxidants may help reduce your blood pressure and blood sugar levels and also versatile with a vibrant color. It can act as cancer deterrent. It helps to increase the production of red blood cells in the body.

Keywords— Purple yam, Anthocyanins, Edible straw, Gelatin and glycerin, Validity test, Proximate analysis.

I. INTRODUCTION

A drinking straw is an instrument that's intended to carry the contents of a libation to one's mouth. Globally usage of straw is about 500 million. Disposal of plastic wastes in water bodies shackle waterways, oceans, seas etc. Plastic usually takes so much time to decompose which last from 400-1000 years, some of the plastic types remain non-degradable as well. While producing and recycling plastics huge amount of toxic gases were produced which cause air, water and land pollution. Plastic straws are made up of a type of plastic manufactured from petroleum, known as polypropylene. The chemical substance in the plastic straws when exposed to heat and acidic beverages, leads to outbreak of chemicals that could affect our estrogen level. Micro plastic ingested by fish affect human is unknown. The straws are wrapped into unbleached paper – a nature friendly material. Drinking from these straws is a veritably special experience. Disadvantages of plastic straws are the deaths of marine life which have swallowed plastics plant in the ocean

debris. These non-biodegradable straws break into microplastic consumed by fishes and shellfish on our regale plates. Worldwide, further than 1000 million plastic straws are used diurnal leads to severe environmental issues. Combined consumption of the EUROPE and the United States alone quantities to over 200 billion every time. Drinking straws constitute roughly 4 of plastic waste, but are among the particulars most generally plant on all the submarine eco system leads to hang to marine and fresh water foliage and fauna. straws regard for roughly 0.03 chance of plastic waste in the ocean.



Straws are generally made from plastics but environmental enterprises and new regulation has led to rise in applicable and biodegradable straws.. A simple way to reduce the usage of plastic straw is not to use it or else having our own reusable or bio-degradable straws. The natural straw is an environmentally friendly volition to conventional plastic straws.. The straws are hand made without use of any chemicals. India- grounded Nom has developed flour- grounded, comestible straws. The straws are part of Nom's larger charge to offer consumers easy ways to drop waste. The Nom straws offer an volition to traditional straws. Also, unlike other eco-friendly straws, the Nom interpretation is fully desolate-free. Made from wheat and rice flours, vegetable canvas, sugar and flavoring, the straw is fully comestible. This project is concerned with preparation of edible eco-friendly straw from purple yam. The comestible straw from *Dioscorea alata* could help reduce the quantum of plastic in abysses and save millions of fish and other marine life precluding the preface of poisons in the mortal food chain. It should be considered also post-drink snack and instantly a functional food when adding vitamins and nutrients. The edible straw from *Dioscorea alata* could help reduce the amount of plastic in oceans and save millions of fish and

other marine life preventing the introduction of toxins in the human food chain.

II. PURPLE YAM

Purple yam belongs to the family of yam which is vivid violet -purple to bright lavender in color ,which is commonly called as kand in India .They have sweet ,nutty flavour and are used in a variety of dishes ranging from sweet to savory .They have more powerful plant compounds and antioxidants, which include anthocyanins which is the main cause of their vibrant hue. As they are rich in vitamin c ,they keeps our cells healthy boost iron absorption ,and protects DNA damage .Due to the presence of huge amount of antioxidants our cells get protected from damage causing harmful molecules called free radicals which is the main reason for many chronic conditions ,such as cancer ,neurodegenerative disorders ,heart disease also the presence of antioxidants helps in the reduction of blood pressure ,also reduce the symptoms of asthma .



Frequent intake of *Dioscorea alata* which has two anthocyanins -cyanidin and peonidin may have chance to reduce the growth of certain types of cancers which includes colon cancer ,lung cancer ,prostate cancer. It may helps to lower blood sugar in those obesity and inflammation which is caused by oxidative stress .Purple yam helps in improving the gut health. These also reduce risk of certain conditions such as colorectal cancer ,inflammatory disease(IDB), and irritable bowel syndrome (IBS) .Even they produce healthy fatty acids and vitamin B

One cup (100 grams) of cooked ube provides the following (1Trusted Source):

Calories: 140

Carbs: 27 grams

Protein: 1 gram

Fat: 0.1 grams

Fiber: 4 grams

Sodium: 0.83% of the Daily Value (DV)

Potassium: 13.5% of the DV

Calcium: 2% of the DV

Iron: 4% of the DV

Vitamin C: 40% of the DV

Vitamin A: 4% of the DV

III. STARCH EXTRACTION

Starch from *Dioscorea alata* is extracted initially by the process of sedimentation .This process begins from cleaning and peeling of potatoes using warm water followed by grating .Then the grated potatoes were immersed in warm water of 700 to 950 ml .Then yam is strained with the help of cheese cloth ,then squeeze to get as much water .By repeating the same process more water is extracted which contain starch .By allowing the starch to settle for about 20 mins it will lead to deposition of starch in the bottom. By adding some additional fresh water after this for getting clear starch. This process ends in extraction of wet starch. Then it is spread in a baking sheet and allow it to dry and make it as powder after it become harden , the harden starch is converted into powder and stored in a jar.

IV. MATERIAL AND METHODS

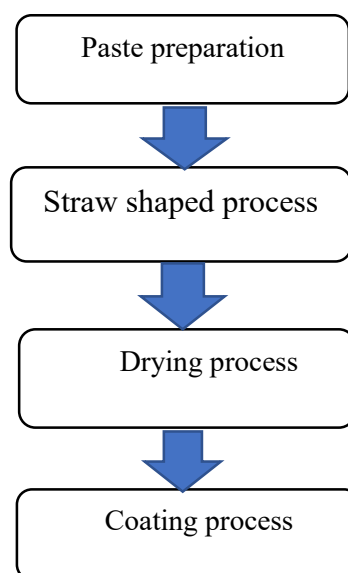
A. Materials

The materials used and their roles are

- Distilled water-mixing
- Purple yam-starch
- Gelatin -gelling agent
- Icing sugar-sweetening agent
- Carboxymethyl cellulose-stabilizer
- Glycerine -plasticizer
- Carnauba wax-coating material

B. Methods

Figure 1 shows the several steps involved in straw making through flow chart .There are several steps to be followed which include paste preparation ,straw shaping process and drying process.



Straw making process

1) Paste Preparation

Paste preparation is the process of mixing the ingredients .This process begins by mixing of carboxymethyl cellulose with icing sugar ,followed by

mixing of gelatin with water and purple yam ,then the mixture is heated at 50-60°C to dissolve it .This is followed by mixing of gelatin mixture with carboxymethyl cellulose mixture by continuous kneading at room temperature (25-35°C). Addition of glycerine takes place .Then homogenous paste is obtained.

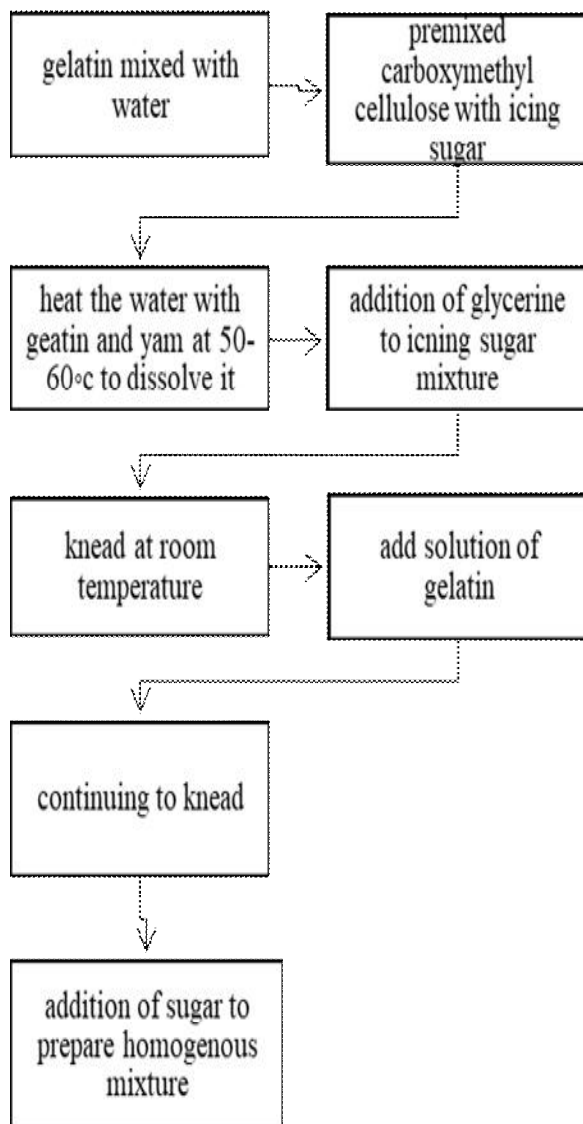
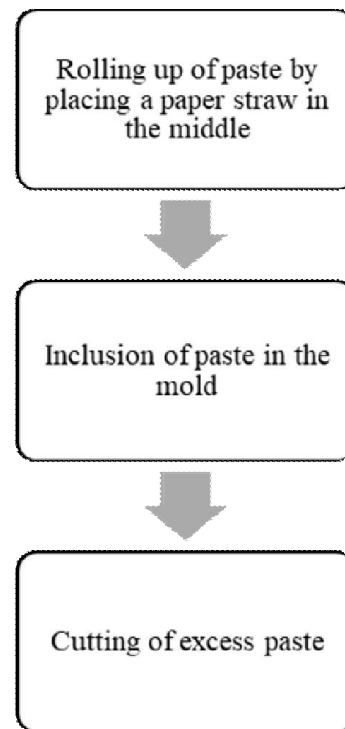


Fig. 1. 2 Paste preparation process

2) Straw Shaping Process

The process is carried out based on the concept of bakery method where ,the paste is placed in a mold by rolling the paste with a paper straw in the middle ,to get desired shape, texture and thickness .After this process the excess paste that comes out of the mold has been cut off.



3) Coating Process

The main purpose of coating is to extend the shelf life of the product also to increase the quality of the product by creating a modified atmosphere inside the product due to their properties to gases and mixture .The method used here is paraffin wax method .In this carnauba wax is used for coating and was dissolved at 82°C to create paraffin by which immersion of straw in hot paraffin ,then the straw which waxed was left to dry at room temperature.

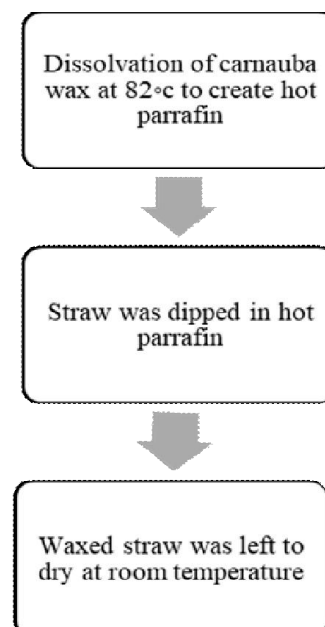


Fig. 2. Coating process

V. ANALYSIS

After completing the process of straw making ,the straw is subjected to required analysis for determining the

durability ,capability ,sustainability ,moisture content determination ,antioxidant activity . These analysis include

A. Validity Test

1) Water Resistant Test

Validity test is conducted to know the durability, capability and sustainability of the edible straw by determining the water resistant, toxicity and drinking test by the following procedure. In water resistant test ,straws have been soaked in five different temperatures such as 0°C,30°C,60°C for 2hours .After 2hours , condition of the straws have been observed and recorded. Water resistant has been calculated by the following formula.

$$WU\% = \frac{\text{Final weight (g)} - \text{initial weight (g)}}{\text{initial weight (g)}} * 100\%$$

B. Toxicity Test

Also the toxicity test has been conducted for three days. In toxicity test, pH of the water in the vessel is estimated using pH meter. It is determined to check whether the water is too acidic or too alkaline to prove that there is no toxicity in the water. In toxicity test ,small cut straw and yellow zebrafish is placed in the container which is filled with distilled. Also the condition of the fish has been checked for twice a day and recorded the changes in 3days.on the 3day ,water in the container was evaluated by using pH meter.

C. Drinking Test

After toxicity test , drinking test was carried out. Drinking test is used to calculate the possible amount of water that can be sucked through the edible straw. In drinking test, four beakers is filled with different amount of water. Then the round plate with a hole which lies directly on the surface of the water in each beaker and straw is placed through each hole ,when the plate is pressed down also the water is pressed overhead through the straw. Then the height of the water in straw column and in the beaker is recorded.

D. Moisture Content Determination

Moisture content determines the amount of water in the food and ingredients, but water behaviour describes how the water in the food interacts with microorganisms. The rate of microbial growth is poor with a lower moisture content The moisture content of straw was calculated by a formula as

$$\text{Moisture content (\%)} = \frac{W2 - W3}{W2 - W1} * 100\%$$

Where,

W1 = weight of straw

W2 = weight of straw with a tray before drying

W3 = weight of straw with a tray after drying

E. Antioxidant Test

DPPH Test is conducted here for evaluating the antioxidant activity of foods. For this 0.5ml of sample was taken ,followed by addition of 0.1ml of molar DPPH .Then 400-µl of 500mm Tris HCL is added .Then the sample is incubated at room temperature for 30 minutes .From this antioxidant activity of our product is determined.

VI. CONCLUSION

In this paper replacement of plastic straw with naturally prepared edible straw which can be prepared very easily and safely by simple and eco-friendly techniques. Edible straw was prepared and studied for their characteristics along with their medicinal values and several test were taken which include validity test ,antioxidant test ,moisture content determination .The edible straw prepared from *Dioscorea alata* can be used as natural straw in the place of plastic straw reduce plastic wastes .The anthocyanins present in *Dioscorea alata* edible straw exhibit higher level of antioxidant activity also helps to reduce blood pressure and blood sugar .It can be used as post snacks . Yams contain a chemical called diosgenin which can influence the production of estrogen and several other hormones . It also can act as cancer deterrent.

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PREPARATION OF HERBAL ICE CREAM USING ALOE BARBADENSIS MILLER AND MINT FLAVOURING

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Abstract— Aloe Barbadensis miller unremarkably noted as aloe is one in all quite four hundred species of succulent happiness to family Liliaceae that originated in an African nation. Aloe has been employed in ancient medication for over thousand years and studies have coupled to numerous health advantages also. For instance, the plant is employed to treat sunburns, fight plaque, and lower blood levels. It is wealthy in nutrients with quite seventy-five potentially active compounds together with vitamins, minerals, enzymes, amino acids, fatty acids, and polysaccharides. A stemless or short-stemmed perennial succulent or xerophytes with elongated and peaked leaves with giant amounts of water area unit holds on within the tissue. The fleshy leaves targets height from several centimeters to 2-3 meters or additional and have 3 acknowledgeable layers. The skin, the gel (mucilage), and the latex (extrudate). the simplest noted is their gel that is chargeable for most health advantages. The aloe gel could be a clear viscous jelly-like substance contained within the parenchymatous cells of recent aloe pulp, with a gel yield of around 70g/100g pulp obtained by mechanical extrusion. The gel has a high-water content (99%) with the remaining soluble solids creating up 0.55-1% and a spread of gel acidity (pH) of 4.4-4.7. No carcinogenicity knowledge is offered for succulent gel. Succulent gels were used clinically within the 1930s for the treatment of burn wounds, oral lichen ruberplanus, hyperlipidemic kind two diabetic patients, and repeated aphthous rubor. Mint is a tender perennial plant within the family Liliaceae. The leaves area unit was fresh and aromatic. The therapeutic characteristics of this herb are broad-primarily with the presence of phytochemical compounds. The juice extract of the leaves helps to market the expansion of fine microorganisms within the gut and helps to kill unwanted microbes and microorganisms that damage the biological processes. Conjointly encompasses a vital content of iron at 0.262%, xanthophylls (0.356mg/g of the dry weight of the plant) conjointly has alpha carotene (0.157 mg/g of dry weight) and beta-carotene (0.0035mg/g of dry weight). All this makes mint a good dietary supplement. This paper aims at discussing the manufacturing of food products like ice cream and chocolates with aloe as a primary herbal supplement with added flavors like mint. Thus, manufacturing a healthy food supplement.

Keywords— aloe vera, mint, therapeutical values, herbal icecream.

I. INTRODUCTION

For thousands of years, aloe vera has been used for its medicinal properties. Its use has been documented in ancient science in countries like India, Egypt, Greece, Rome, and China. Aloe vera products are among the most popular for many uses. Today, the aloe vera industry is thriving, and the gel is used in a variety of products including fresh gel, juice, and other health and medicinal compositions. Aloe vera is used to cure wounds, burns, and frost bite damage, as well as guard against x-ray skin damage, lung cancer, digestive disorders, and increase high density lipoprotein (HDL) while lowering low density lipoprotein (LDL), lowering blood sugar levels in diabetics, combating acquired immune deficiency syndrome (AIDS), allergens, and strengthening the immune system. Aloe vera gel's phytochemistry indicated the presence of over 200 bioactive compounds. Aloe vera gel is collected from the leaves of the plant, and processing processes for stabilization and end products are produced.

Mint is an herbaceous rhizomatous perennial plant that grows to 30–90 cm tall and belongs to the Liliaceae family. The leaves are dark green with reddish veins, with a sharp apex and coarsely serrated margins, and range in length from 4–9 cm long and 1.5–4 cm wide. In most cases, the leaves and stems are slightly hairy. The purple flowers are 6–8 mm long and have a four-lobed corolla that is about 5 mm in diameter. They generate thick, blunt spikes that grow in whorls around the stem. Peppermint has a lot of menthol and is commonly used to flavor ice cream, confectionary, chewing gum, and toothpaste. Menthone and methyl esters, particularly methyl acetate, are also present in the oil. Peppermint may have radioprotective effects in individuals receiving cancer therapy, according to one rodent study (Baliga and Rao, 2008). Mint's scent has been shown to improve memory (Moss et al., 2008). Textural qualities were observed in herbal ice cream made using therapeutic herbs.

II. ALOE VERA STRUCTURE

A. Physical structure of Aloe vera leaf

The Aloe Leaf consists of three layers:

1. The outer thick rind
2. A viscous, jelly like mucilage layer into which the vascular bundles, attached to the inner surface of the rind, protrude.
3. The Yellow latex or extudate. This is the water storage area for the plant.

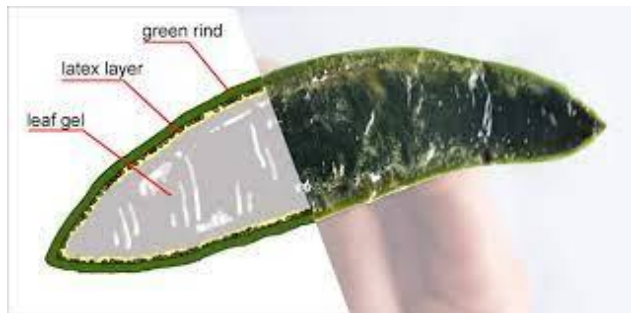


Fig. 1. layers of Alovera (Aloe leaves- The self preparation of aloe gel at home is risky, Dr.Lerch, Barthmann and Inge Grinbach.)

B. Chemical Composition Of AloeVera Leaf

The main composition of the Aloe vera leaf are: (i) Aloin: It is an irritant laxative contained in the yellow sap of Aloe, which is a composition of the Anthraquinone complex, (ii) Methanol Precipitable Solids (MPS): When alcohols are added to Aloe solutions about 20-25 % of the total solids come out of solution or 'precipitate'. The chemical composition of Aloe vera Barbadensis (Joshi, 1998) comprises of mainly polysaccharides, glycoprotein, and salts of organic acids. The polysaccharides represent about one-half to two-thirds of the MPS or about 10-15% of the total solids. (iii) Polysaccharides: There are over 200 compounds in Aloe vera, the single most important constituent being the polysaccharides.

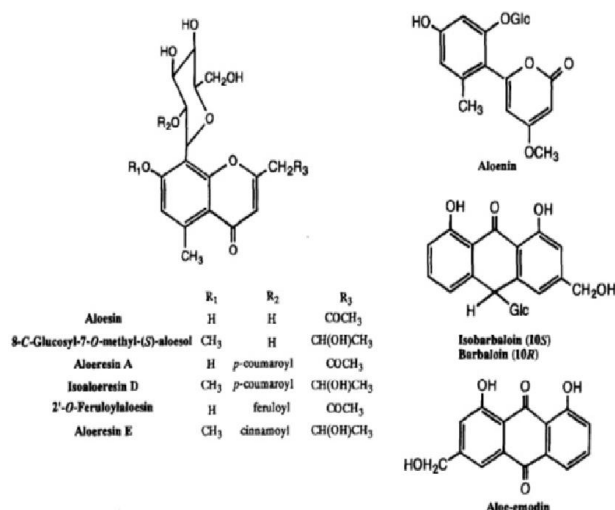


Fig. 2. Structure of Aloe vera compounds(Aloe vera powder properties produced from aloe chinensis baker,Pontianak,Indonesia., T.Y.Hendrawati)

Aloe contains twelve organic compounds known as anthraquinones. Aloin, that causes a laxative effect, and

emodin facilitate pain relief and work as antibacterial and antiviral agents. Anthraquinones are unit typically far away from the industrial succulent product. Clear skinny gelatin like material that comes from within the Aloe vera leaves. Aloe vera gel additionally improves blood circulation because of its ability to detoxify. It is also a natural expert, and therefore any internal ulcers or lesions will be soothed, and healing is going to be increased. Aloe vera works as an anti-septic, medicinal drug, antiviral, anti-cancer, and anti-inflammatory. It's been used to cure skin disease, diabetes, inflammatory disease and is claimed to stop infection. It additionally improves the human immune and helps in digestive systems.

III. FORMS OF ALOE VERA

- Aloe vera gel
- Aloe vera gel sugar coated
- Aloe concentrate
- Aloe cubes
- Aloe powder

A. Aloe Vera Gel

A blender is used to mix the pulp. A muslin cloth is used to filter the sludge. The gel is then pasteurized at 85°C for 30 minutes before being stored at 4°C until needed which results in a clear and viscous aloe gel. The transparent gel merges well into the ice-cream base after being mixed with the ice-cream base mixture. The resultant ice cream has a silky texture. The flavors of the gel and the ice cream base complements each other nicely. Aloe gel is discovered to be the most acceptable form for use in ice cream. The gel works great with the ice cream base as well. [3]

B. Sugar Coated Aloe Vera Cubes

The cleansed leaf pulp is cut into cubes. The ground sugar and aloe vera cubes are blended in a 1:1 weight ratio. After that, the cubes are kept for at least 24 hours at 4°C. The cubes, as well as the sugar foundation, are mixed with the ice cream base. In an attempt to add aloe vera pulp as 0.5 x 0.5 cm' cubes with or without ground sugar coating, it is discovered that the blandness of the aloe pulp cubes is not well compatible with the ice-cream base. Furthermore, the sugar-coated cubes develop ice crystals on their outside surfaces, which is undesired. [3]

C. Aloe Vera Gel Concentrate

The aloe vera gel concentrate is also carefully combined with the ice-cream base, giving the final product a smooth texture. [3]

D. Aloe Vera Gel Powder

Aloe vera gel powder forms clumps in the ice cream and has some bitter spots. It is made by freezing the gel of aloe vera plants. The powder is kept at 4°C in an airtight container until needed. [3]

E. Aloe Vera Cubes

When the cubes are frozen after being blended with the ice-cream base formula, unwanted ice flakes forms. The leaf pulp is cleaned and cut into cubes measuring 0.5 x 0.5 x 0.5 cm. The cubes are then kept at 4°C until needed. The aloe leaf pulp cubes are transparent and

delicate, with a tiny green line running through some of the cubes exterior surface. Furthermore, the blandness of the cubes contrasts sharply with the sweetness of the ice cream foundation. [3]

IV. METHODOLOGY

A. Blending The Mixture

Local dairy farmers deliver milk to the ice cream business in chilled tanker trucks. The milk is then poured into storage silos that are kept at 36°F (2°C). Milk is delivered to stainless steel blenders via pipes in pre-measured proportions. For six to eight minutes, premeasured volumes of eggs, sugar, and additions are blended with milk.

B. Pasteurizing To Kill Bacteria

The pasteurization machine, which is made up of a succession of thin stainless-steel plates, receives the blended mixture. One side of the plates, hot water at around 182°F (83°C) flows. The other side, the chilled milk mixture is piped through. The water raises the temperature of the combination to 180°F (82°C), effectively eliminating any germs present.

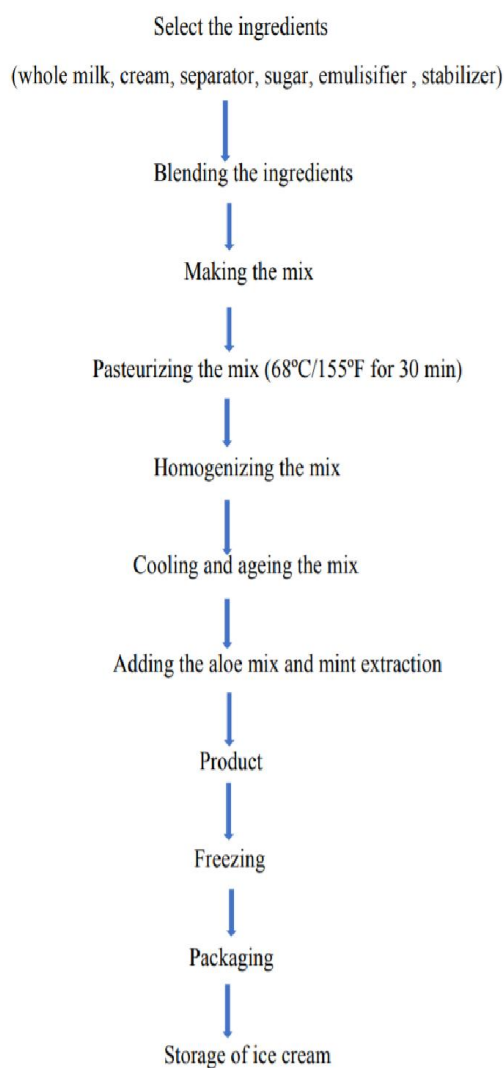


Fig. 3. Herbal ice cream preparation - Methodology

C. Homogenization

The hot mixture is driven through a small orifice into the homogenizer by applying intense air pressure. This makes the fat particles break down, preventing them from separating from rest of the mixture. The mixture is further mixed in the homogenizer, which is effectively a high-pressure piston pump, as it is sucked into the pump cylinder on the down stroke and then driven back out on the upstroke.

D. Cooling And Ageing The Mix

The combination is piped back to the pasteurizer, where cold water (about 34°F/1°C) runs on one side of the plates while the mixture passes on the other. The mixture is cooled to 36°F (2°C). The combination is then pumped into tanks in a room set to 36°F (2°C), where it will sit for 4 to 8 hours to allow the ingredients to mingle.

E. Flavouring The Icecream

The ice cream is pushed into stainless steel vats. The flavorings are piped into the vats and thoroughly combined.

F. Freezing

Now it's time to put the mixture in the freezer. It's poured into continuous freezers capable of freezing. Using liquid ammonia as a freezing agent, the temperature within the freezers is kept at -40°F (-40°C). Air is introduced into the ice cream. The combination has the consistency of soft-serve ice cream when it comes out of the freezer.

G. Hardening

The ice cream must have to be hardened to a temperature of -10°F (-23°C) before beginning storage or packaging. The ice cream cartons are transported through a conveyor system to a tunnel set at -30°F (-34°C). Ceiling fans are constantly rotating which cause a wind chill of -60°F (-5°C). For 2 to 3 hours, the cartons move slowly back and forth down the tunnel until the contents are rock solid.

H. Storage and Packaging

To avoid ice recrystallization and coarsening, which gives ice cream a grainy texture, ice cream should be kept cold with minimal temperature changes throughout the cold chain from factory to consumer.

S. No.	Ingredients	Amount (% w/w)
1.	Milk (Standardized)	49.64
2.	Cream	4.67
3.	Butter (Without salt)	3.75
4.	Skimmed milk powder	3.75
5.	Sucrose	12.75
6.	Stabilizer	0.23
7.	Lemon flavour	0.14
8.	Green colour	0.07
9.	Water	q. s.

Fig.4.Basic ingredients for ice cream preparation[4]

A. Microbiological Analysis

The prepared sample is thawed in a refrigerator at 4°C and aseptically homogenized for 2 minutes in a sterile stomacher bag containing sterile 0.1 percent peptone water using a stomacher. A total plate count agar is used to prepare the media for counting total aerobic microorganisms. At a dilution of 30 to 300 CFU per plate, the plates are incubated at 37°C for 48 hours and the colony forming units (CFU) per gram are counted.

B. Sensory Analysis

For ice creams having 0.1 to 10% fat, descriptive analysis is utilized to define terminology for appearance, flavor, and texture aspects. The main sensory attribute categories include- texture: thickness, stickiness, meltability, air holes, and coldness; flavor: sweetness, cream, cooked, corn syrup, milk powder, aftertaste, vanilla, astringent, bitter, and oxidized; and appearance: graininess, air holes, glossiness, yellowness, whiteness, and gummy or sticky.

Ice cream samples can be rated with variable fat contents on a scale of 1 to 9 using a devised terminologies to describe and quantify appearance, flavor, and textural aspects. A higher score indicates that the descriptive term is becoming more intense. As the product is assessed from crumbly to smooth, the score for textural appearance is identified.

C. Chemical Analysis

Chemical analysis is performed on the various herbal icecream treatment combinations, and the following parameters are determined: moisture, carbohydrate, protein, Fat, ash, acidity, total solids. Some commercially available ice creams have these quantities of standard parameters.

Constituent	Amount (%)
Moisture	73.74
Protein	3.55
Fat	6.18
Total sugar	14.71
Total ash	0.68
pH	6.20

Fig.5.Composition of standard aloe vera ice cream[4].

VI.CONCLUSION

Aloe vera can be considered as a good dietary supplement in an ice cream. Incorporated in an ice cream aloe vera could be a good alternative in place of commercially available aloe juice or drinks. Studies have shown that children are more vulnerable to ice creams but ice creams with herbal products in them (aloe vera & mint) changes that fact. Improved in its herbal properties ice creams can be selected as a major vehicle to incorporate nutrition in all human ages.

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PROJECTION OF PEELS(ALLIUM CEPA AND ALLIUM SATIVUM) TO PRESERVATIVES FOR PERISHABLE FRUITS & VEGETABLES

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Abstract—Production of functional food with a higher shelf life is one of the nature concern for the food industry. Onion and garlic peel is regarded as waste in food industry and if not properly control these wastage may cause environmental pollution. Onion and garlic are same species *Allium* belonging to the family of liliacea .Generally ,both onion bulb, peel contains flavonoids ,antioxidant etc., since peels are consider as major by product from fruits and vegetables during process. Then the peel powder is subjected to phytochemical analysis then it was tested for its antimicrobial activity. A Preservative gel is made using flax seed and peel powder sample .This study aimed to assess the potential of combination of peel powder as a natural preservative .the peel powder can be added with flax seed gel and to coating the perishable fruits and vegetable to extend shelf life.

Keywords— *Onion peel, garlic peel, Antimicrobial activity, phytochemical analysis, Antioxidant, flax seed,perishable fruits.*

I. INTRODUCTION

Nowadays fresh cut fruit has been popular and the processing and operation such as peeling, slicing, dicing etc..., can cause damage to the surface to the surface of the fruits. Tissue softening, water loss, color change, appearance of unpleasant order and microbial proliferation are the common damage during cutting process of fruits. The most common way of preservative cut fruits includes cold storage, modified atmospheric packaging, coating decation are addition of preservative additives. The product without synthetic additives will be considered for good health and food safety. Peels are consider as major by product from fruits and vegetables during processing.one third of food produced for human consumption in lost or wasted globally. Total food wastages are occurred in 1.3billion tones per year, and total fruits wastages occurred on 16% per year .Vegetables wastes arrived in per year 24 million Over the past 20 years, world production of onion has raised at least by 25%; [11] reports a production of about 47 million tons every year, becoming the second most important horticultural crop. By changes caused in the life style increases the demand for fresh-cut ready-to-use vegetables

and fruits, including onion. By gathering the processed onion and garlic has led to a higher wastage in a increased market.

In this proposal we aimed to project the by product (peel) as useful product. Amaryllidaceae family is considered to be the most important food species, found in temperate region. In recent trends Amaryllidaceae family used as a source pharmaceutical agent, agrochemical, flavoring agent, hair cosmetics and ingredients in food additives. *Allium cepa* is a twin herb to *Allium sativum* and it's a dominating member of kitchen cabinet used ingredients in food additives. *Allium cepa* is a twin herb to *Allium sativum* and it's a dominating member of kitchen cabinet as wet condiment having ability to get rid of variety of diseases, cancer and diabetics in order to reuse the waste (onion and garlic peel). In this project we are focus to assess the potential of *Allium cepa* and *Allium sativum* peels powder as a natural preservative and various products.

II. ONION PEEL

A 1–2% addition of OPP enhanced sensory properties. After the 28-day storage, the control samples received the lowest sensory score, because of the presence of a strong fishy odor, which wasn't present in samples with OPP. HPLC–MS/MS analysis revealed that quercetin is that the most dominant compound in OPP. Overall, the results indicate that the addition of OPP in amounts of 1–2% , without the deterioration of sensory properties. Metabolic classes of onion peels are flavonoids and anthocynin.Foremost abundant bioactive components are quercetin and quercetin glucosides.By evaluating the potential of onion peel testing several biological activities: ABTS/oxygen radical absorbance capacity (ORAC) and in vitro alpha-glucosidase assays were performed the antioxidant and anti-diabetic properties of the extracts and by MTT assay on human fibroblasts their main compounds was evaluated.



Fig. 1. onion peel

III. GARLIC PEEL

Garlic (*Allium sativum* L.) may be a crucial vegetable crop throughout the earth. In Greece there are many areas which have specialized in garlic cultivation through the last ten years, considered the foremost production areas. However, despite the importance of garlic as a foodstuff and thus the high annual income of this crop, there is a decreasing trend in total cultivated area in Greece, and therefore the local landraces are gradually neglected in favor of latest imported genotypes. Within the present study, garlic genotypes (local landraces/varieties, imported genotypes, commercial cultivars) from the foremost production regions of Greece were assessed for their chemical composition and quality and bulb morphology.



Fig. 2. Garlic peel

IV. FLAX SEEDS

Flax seeds are actually harvested from same plants that gives us linen. It holds phytoestrogens called lignans, which are close to the hormone estrogen. Flax seeds are a flowering plant *Linum usitatissimum*, belonging to the family of *Liliaceae* in the order of *Malpighiales* kingdom is *Plantae*. Flax is a very important fibrous bast plant. Flax tolerates a range of soil and climates. It is a herbal supplement used to treat constipation, cancer, diabetes, cholesterol etc.,. Flax seeds have three groups of compounds, based on specific biological activity and functional properties. Omega 3 fatty acids are present in high level in flax seeds. The 20 - 30% of protein content present in the flax seeds. Proteins of flaxseeds are limited by lysine. Regular consumption of flaxseed products can affect serum total and low-density lipoprotein cholesterol concentrations and excess consumption of flax seeds without enough water can lead to intestinal blockage. Flax-seeds mucilage is used for treating gastrointestinal, throat and skin diseases. The antioxidant present in flax seeds like lignans and insoluble fiber content in flax seeds increase the mass to our stomach linked waste.

V. BASIC ANALYSIS

A. Phytochemical analysis

Photochemical analysis including qualitative and quantitative analysis. In the present study, the potential phytochemicals present in the different extracts (Aqueous, Acetone, Ethanol and Hexane) of onion and garlic peel powder were carried out. Phytochemical investigations include phenols, tannins, flavonoids, anthocyanins, saponins, steroids, glycosides, alkaloids, fatty acids, carbohydrates, proteins and amino acids. Among these four different extracts of onion and garlic peels contain more number of phytochemicals like phenol, tannins, test glycosides, flavonoids, carbohydrates, oil and fats, sterols and triterpenoids. Antioxidant study was performed by DPPH, flavonoids, total phenolic test. DPPH activity is high in acetone extracts whereas flavonoid activity, total phenol activity, and FRAP activity onion and garlic peel powder is maximum in ethanol extract.

B. Antimicrobial Activity

Antimicrobial activity can be defined as a principle (agents) that hold back the growth of bacteria, prevent the formation of microbial colonies, and may demolish microorganisms.

C. Agar Disk Diffusion Testing

This method is used in many clinical microbiology laboratories for routine antimicrobial perceptible testing. All pathogens are not tested by this method there are some standard bacterial pathogens. In this method, the test agar plate is swabbed with a standardized concentration of the test organism, and then paper disks containing a defined antibiotic concentration are placed on the lawn of bacteria. After overnight incubation, the diameter of the zone of widely used to evaluate the antimicrobial activity of plants or microbial extract.

D. Determination of phenolic content

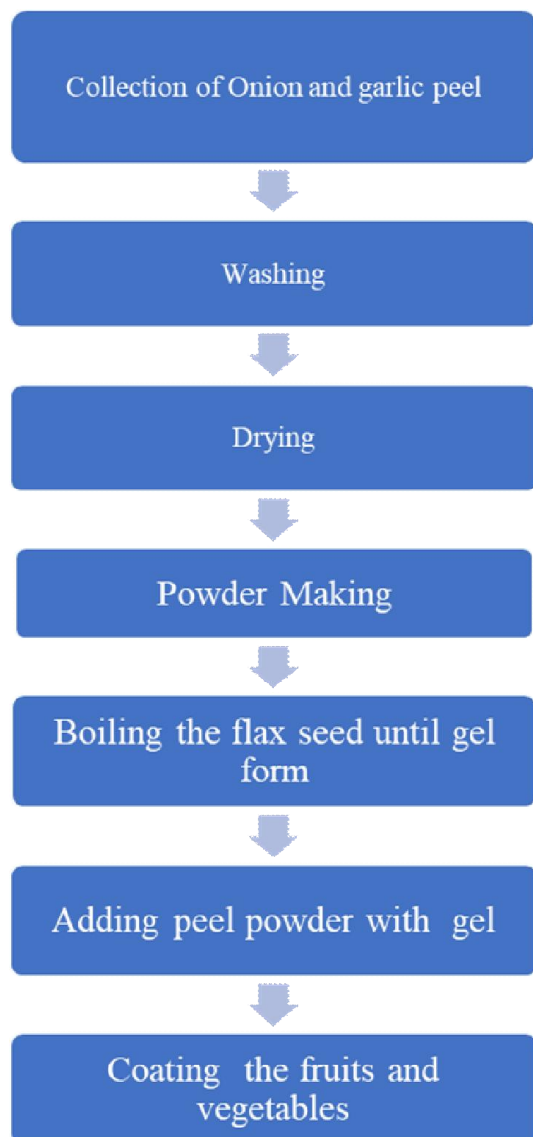
Total phenolic content (TPC) activity is the process. It is to determine the total amount of phenolic content in the samples. Phenolic compounds are present in the plants. The plants have redox properties and the properties allow them to act as antioxidants.

Here three extracts are used, that are ethyl acetate extract, ethanol extract and water extract. These extracts were tested as Folin-Ciocalteu method and except for these, seven different methods are DPPH, ABTS and OH radicals scavenging, ORAC, reducing power, metal chelating and β -carotene bleaching assays for phenolic content and antioxidant measurement, respectively. The final results are confirmed that all of three extracts contained high amount of phenolic compounds and showed relatively strong antioxidant activities. There is no common difference between each other extracts with regards to various antioxidant evaluation methods. The results indicated that phenolic compounds of peels deserve more attention.

Folin Ciocalteu method is used to test three extracts ethyl acetate, ethanol, water extract for phenolic content and antioxidant measurement, respectively. Three extracts have a maximum contents of phenolic contents and reveal strong antioxidant activities. There is no uniform difference

between each other with respects to various antioxidant evaluation methods. The results designate that phenolic content of seed shell earn more attention.

VI. METHODOLOGY



VII. COLLECTION OF ONION AND GARLIC

The onion and garlic peel samples are collected from house hold and local market .dried atleast for 1 week in sun drying or 40 degree in microwave oven. Then that samples are grinded in a mixer grinder. These peels are subjected to an analysis of its basic chemical composition, antioxidant activity, polyphenols and water- holding capacity determination.

VIII.WASHING

After collecting onion and garlic peel, that should washed completely because the dust, soil and fungi may be attain in that skin so wash it the normal water not used in hot water. Because the onion and garlic skin is sensitive, so don't use hot water.

IX. DRYING

After washing of that peels further process it should be drying. otherwise the peels are spoil or contaminated by microorganisms like bacteria or fungi. The drying occur in three methods, these are shade drying, oven drying and sun drying. Because these are traditional method. Then the peel samples are converted into powder form.



Fig. 3. Onion peel powder



Fig. 4. Garlic peel powder

X. FORMATION OF GEL

Take a 200 ml of water and boil it. While boiling add little amount of flax seeds. Flax seeds is flowering plants *Linum usitatissimum*, belonging to the family of *Liliaceae* in the order *Malpighiales* kingdom *plantae*. This seed have a capability of gel formation so by adding flax seeds in boiling water and stir for few minutes atleast gel formation occurs which is in wax like consistency.



XI. ADDING ONION AND GARLIC PEEL POWDER WITH GEL

Now the main step is carried out. Adding the by products such as onion and garlic peels powder of 1:1 composition, in that gel formation and stir well to enhance the flavors in the peels. These powder should undergo the following analysis such as phytochemical analysis and antimicrobial analysis these two will check the components that present in both peels powder to check the phenol content. After all analysis these powders extract are used as a natural preservatives for fruits vegetables..

XII. COATING THE FRUITS AND VEGETABLES

That gel formation with that extract is coated for perishable fruits and vegetables because these foods will have short shelf life .

It will easily get spoilage. Coating of these kind of fruits and vegetables is a challenging one. So by coating these type of foods to increase the shelf life by using natural preservatives .

TABLE I. COMPOSITION OF GARLIC AND ONION PEEL

Characteristic (%)	Onion peel	Garlic peel
Ash	0.39±0.01	0.49±0.04
carbohydrates	88.56±0.04	93.2±0.04
Crude fibre	0.15±0.01	0.13±0.01
Fat	0.04±0.01	0.05±0.01
Moisture content	9.98±0.01	5.50±0.00
Protein	0.88±0.03	0.57±0.02

Table1 shows the results of the proximate comparison of composition in the onion and garlic peel powder. In this comparison Ash, Fat and Carbohydrates are contain more percentage than the onion peel.

Then Crude fiber, moisture content and protein are more than the percentage of garlic peel.

TABLE II.

BY PRODUCT	Total flavonoids(μg QUE ml ⁻¹)	Total phenolic(μgml^{-1} GAE)
Onion peel	98.52±5.45	664.30±0.00
Garlic peel	33.27±2.95	355.50±2.17

Table 2 revealed the total phenolic (355.50 $\mu\text{g}/\text{ml}$ GAE) and flavonoid content (33.27 $\mu\text{g}/\text{ml}$ QUE) of onion peel and garlic peel powder.

It has been reported that flavonoid is one of the most diverse widely spread group of natural products and probably the most important natural phenolic compound.

Research findings have shown that onion and garlic peel contained flavonoids (allixin), Phenolic compounds with strong antioxidant properties are prominent components of many food plants, including aromatic plants enhance the sensory quality of foods.

XIII.CONCLUSION

For the survey report 50,000 tonnes of Onion and garlic wastes are thrown away . The scientists says this could be a useful food ingredients. Further The food industry generate a

large amount of Onion and garlic peel wastes and there is need to find a possible ways of their usage. Because the onion and garlic and their wastes are available in all seasons. Then this investigation has found that onion and garlic peel has a high content of carbohydrate, Flavonoid, phenol and antioxidant. So that Can be projected as a preservatives. All of these Matters are advantageous to human health. This concludes that both peels can contribute appreciably to human health as an antimicrobial as well as an alternative source of nutritional supplements.

XIV.DISCUSSION

A preservative is defined as any compound or molecule which is capable of inhibiting, retarding or arresting the growth of microorganisms, or of marking the evidence of any such deterioration.

Preservatives are of three types: Antioxidants, Antimicrobials, Anti-browning agents. Biologically relevant definition of antioxidants is “synthetic or natural substances added to products to prevent or delay their deterioration by action of oxygen in air or in surrounding environment.

On the basis of article studies orange peels , pomegranate peels, beetroot peel powders etc are used as face productive gel, natural preservative in functional beverage and to preserve the meat and fruit salad respectively. These two are consider as a waste products which causing the environmental pollution. Likewise the major factor that affects the environment is wastage of onion and garlic peels because these kind of peels has a billion tone of wastages. By household, local markets and also from food industries these are the daily consumption products so it contains lot of wastages.

So the theme of this project is to convert that wastage into a effective matter. By using these peels the food industries can make products like candies, hair oil, collagen and preservatives. This project aims by making powder of these both peels and make it as a preservative agent for most of the fruit and vegetables to extend the shelf life of the product. Even onion and garlic peels are used as a preservatives for cooked beef and meat. There is no articles related to the preservative coating fruit and vegetables by onion and garlic so by using these both creates a natural preservative. These peel powder can cure many of the disease like cancer, cardiovascular disease, diabetes etc by natural matter without any chemicals.

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THE ELABORATE STUDY ON CYAMOPSIS TETRAGONOLOBA AND THEIR SEVERAL PROPERTIES

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Abstract— In the ancient systems many of plants have been used for the treatment of diabetes mellitus around the world. Out of these few have been evaluated for the medicines. From many plants only extracts have been prepared and evaluated their usefulness and it tested diabetes in animals. The plant like *Allium cepa*, *Allium sativum*, *Ficus bengalensis*, *Gymnema sylvestre*, *Pterocarpus marsupium*, etc. These all have the active hypoglycemic principles and been isolated for their mechanism. It seems to act on pancreas and stimulate the insulin level in blood. These plants has less side effects and as good hypoglycemic drugs. Mainly the cluster beans or guar gum is used for treatment of antidiabetics. The cluster beans are an annual legume and found throughout India, it is mainly cultivated for its pods and it is used as vegetables for its high nutritive value, antidiabetic properties and for guar gum. The methods that are carried out along with important diagnostic characters, the tests are macroscopy, microscopy, powder microscopy, histochemical and preliminary phytochemical studies. The phytochemical tests revealed presence of phenols, starch, steroids, alkaloids, carbohydrates, proteins, raponins and tannins. Natural bioactive compounds includes the structures and functions that provides molecules for the production of nutraceuticals, food additives and functional foods. This article may act as tools to abreast with the recent developments in nutraceutical research.

Keywords— *Cyamopsis tetragonoloba*, Cluster bean, Medicinal values, Nutraceutical, Antidiabetic property.

I. INTRODUCTION

The *Cyamopsis tetragonoloba* is the botanical name of guar or cluster bean. It is an annual legume and therefore the source of gum. It is also referred to as gavar or guar bean. The origin of *Cyamopsis tetragonoloba* is unknown, since it's never been found within the wild. Belonging to the Leguminosae, under the sub family papilionaceae.

The plant possess different nutrients like carbohydrates, minerals, vitamins, protein, fibre, fat, copper, manganese, calcium, iron, zinc, vitamin B9, vitamin C, and niacin, etc. The pods of the plant recommended remedy for treatment of diabetes within the traditional literature (Shantha et al.2016). In recent year, the interest has been increased within

the consumption of plant based foods and which possess health benefits.

The consumption of fresh fruits and vegetables improves the nutritional quality provision of affordable vitamins and minerals. These plants foods are in macro and micro nutrients and also bioactive compounds and major source of antioxidants (Catherine et al.2011).

Diabetes is a chronic disease affecting people around 2-3% of the worldwide. And after the introduction of sulfonylurea and metformin about 50 years obtained a correct drug for diabetes. There are so many plant materials were used for the treatment of diabetes to form a new or replacement drug.

The term "nutraceutical" combines the word "nutrient" (a nourishing food or food component) with "pharmaceutical" (medical drug). they're non toxic food extract and has proven health benefits for both treatment and prevention of disease. Nutraceuticals are described as products extracted, purified or produced from plant or animal, produced from dried, powdered material is to supply protection against chronic disease (Ghada et al. 2016). Diabetic patients fights to take care of their glucose level on a day to day. So it's difficult to regulate blood glucose level in body for diabetics. The low glycaemic index which is out there in cluster beans aids in maintaining the glucose levels (Mote et al.2020).

This is often mainly due to gluconutrients that are available within the glycaemic index of cluster beans which are rich in water soluble dietary fiber. This beans basically helps in controlling the rapid fluctuations in blood glucose levels. Vegetables and fruits are a crucial food crops playing a major role in food trade India.

India's diverse climate ensure availability of all sorts of fruits and vegetables for consumption and throughout the year. During 2012-2013, India has produced 81.285 million metric tonnes of fruits and 162.19 million metric tonnes of vegetables. The area under cultivation of fruits stood at 6.98 million hectares and vegetables at 9.21 million hectares (Mote et al.2020).

There are several properties were studied about *Cyamopsis tetragonoloba* in this article. They are anti-diabetic, anti-cancer, anti-inflammatory and anti-microbial. *Cyamopsis tetragonoloba* is found throughout the India for its pods and for the source of guar gum.. The cluster beans have been used for treating diarrhoea, irritable bowel syndrome , obesity and diabetes for reducing cholesterol. Guar gum is widely used specifically as binding agent in tablets and as thickening agent in lotions and creams.

II. PLANT WITH THEIR CHARACTERIZED PROPERTIES



Fig.1. Cluster bean plant

A. Taxonomic Classification

Domain: Eukaryota
 Kingdom: Plantae
 Subkingdom: Viridiplantae
 Phylum: Magnoliophyta
 Subphylum: Euphyllophytina
 Infraphylum: Radiatopses
 Class: Magnoliopsida
 Subclass: Radiatopses
 Superorder: Fabanae
 Order: Fabanae
 Family: Fabaceae
 Subfamily: Papilionaceae
 Tribe: Indigofereae
 Genus: *Cyamopsis*
 Specific epithet: *tetragonoloba*-(L.) Taub.

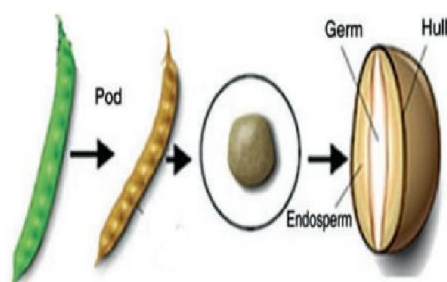


Fig.2. Cross section of cluster bean.

B. Origin and Varieties

Fig.1. *Cyamopsis tetragonoloba* is an annual legume obtained from the seeds of the brought-tolerant plant, a member of the leguminous family (Whistlers & Hymairtz 1979; Kay 1979 ;Prem et al, 2005). The ancestor of cluster bean is *Cyamopsis senegalensis*. The origin of *Cyamopsis tetragonoloba* in India, Pakistan and Probably Africa, since it has never been found in the wild. The *Cyamopsis tetragonoloba*, guar gum flour and Indian cluster Bean of the galactomannan fraction, guar and guaran respectively. The height of cluster plants varies greatly being between 50 cm and 1.5 m tall.

Goma manjari, Durga Bahaar, Pus Navbahar, Pusa Sadabahar, P281, RGC 936, RGC 1002, RGC 1003, RGC 1066, HG2-20, HG 365, GC-I, RGC 1017, RGM 112, HGS 563, RCG 1038 are some of the important cluster varieties ,cluster beans are a low- calorie vegetable that can help you lose weight if you include them in daily diet. Fig.2. refer the cross section of cluster bean.

C. Health Benefits

The plants roots and rhizomes are used in various types diseases like chronic diarrhea, inflammation, skin rashes and excess bleeding. It has also anti-estrogenic, antimicrobial, antihistaminic, antipyretic and antidiabetic activities. The tuber part of *Cyamopsis rotundus* is one of the oldest known traditional plants used for the medicinal purpose and treatment of dysmenorrheal and menstrual irregularities. And also, the 95% ethanol extract from the rhizome that has been recently identified to have an inhibitory effect on human immunodeficiency virus (HIV) and posses antifungal, antibacterial and immunomodulating properties (Seema Surendran, Vijayalakshmi K, 2011). The cluster beans have certain hypolipidemic and hypoglycaemic qualities, making them the ideal natural remedy for hypertension patients. It helps to keep blood pressure in check while also preventing other problems. On a daily basis, diabetic people battle to keep their blood glucose levels stable. Controlling blood sugar levels in the body is therefore difficult, especially for diabetes. Cluster beans have a low glycaemic index, which helps to keep blood sugar stable. This is mostly because of the glyconutrients that cluster bean have in their glycaemic index are high in dietary fibre that can be dissolved in water. This basically helps in controlling the rapid fluctuation in blood sugar levels cluster beans, Guar gum, a thickening ingredient used in exclusively made from cluster bean. The Gum derived from the cluster beans has 5 times the thickening power of regular gum when compared to corn starch (Mote et al.2020).

TABLE I. NUTRITIONAL VALUE OF GREEN CLUSTER BEAN

Constituent	Value
Moisture (g)	81.00
Protein(g)	3.20
Fat(g)	1.4
Carbohydrate(g)	10.8
Vitamin A(IU)	65.3
Thiamine(mg)	0.09
Riboflavin	0.03
Niacin(mg)	0.06

Ascorbic acid(mg)	49.0
Calcium(mg)	57.0
Phosphorous(mg)	57.0
Iron(mg)	4.5

III. NUTRACEUTICAL

The Nutraceutical term was coined from nutrition and pharmaceutical in 1989 by Stephen Defelice. He was founder and chairman of foundation for innovation in medicine. It is an American organization which encourages medical health. According to Stephen "A nutraceutical is a type of food substance that is a food or a part of food that provides medical or health benefits, including the prevention and treatment of disease" (Manisha Pandey et al,2010).

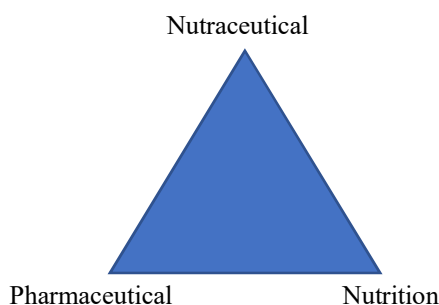


Fig.3. Nutraceutical

Fig.3. Nutraceuticals means, "NUTRITIVE" and "PHARMACEUTICAL". A food stuff (as a fortified food or salutary supplement) that provides health benefits. The Nutritional remedy is a mending system using salutary rectifiers or nutraceuticals as a reciprocal remedy. On the base of their natural source, chemical grouping, orders into three crucial terms-nutrients, herbals, salutary supplements salutary fiber, etc. (Baby Chauhan et al, 2013).

A. Nutraceutical Categories

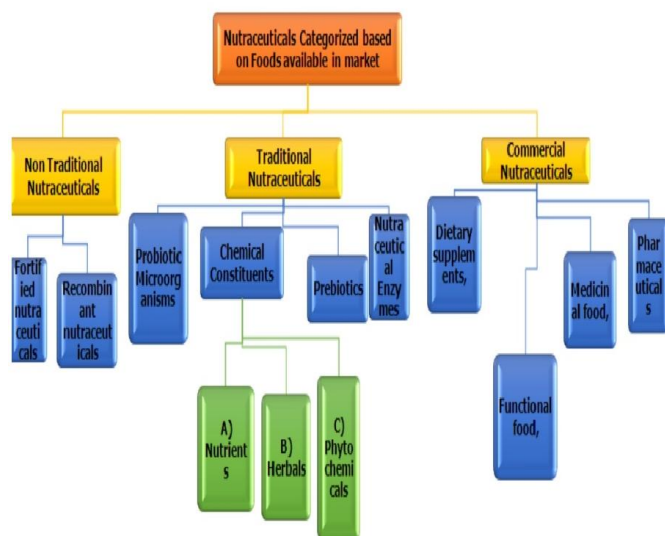


Fig.4. Categories of Nutraceuticals

B. Role of Nutraceutical

Numerous diseases can be prevented and life span can be prolonged with appropriate use of nutraceuticals and healthy lifestyles. Nutraceutical can improve health and well-being and help conditions to prevent diseases to a considerable extent and support profitable development.

Common people should understand the medicinal value of traditional and natural whole food nutraceuticals which can be consumed in its natural form. Numerous fruits, vegetables, grains, spices etc. contain compounds that deliver health benefits beyond their basic nutrition. Drug-nutraceutical interactions, interactions between different nutraceuticals as well as interactions between nutrients and nutraceuticals, and the effect of cooking and processing on the nutraceutical compounds and their efficacy should be determined by scientific studies. Besides, interaction of nutraceuticals with gut environment including microorganisms should be considered (Muhammed Majeed and Appian Subramoniam,2017).

- It can used for the prevention or treatment of a condition or disease.
- It can be administered with a view to restoring, correcting or modifying physiological functions in human being.

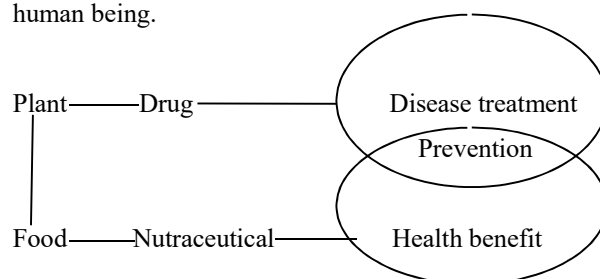


Fig.5. Nutraceutical relationship between food and drug.

IV. MATERIALS AND METHODS

A. Plant Materials.

The fresh pods of *Cyamopsis tetragonoloba* were collected from different types of vegetable markets. The plants were identified with the help of flora and survey of medical plant unit. The cluster beans were extracted and processed into dry powder.

The bean powder is light green in colour with small pieces of fibres, smells agreeable and tastes bitter, when it is observed under the microscope (patchaimal et al.2016), it should different fragments of tissues like rectangular epidermal cells covered by a thin cuticle and thin walled parenchymatous cells, fibres with pits, epidermal cells with stoma, single fibres, epidermal cells with stomata, etc.

B. Gas Chromatography-Mass Spectrometry (GC-MS) Analysis:

The GC-MS analysis of selected samples was performed with Shimadzu GC-MS - QP2010. The inert gas helium (99.9995%) was used as carrier gas, at flow rate of 1.5 ml/min,

Split ratio 10:1; sample size, 1µL injected using one of the technique called split less injection technique; fused capillary silica column HP-5 (30m×0.25mm× 0.25µm).

TABLE II.

GC-MS ANALYSIS

Peak #	R. Time	Name of the component	Molecular Weight	Peak Area %
1	3.317	1,2-Cyclopentanedione	98	0.33
2	6.433	Isopentyl acetate	130	0.86
3	7.167	Dihydroxy-6-methyl-2,3-dihydro-4H-pyran-4-one	144	0.65
4	8.419	2,3-Dihydro-benzofuran	120	0.46
5	8.79	Acetyl monoglyceride	134	0.25
6	9.402	1-(p-methoxyphenyl)propene	148	0.35
7	14.001	Ethyl alpha-d-glycopyranoside	208	8.88
8	15.515	Mome inositol	194	69.54
9	16.092	N-(2-heptynyl)-n-hexylamine	195	0.23
10	17.343	Palmitic acid	256	1.5
11	17.603	Ethyl hexadecanoate	284	1.56
12	18.128	Hexopyranosyl hexopyranoside	342	0.52
13	18.712	Phytol	296	0.52
14	19.176	Ethyl (9Z,12Z)-9,12-octadecadienoate	308	0.33
15	19.233	Ethyl (9Z)-9-octadecenoate	310	0.67
16	19.457	Ethyl n-octadecanoate	312	0.49
17	22.189	2-Hexadecanoyl glycerol	330	0.74
18	22.317	Mono(2-ethylhexyl) phthalate	278	0.21
19	22.742	Ethyl nonadecanoate	326	0.12
20	22.923	Aletamine	161	0.17
21	23.57	Propyleneglycol monoleate	340	1031
22	23.752	alpha-Monostearin	358	0.21
23	24.205	Ethyl docosanoate	368	0.12
24	24.595	3-(2-Hydroxy-3,4-dimethoxyphenyl)-7-chromanol	302	1.53
25	24.898	Nonacosane	408	0.16
26	24.959	4,5-Bromoacetylbenzocyclobutene	224	0.12
27	26.02	beta-Tocopherol	416	0.11
28	26.22	Tetracontane	618	0.17
29	26.56	dl-alpha-Tocopherol	430	0.34
30	27.473	Ergost-5-en-3-ol	400	0.24
31	27.69	Stigmasterol	412	4.47
32	28.264	gamma-Sitosterol	414	0.82
33	28.788	Alpha-amyrin	426	0.97
34	29.305	Lupeol	426	0.98

The Temperatures for injector is 260°C, the detector is 300°C and the column is 70°C, 10°C min⁻¹, 260°C (10 min). The total time for running GC was 35 min. Then the MS was taken at 70 eV. The MS scan parameters included a mass range, scan interval, scan speed and detector voltage are m/z 40-1000, 0.5 s, 2000 amu s⁻¹, 1.0 kV. NIST08, WILEY8 and FAME Libraries are the database used for identification of compounds. The individual unknown compounds were compared with the known compounds stored in the software database Libraries by Mass Spectrum. The test materials were ascertain such as name, molecular weight and structure of the components. Table II. As a result of this GC-MS analysis there are 34 peaks indicating presence of thirty four phytochemical constituents. By comparing the mass spectra of the constituents with these database NIST08, WILEY8 and FAME libraries the thirty four phytoconstituents were characterized and identified. The major phytochemical constituent's mass spectra are mome inositol, ethyl alpha-d-glucopyranoside and stigmaterol. The major phytochemical constituent's mass spectra are 7-isopropenyl-1,4a-5,6,7,8-hexahydro-3Hnaphthalen-2-one, zierone and (+)-cis-longipinan (Seema Surendran et al, 2011).

C. Microscopic Analysis

The pods of cluster beans were soaked in 70% alcohol for 24 hours, it is cleared with chloral hydrate solution and water, stained with different staining reagents according to the standard prescribed methods. Further pods of cluster were also shade dried and powdered for powder microscopy. The power studies were also carried out by following the standard methods (Shantha et al. 2016)

D. Solvent Extraction

The threshold pods of cluster beans were collected from the fields. Table III. The powdered samples were extracted with petroleum ether (60°-80°). The samples were extracted by soxhlet method using ethyl acetate, acetone and chloroform for 8 hours. The extracts were analysed of total flavonoids, phenols, tannins and free radicals scavenging activity (Sukriti Nehra et al. 2018).

TABLE III. EXTRACTION METHOD

Solvent	Values (%) w/w
Petroleum ether (40-60°C)	0.55
Choloroform	8.63
Ethanol	11.01

E. Micrometric and histochemical analysis

Micrimetric details of pods were carried out and the measurements were recorded with the help of cat cam software and histochemical studies were conducted by using different reagents as per the standard methods (Shantha et al. 2016). The histochemical studies of the fruits showed the presence of calcium in pericarp, mesocarp and seed, calcium oxalate, calcium pectate in different regions, phenols, silica,

protein content, lignin, epicarp, starch grain contents in different regions of tissue.

F. Physiochemical Analysis

Physio chemical analysis are ash values, extractive values, were carried out according to the standard procedure prescribed in ayurvedic pharmacopoeia of India. The moisture content of samples was determined and the pH was measured using pH meter model. The total acidity was expressed as percentage of principle organic acid in beans. And also the colour measurement was carried out with Hunter colorimeter model D25 optical sensor. The assays were performed for all the physio chemical variables monitored.

G. Thin Layer Chromatography

Shade dried pods powder was extracted with petroleum ether, chloroform and methanol at room temperature with the help of rotary shaker. These extracts were carried out by using silica gel plates at room temperature (Patchaimal et al. 2016).

V. PHARMACOLOGICAL ACTIVITIES

A. Antidiabetic activity

An aqueous or watery extract of pods of the plant at a dose of 250mg/kg of body weight, it significantly reduces the blood sugar glucose level in normal and alloxane induced in diabetic rats or mice.

Cyamopsis tetragonoloba showed marginal antihyperglycemic effect on blood sugar glucose level in normal fasted rats, however, the blood glucose lowering effect was significant in alloxane-induced hyperglycemic rats or mice. The fall was seen at 1hr and it remained up to 3hr after administration of extract. Sub acute treatment with aqueous extract of Cyamopsis tetragonoloba on alloxan-induced hyperglycemic mice produced consistent reduction or fluctuation in blood sugar glucose level. Authors suggest that; this effect can be attributed due to presence of flavanoids and other phenolics of the plant (Paras Sharma et al 2011).

B. Antimicrobial activity

The antimicrobial activity was tested in Cyamopsis tetragonoloba. Methanolic extract of C. tetragonoloba was tested against S. aureus, Lactobacillus Spp., S. Typhimurium and E. Coli. 20% and 60% of methanolic extract showed a mild antibacterial effect with lactobacillus Spp. MIC was 3.13 & 0.78 fraction/ml. For 100% MeOH extract against S. aureus, lactobacillus Spp. respectively. A similar MIC was observed for 100% MeOH fraction exposed to E. coli & S. typhimurium at 1.56 & 0.78 mg fraction/ml (Hassan et al, 2010).

And also another antimicrobial activity the Agar well diffusion method is used and the test was done by Agar well diffusion method against Gram positive bacteria, Gram negative bacteria and fungal strains. The microorganisms were acquire from National Chemical Laboratory, Pune, India. The Gram-positive bacteria studied were Bacillus cereus (ATCC11778), Bacillus subtilis (ATCC6633), Staphylococcus aureus (ATCC29737), and Corynebacterium rubrum (ATCC14898). The Gram negative bacteria were Escherichia coli (NCIM2931), Pseudomonas aeruginosa (ATCC27553), Salmonella typhimurium (ATCC23564) and Klebsiella pneumonia (NCIM2719). The fungal strains were Candida albicans (ATCC2091), Cryptococcus neoformans (NCIM3542), Candida glabrata (NCIM3448) and Candida epicola (NCIMB367). (Moteriya et al., 2015)

C. Anti-inflammatory activity

The alcoholic & aqueous extract of the seeds (50 and 100 mg/kg) of the plant for anti-inflammatory was assessed in acute, subacute and neurogenic inflammation against Carageenan Induced and Formaldehyde induced paw edema, Xylene induced ear edema respectively.

Ethanol extract showed significant suppresses or restrains the effect on inflammation caused by various phellogestic agents in a dose dependent manner with the greater percentage inhibition of 85.29% against carageenan Induced paw edema and this has been used to evaluate anti-edematous effect of natural products. 82.10% against Formaldehyde Induced paw edema and 60.20 % against xylene induced ear edema when compared to positive control. The anti-inflammatory activity may be correspond with its rich flavonoidal and saponin content, which showed anti-inflammatory activity in various previous reports (Paras Sharma et al 2011).

VI. DISCUSSION

The three major types of diabetes are Type 1, Type 2 and Gestational Diabetes. The Type 2 diabetes mellitus is characterized by dysregulation of carbohydrate, lipid and protein metabolism, and results from impaired insulin secretion, insulin resistance or a combination of both. Type 2 is most common (accounting for more than 90% of all cases) than either type 1 diabetes mellitus or gestational diabetes. Over the past few decades, our understanding of the development and progression of Type 2 has evolved rapidly. The major cause for type 2 diabetes is progressively impaired insulin secretion by pancreatic β -cells, usually upon a background of pre-existing insulin resistance in skeletal muscle, liver and adipose tissue.

Cyamopsis tetragonoloba is found throughout the India for its pods and for the source of guar gum. The pods are used for laxative digestive, constipation and tonic. The cluster beans have been used for treating diarrhoea, irritable bowel syndrome, obesity and diabetes for reducing cholesterol. Guar gum is widely used specifically as binding agent in tablets and as thickening agent in lotions and creams.

Nutraceutical products are derived from the food sources. It provides an extra health benefits, in addition to the basic nutritional value found in foods. Nutraceutical may range from isolated nutrients, dietary supplements, and diets to genetically engineered food. In future, further proceedings to develop nutraceutical products from the cluster beans for the treatment of diabetes. The type II diabetes is the most common type, it causes insufficient insulin secretion for blood glucose regulation and it has much effective symptoms. The nutraceutical tablet will reduce the blood sugar glucose level and there is no side effects when compare to other chemically treated tablets.

VII. CONCLUSION

The review focuses on various technologies used for the production and isolation of nutrients from the cluster

Pods. Nutraceuticals are widely used in the food and pharmaceutical industries and most of them from either animal origin or vegetable. Like beta carotene, curcumin, limonene, eugenol, safranal these constituents are prepared into dosage. It is used in various categories as antibiotics, antidiabetic, antimicrobial and anticancer. The results of study indicate the demand and consumption of nutraceuticals are now going on increasing due to safety, therapeutic efficacy, stability of formulations gives the ultimate health and benefits to mankind.

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A DESIGN AND IMPLEMENTATION OF FIRM LEAVE SCHEDULING AND MANAGING APPLICATION BASED ON PHP & MYSQL

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Abstract - This project is geared toward developing a web-based Leave management system that is vital to the school. It's AN intranet-based application that may be accessed throughout the school. This method may be wont to apply leave applications and their approvals on-line. There are options like cancellation of leave, approval of leave, forward the leave to box. The organization/company Leave Management System includes the method of managing the organization/company leaves and multiple kinds of leaves, for instance, casual leave, medical leave, restricted vacation, etc. Students are going to be able to submit the leave type, check the standing of leave requests and examine completed leave history. The Leave Management System maintains info of scholars to go away history.

Keywords—leave application, leave management system, intranet-based application, automatic approval of leave, OTP.

INTRODUCTION

The objective of “Employee Management System” is planning a planning system for a piece center. planning is such a tool with that the method of intimating activities and notifications are straightforward and even on-line within the organization wherever it's put in. however these

task of planning the various activities if manually done whether or not they additionally basis on personal or official is time intense and also might cause confusion if not properly scheduled. Worker Management System may be a distributed application, developed to take care of the main points of staff operating in any organization. It maintains the data regarding the non-public details of their staff. The appliance is truly a set of applications developed mistreatment PHP. It easy to know and maybe employed by anyone United Nations agency isn't even acquainted with easy employee's system. It user-friendly and simply asks the user to follow step-by-step operations by giving him few choices. It quick and may perform several operations of a corporation or organization. This software package project has been developed mistreatment the powerful cryptography tools of hypertext markup language, CSS and PHP at the front and Microsoft SQL Server at the side. The software package is extremely user-friendly. The project contains modules like worker and Admin. This version of the software package has a multi-user approach. For any sweetening or development of the package, the user's feedback is thought of that makes the presently access of the record not in the least simple task and overhead to peoples.

A. OBJECTIVES

save voluminous bunching logs of files on system.
Automatic: creating the prevailing system totally automatic which can save voluminous human.

EXISTING SYSTEM

The problem definition for coming up with the system is to take care of knowledge of worker, to create simple dominant workers, to divide jobs and access management of workers, to use technology for correct and timely process by totally privacy and full authority access. The target of the project is to line up worker data system concerning standing of worker and attending of worker and monthly regular payment method and delivery. To eliminate or cut back the maximum amount as doable the hardships of existing system and avoid errors whereas getting into knowledge. In existing technique worker management area unit worker record area unit maintaining in records. It's a manual method. Sophisticated to go looking the worker regular payment Disadvantages: • Needs for additional manual effort. • In existing system is standalone method traditional worker cannot track their worker standing. • Less Safety and Danger of losing files • certain needed report isn't offered Time- overwhelming method.

A. PROBLEM STATEMENT

Manual handling of worker data poses variety of challenges. This is often evident in procedures like leave management wherever associate degree worker is needed to fill in an exceedingly kind which can take many weeks or months to be approved. The employment of paper add handling a number of these processes may lead to human error, papers could find you within the wrong hands and not forgetting the actual fact that this is often time overwhelming. variety of current systems lack worker self-service that means staff aren't ready to access and manage their personal data directly while not having to travel through their unit of time

Paperless: to form existing system paperless and save voluminous bunching logs of files on system.

Departments or their managers. Another challenge is that multi-national firms can have all the worker data hold on at the headquarters of the corporate creating it troublesome to access the worker data from overseas once required at short notice. The aforesaid issues is tackled by coming up with and implementing a web-based unit of time management system. This system can maintain worker data in an exceedingly information by totally privacy and authority access. The project is aimed toward putting in place worker system regarding the standing of the worker; the tutorial background and therefore the work expertise so as to assist monitor the performance and action of the worker through a parole protected system. This report's documentation goes through the full method of each application and information development. It additionally contains the event tools are utilized for these functions. This technique ought to accommodate associate degree application, on one hand, and information (repository of data) on the opposite. The program ought to perform the fundamental operations upon the information as retrieving, inserting, change and deleting information. Any extra practicality could be a goal of an extra module development. It's a sort of strategy to start out the event from coming up with and constructing the information, as this structure can confirm the additional structure of the appliance program. The logical information model (tables, their content and therefore the relationships between them) ought to answer the given task and canopy the fundamental needs. The Interface of the program ought to be easy, and therefore the program ought to be as straightforward to be used because it is feasible. Each controls and forms ought to logically and functionally be connected at intervals the program and totally answer the structure of the information. Another downside is establishing the connections with the information, every time, once a question is required to be performed upon it. Exception-handling ought to even be taken into associate degree account

PROPOSED SYSTEM

This chapter builds on the work exhausted the Analysis Chapter and offers documentation for the look of the worker Management System. The EMS is modeled in terms of objects and categories and their interactions with one another. Rationalization of the projected system is finished furthermore structure of the Entity Relationship Diagram (ERD). Style of the programmer is additionally mentioned. The projected system is meant to eliminate all the drawbacks of the prevailing worker management code. The system shall be chargeable for maintaining info regarding staff, so their personal profile. The system shall incorporate leave management all the manner from application to acceptance/rejection of leave requests furthermore as all worker comes with shut observance of the comes from creation to completion and trainings to help in observance active and inactive staff. The main options to be extra include:

- Employee profiles
- Leave management
- Task management
- Notifications
- Employee Self-Service (ESS)

Consistent- the web site ought to have the same look and feel on each page. Each page ought to have constant header/logo, heading vogue, fonts, navigations etc. Efficient and straightforward to maintain- This refers to the very fact that there's got to separate content from layout, so you'll be able to simply modification your page style while not piece of writing each page on the location. Layout-The layout of every page ought to have an honest distinction between the text and background space. This helps significantly with visibility because it are troublesome to read the text if it's virtually constant color because the background. Monitor size ought to even be taken into thought. Easy to navigate and use- Users mustn't have a tough time attempting to navigate the location. Navigation links ought to be consistent and clearly tagged. All navigation links ought to even be operating properly and may purpose to the supposed page/site. Browser compatible- once planning the location contemplates totally different browser environments. In depth testing ought to be done on every page altogether the key browsers and

therefore the style modified fitly to cater for all. Visually appealing- the employment of color, text, fonts and graphics ought to be rigorously thought of and accustomed make sure that the location is visually appealing to its guests.

A. FEATURES

- Light weighted
- Unity
- Protected
- Convenient
- Goodness
- Runtime Compactness and Speed

B. ADVANTAGES

- Transparency to all the user of system.
- Less paper use and removal of redundancy.
- Less prone to errors.
- The whole system is interactive.

IMPLEMENTED SSYSTEM

All these options embrace the flexibility to feature user, update (edit), and retrieve through search results. It conjointly contains a report generation system which will be saved in a very pdf file format. The system works within the following manner, accessing the system numerous corporations and organizations could have completely different worker structures and hierarchy. Being generic, the developed System has four main access levels that are:

- Employee
- Head of Department (HOD)
- Human Resource Manager (HR)
- Administrator

All users are given with an equivalent login interface. User should login the system by suggests that of valid username/password combination. Once access is granted to the system, the admin will add a replacement user to the system by coming into the fundamental info that the complete names and email address. The admin conjointly assigns the new user a job which can confirm the access level. Throughout the method of user registration, the all users are issued with a novel username and parole combination. Seeing that the system holds non-public worker info, the admin has the flexibility to observe all activity logs into the system by date and time.

The recently extra user logs into the system with a default parole which might later be modified to a safer parole. All workers will edit basic info like recently no heritable technical skills and emergency contacts. Workers will apply for leave by filling associate degree exceedingly in a very type moreover as submitting an attachment to support their leave request. The box has the flexibility to look at all workers beneath his/her department, assign a task and trainings. The box may produce a project, add members to the project and build a piece breakdown structure. Being AN worker, the box will apply for leave moreover as check leave days accumulated. Upon work in to the system, the unit of time manager gets notifications on the leave applications submitted and has the flexibility to approve or reject leave requests as they're submitted. The unit of time carries out all worker tasks that embrace the flexibility to look at and edit basic details, read unfinished tasks and comes trainings. The unit of time conjointly should the flexibility to come up with worker reports in PDF format. After you use an announcement that creates modification to the table however use doesn't INSERT, DELETE or UPDATE statement, the trigger isn't invoked. As an example, the TRUNCATE statement removes the total information of a table however doesn't invoke the trigger related to that table

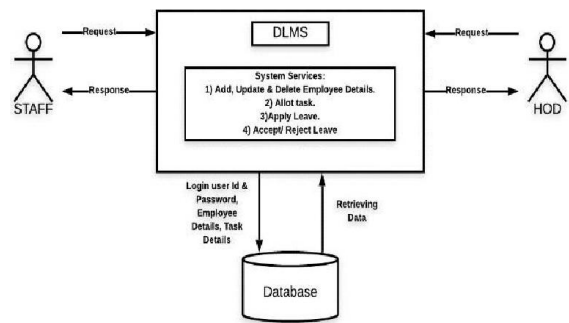


Fig. System Architecture

A. SCREENSHOTS

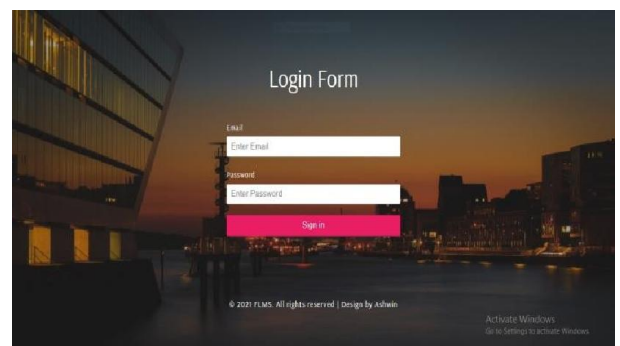


Fig. Admin Login Page

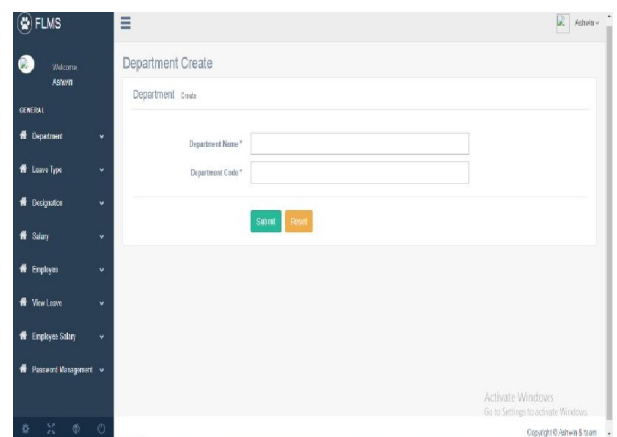
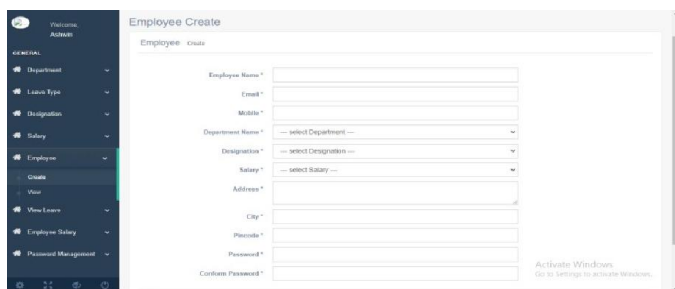
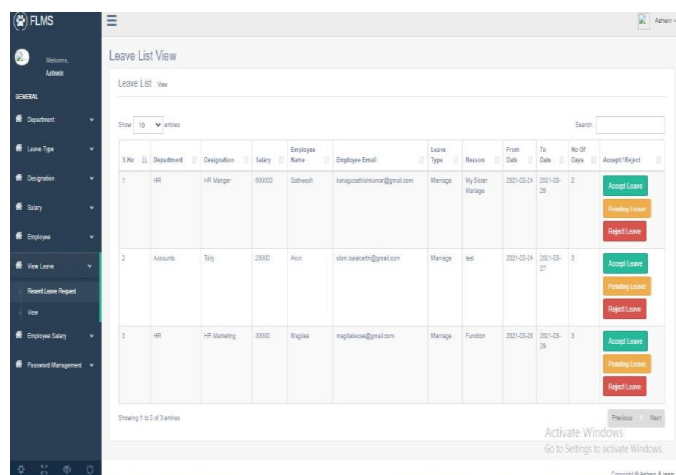


Fig. Employee Login Page



The screenshot shows the 'Employee Create' form in the FMS system. The form includes fields for Employee Name, Email, Mobile, Department Name, Designation, Salary, Address, City, and Password. There are dropdown menus for Department and Designation. A 'Confirm Password' field is also present. The left sidebar shows the navigation menu with options like Home, Department, Leave Type, Designation, Salary, Employee, View Leave, Employee Salary, and Password Management. The 'Employee' option is currently selected.

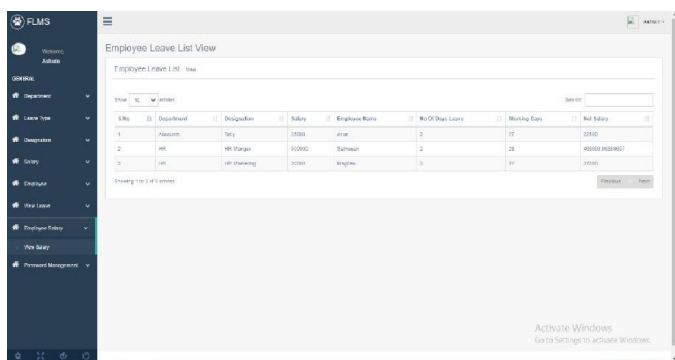
Fig. Employee Registration Page



The screenshot shows the 'Leave List View' page in the FMS system. It displays a table of leave requests with columns for S.No, Department, Designation, Salary, Employee Name, Employee Email, Leave Type, Reason, From Date, To Date, No. of Days, and Action. The table contains three entries. Each entry has buttons for 'Accept Leave', 'Pending Leave', and 'Reject Leave'. The left sidebar shows the navigation menu with options like Home, Department, Leave Type, Designation, Salary, Employee, View Leave, Employee Salary, and Password Management. The 'View Leave' option is currently selected.

S.No	Department	Designation	Salary	Employee Name	Employee Email	Leave Type	Reason	From Date	To Date	No. of Days	Action
1	HR	HR Manager	80000	Satish	satish@hr.com	Marriage	My Sister Marriage	2021-02-19	2021-02-25	2	Accept Leave Pending Leave Reject Leave
2	Accounts	Tally	20000	Arun	arun@accounts.com	Marriage	Self	2021-02-14	2021-02-27	1	Accept Leave Pending Leave Reject Leave
3	HR	HR Training	30000	Angela	angela@hr.com	Marriage	Funeral	2021-02-18	2021-02-28	1	Accept Leave Pending Leave Reject Leave

Fig. Leave Request Page



The screenshot shows the 'Employee Leave List View' page in the FMS system. It displays a table of employee leave data with columns for S.No, Department, Designation, Salary, Employee Name, No. of Days Leave, Working Days, and Net Salary. The table contains three entries. The left sidebar shows the navigation menu with options like Home, Department, Leave Type, Designation, Salary, Employee, View Leave, Employee Salary, and Password Management. The 'Employee Salary' option is currently selected.

S.No	Department	Designation	Salary	Employee Name	No. of Days Leave	Working Days	Net Salary
1	Accounts	Tally	20000	Arun	2	27	20000
2	HR	HR Manager	80000	Satish	2	28	40000.0000000001
3	HR	HR Training	30000	Angela	1	27	27000

Fig. Salary Calculation Page

CONCLUSION

Overall, the system is helpful for all the users to keep up data at varied levels. It connects admin and worker and so straightforward to keep up. Currently admin will simply set the task or any notifications to the various workers while not having an individual to send to workers and workers will apply for leave or reply with task allotted to them. It's been a good pleasure on behalf of me to figure on this exciting and difficult project. This project verified sensible for U.S.A. because it provided sensible data of not solely programming in PHP, HTML, CSS and Oracle MySQL Server Developer operating of web-based mostly application, however additionally regarding all handling procedure connected with Advance and new technology. It additionally provides data regarding the newest technology employed in developing internet enabled application and consumer server technology which will be nice demand in future. This may give higher opportunities and steerage in future in developing comes severally.

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BLOCKCHAIN'S APPLICABILITY IN IOT FOR MITIGATING DISTRIBUTED DENIAL OF SERVICE ATTACKS

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Abstract - The Internet of Things (IoT) makes smart cities feasible all around the world. Smart homes, smart farming, smart climate, smart wellness, smart governance, and many more types of smart communities are all possible in today's world. The Internet of Things is also utilized in the petroleum, gas mining, and industrial industries. In the human world, IOT increases efficiency, optimizes pricing, optimizes human capital, retains forecasts, and adds a great deal of convenience to daily activities. With the participation of a huge number of different devices and the processing of enormous amounts of data, security concerns are becoming more prevalent. The lack of success of the Internet of Things is mostly due to security and privacy concerns. One of the most serious dangers is the possibility of a distributed denial of service (DDOS) assault. This study discusses the application of blockchain-based techniques to prevent distributed denial of service (DDOS) attacks in the internet of things. It gives a thorough examination of the existing blockchain-based architectures for dealing with distributed denial of service (DDOS) assaults.

Keywords - IoT, Blockchain, Smart

Contract, DDOS, Threat, Attack, Mitigation,
INTRODUCTION

Kevin Ashton [1] is the creator of the Internet of Things. The Internet of Things has, however, become a haven for nearly all applications in the previous decade, including home automation, intelligent healthcare, utility facilities, and smart transportation [2]. RFID technology (WLAN), Wi-Fi, Bluetooth, Internet technology, and intelligent computing (Artificial Intelligence), among other things, are key Internet of Things enabling technologies. WIC (Wise Intelligence Computing) technology is also featured. The Internet of Things (IoT) is a rapidly expanding network of internet sensors embedded in a variety of physical objects, or "things," that communicate with one another. Stuff may, of course, be any physical object on the planet that can be interacted with or on which a sensor can be embedded. This includes both living and nonliving things. Sensors are capable of performing a wide variety of computations. Things can be accessed over the Internet via wired or wireless connections. Objects may be anything, both living and inanimate, that needs physical existence.

As shown in the preceding figure 1, sensors are a large number of diodes that are equipped to detect natural physical boundaries such as temperature and pressure. Sensors are in charge of acquiring data from the environment. They have the capability of collecting data continually. Sensors are capable of recording a variety of data such as humidity, temperature, motion, and others. The Internet of Things platform is a middleware. There are several high-quality Internet of Things platforms available today, including Microsoft Azure IoT and AWA IoT. The actual data is kept on a cloud-based storage server. When data analytics apps are used in the cloud, they are shared with stakeholders using mobile applications that are accessible from anywhere.

The lack of success of the Internet of Things is mostly due to security and privacy concerns. One of the most serious dangers is the possibility of a distributed denial of service (DDoS) assault. An internet distributed denial of service (DDoS) assault includes a large number of impacted systems targeting a single target, which results in the denial of service for the devices that are being attacked and their users being affected. In response to the overwhelming volume of incoming

messages, the targeted device was forced to shut down, thereby denying genuine users access to the computer.

An open automated record that is decentralized handed on, and opened is known as a blockchain [3] [4][5]. It is used to record trades transversely over multiple PCs and is designed to prevent any included record from being balanced retrospectively, without the difference in all resulting blocks. Individuals are given the ability to confirm and audit deals on their own while being financially self-sufficient and tolerable. A blockchain database is freely monitored using a common framework and a time-venturing worker who is appropriately suited for the task. They are backed up by widespread collaboration that is fueled by a wide range of individual concerns. Individuals' weaknesses in terms of data security are pushed to the margins by such a structure, allowing for a more dynamic work environment. Because of the utilization of a blockchain, a propelled asset no longer has the normal requirement for unfathomable reproducibility.

[5] Blockchains are used to enhance the accounting and sharing of budgetary exchange data. Benefits include increased speed, less procedural cost, fewer trade errors, more general security, and a

decentralized way of accounting and sharing of budgetary exchange data. This decentralized method eliminates the primary issue of framework dissatisfaction as well as the vulnerability to cyber assaults that existed previously. In virtual budgetary exchanges, the key rationale for utilizing blockchain technology is to ensure that each client's wallet is not only partially protected, but that the wallet is completely protected by storing the record of all transactions between clients in a blockchain. When it comes to developing solutions to prevent distributed denial of service attacks, blockchain is essential.

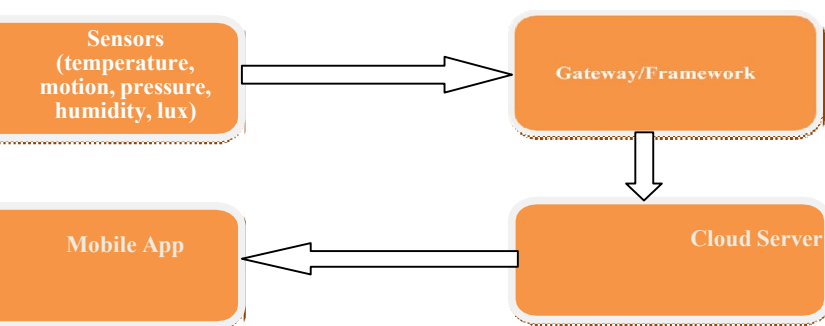


Fig. 1. IoT's Basic Building Blocks

RELATED WORK

According to Arsalon Mohsen Nia et al., 2016 [6], possible attacks and flaws are thoroughly examined from the inside out. In 2014 [7], Mohamed Abomhara et al. discussed the security risks and problems associated with the Internet of Things. They also pointed out that there are four interrelated parts, namely persons, articles, equipment, and software, which communicate with one another through an untrustworthy private network. Cart Das et al., 2016 [8] provided an in-depth and inside-out examination of potential challenges in the Internet of Things.

Salim ELBOUANANI [9] has shown that, at present, no standard or solution addresses all security concerns in the context of the Internet of Things. They discovered that in the Internet of Things, confirmation is a legitimate test. According to Krishna Kanth Gupta et al., 2016 [10], there will be 25 billion Internet of Things (IoT) devices by 2020. They also acknowledged that there were issues with the Internet of Things. A study conducted by Gurpreet Singh Matharu et al. (2014 [11]) revealed that interoperability, standardization, and security are the three areas that require further investigation for the network of things to develop.

Hui Suo et al., 2012 [12] developed an encryption-based technique to improve the security characteristics of Internet of Things systems.

When C. Flügel and colleagues [13] investigated some of the particular causes that need to be fought to create such a system, they found that L. Atzori and colleagues (2012) [14] advocated for the use of IoT in social media platforms.

IEEE range 2014 [15] recognized Java as a leading design tool for the Internet of Things (IoT) applications. The World Financial Gathering's Modern Web Overview, 2014 [16] helped participants get a better understanding of the remarkable opportunities and new risks that have emerged from the Industrial Internet. Air pockets of trust, as described by Hammi et al., 2018 [17], is a novel decentralized architecture that ensures that devices may be verified and verified with powerful recognized evidence of ownership. The authors of [18][19][20] presented a variety of blockchain-based solutions for the Internet of Things environment.

For safe IoT circumstances, Javaid et al., 2018 [21] [22] presented a PUF and blockchain-based arrangement called BlockPro for information provenance and information respectability, which is based on a PUF and blockchain.

In their paper, M. Anwer et al., 2020 [23] suggested a course of action for several masters' methods of the Blockchain to perform IoT checks, as well as a discussion about their limits.

Various security hazards in encryption algorithms used for different Internet of Things solutions were highlighted by the authors in [24][25][26]. Arbitrary number generators have always been seen as a significant source of vulnerability [27],[28],[29]. The new PRNG algorithm was developed by Stephen Checkoway and colleagues in 2014 [30] [31]. It was really

quick.

Yu et al., 2015 [32] provided a variety of well-known weak devices to deal with DDOS attack scenarios. Zhang et al., 2015 [33] demonstrated a notable viewpoint in the IoT environment, which was supported by several authorities.

The authors of [37][35] carried out a comprehensive investigation of the underpowered Internet of Things devices, which included thousands of fascinating contraptions. A significant number of them were blatantly accessible using Internet-based approaches that did not necessitate the production of unmistakable evidence.

This document [36] provides a high-level overview of the guts and bolts of Machine Learning, as well as the standards and computations that are used. Submissions. After a more in-depth machine definition study, we will consolidate different forms of learning, including controlled and uncontrolled methods of instruction, as well as profound learning Perfect standards of instruction. In the remainder of the article, we'll look at the use of machine learning algorithms in a variety of fields, such as design recognition, sensor systems, anomaly detection, the Internet of Things (IoT), and health monitoring and assessment.

[37] describes a method that integrates the Internet of Things (IoT) with certain commonly used artificial intelligence computations to create a predictive model that may be used to assess the inside temperature of intelligent constructions. This predictive model was created to increase the usefulness of a completely new dataset by employing an online learning system. To validate the technique, the article conducts a Machine Learning-based test using real-world sensor data that has been captured. The article after that proposes that the accompanying process be included in an Internet of Things architecture that is based

on Edge Computing to enable the structure to operate in an energy-efficient manner.

RESEARCH DIFFICULTIES IN THE IOT

During the literature review, the following gaps were discovered:

- It was discovered that authentication is a significant problem in the Internet of Things. The reason for this is that there is no adequate authentication infrastructure available in the Internet of Things [9].
- The distribution of keys presents additional difficulty [9].
- The most common source of concern for most industries is security [16].
- Because of the design of the building, men in the middle assaults are a significant concern [20].
- Distributed denial-of-service (DDOS) attacks are also a significant issue with IoT networks. However, there is no such thing as a universal mitigation plan [21].
- Vulnerability in the Internet of Things devices is a serious problem. It is necessary to classify and forecast [32] the situation. A vulnerable device poses a danger to the Internet of Things network. Identification of such devices is necessary [35].

MITIGATION OF DDOS ATTACKS WITH THE USE OF BLOCKCHAIN

Part of this section's content is a critical examination of the blockchain-based designs that are now available for mitigating distributed denial of service attacks.

CloudFlare's services have benefited from Wikipedia's assistance in defending themselves against attacks. This strategy is effective since Cloudflare has a wealth of experience in dealing with these types of assaults. This is an exciting moment to be involved with online encyclopedias. Spamhaus, for example, was protected in March 2013 with the use of CloudFlare's

services. Furthermore, in August 2015, a distributed denial of service (DDoS) attack using the hijacking of insufficient web browsers was launched against CloudFlare Client GitHub (an online coding site).

On the 28th of February, 2018, the most devastating of these was made public. This threat was neutralized thanks to the prolific DDoS service from Akamai. Akamai has made significant investments in DDoS protection. It comprises seven scrubbing centers and 150 personnel who are all dedicated to the battle against distributed denial of service (DDoS) assaults. Accordingly, it will require a significant amount of cash, work, and time to be successful. Even though there are a large number of Memcached servers (about 50 000), such attacks are still possible [39].

In October 2016, a distributed denial of service (DDoS) attack was launched via Botnets, affecting a large number of Internet of Things (IoT) devices [40].

A small number of typical DDoS assaults are directed at the railways' transportation networks. During an assault by a distributed denial-of-service (DDoS) network in Sweden in October 2017, the service was delayed, the IT system that records the position of trains was crashed, and the corresponding email networks, websites, and traffic maps were all dismantled.

Rodrigues and colleagues [41] proposed a shared distributed denial-of-service mitigation blockchain architecture for smart contracts. This is exactly what we're doing. DDoS mitigation is provided by the architecture through the use of several independent machine-managed network domains (ASes). A distributed Ethereum-based blockchain is what this architecture

is referred to as. In blockchain technology, intelligent contracts are used to report IP addresses that have been defined in white or black across a variety of categories. As a result, a transaction is created by inserting an IP address into a block on a blockchain.

According to network rules, the IP address with a black list flow halted or an IP address with a white list relocated would be the one to be used. This design makes it feasible to link IP addresses to the shared blockchain in groups, which is useful for scalability. Instead of exchanging attack information via message, attachments between different sections of the infrastructure, such as between ASes and consumers, are transferred using blockchain technology. Each block in Ethereum is generated every 14 seconds, which is a very fast rate. As a result, the block/allow addresses will be sent to the relevant ASes throughout this period.

Flow rules are configured and applied by the individual ASes using Software Specified Networking (SDN) to prevent DDoS assaults from taking place. Different ASes (domains) differ from one another in terms of their security policy and DDoS threat countermeasures against DDoS attacks (domains). The target server is protected while the DDoS assault is being carried out by filtering the attack traffic on its ASN while the attack is being carried out. Attack traffic is likewise filtered in other ASes following the flow regulations that have been established. As a result, a DDoS assault from a nearby source is mitigated. The combination of SDN and blockchain technology provides a scalable and robust DDoS mitigation solution.

The primary advantage of this design, on the other hand, is that it may be utilized in conjunction with existing defensive

mechanisms as an external security tool. The proposed architecture is rudimentary and provides only the bare minimum in terms of DDoS mitigation. The developers have not provided details on implementation and evaluation, and a significant amount of work has to be completed.

A decentralized blockchain is employed, which can result in increased data flow (transactions) being an issue for scalability, and the authors propose to reduce the space-spread bloom filter, although this is not a serious worry. What method will be used to authenticate a node that records an attack? How can I be confident that other components of the transaction will not attempt to steal information? It is not adequately developed; (c) IP blocking is only possible for static IP addresses; and (d) cooperative domain justice is an issue, since a single domain may be able to employ a higher number of other domain services than those provided by DDoS assaults.

The authors of Javaid et al [21] suggest an IoT built-in blockchain architecture to reduce the number of IoT device-based attacks. The Ethereum blockchain of intelligent contracts is being employed in the construction of the building. The Internet of Things devices must first be registered with the registry to be able to transmit and receive messages. An Internet of Things system can only operate up to the gas threshold above the gas threshold and no further. A server can deregister or remove any Internet of Things system that has a network failure or a gas cap that has expired at any moment. The server is also responsible for the development and recording of the smart contract.

When a contract address is registered, the

server extends that address to all network IoT devices. An Internet of Things machine connected to a server is on the trusted list for the transaction. It is determined at the initialization of smart contracts [21] how much gas will be allocated for each contract transaction to guard against DDoS assaults.

The intelligent contract (a software component) serves as the primary regulator for all Internet of Things devices participating in the transaction. It not only allows the usage of Internet of Things devices, but it also limits their use to a certain quantity of gasoline. In this design, gateways are used to link the Internet of Things devices.

A smart contract makes contact with an IoT computer to transmit a message. An Internet of Things system will only operate up to the amount of gas that has been allotted to it when the server is registered. This limit is set following the bandwidth and resource specifications of the IoT device. In this design, every transaction and procedure has a gas cap associated with it.

Probably the most significant advantage of this approach is that the decentralized blockchain with a PoW consensus system possesses the strength and confidence of the Ethereum cryptocurrency. The failure of a single node has little impact on the overall operation of the system. The use of distributed estimating decreases the load on servers in an effective manner. To provide DDoS defense, each system's architecture is limited to the amount of gas it can hold. Another advantage is that no hardware update is required on an IoT device, (b) an overlay network over the present conventional network may be integrated into the design, and (c) both the solution identified and the solution functions for prevention can be implemented in the

architecture. This design, on the other hand, feeds a trustworthy contract list that is evaluated whenever a new message is issued by a system or whenever communication between devices occurs. As a result, there are still issues with scalability using this technique.

During the registration process, there is no discussion of how to trust an IoT device that has been registered with the registry. The method through which a server will determine the current gas/resource need for the IoT node stays unambiguous. If an attacker can identify distinct Internet of Things addresses, the trusted smart deal list may include those addresses.

For reducing DDoS assaults carried out by IoT devices utilizing trust list traffic management architecture, Kataoka et al [42] propose this design, which makes use of blockchain technologies integrated into SDN technology.

There are three major components to it: Internet of Things/device applications; Internet of Things/edge networks; and Internet of Things/gateway/-validators. Contact is only possible in this architecture if the communication devices/servers are confident in their ability to communicate. Using the trust list principle, it is possible to distinguish between trustworthy and untrustworthy devices. In its most basic form, Trust List is a data structure via which the network distributes "application profiles" and "application profiles."

DDoS assaults on the edge network might result in malicious traffic being stopped and filtered by the SDN switch on the network. The SDN controller guarantees that the blockchain environment is synergistic and that the blockchain

provides access to information about trustworthy resources and computers. IoT servers, gateways, and validators keep track of the information about "trusted services and devices." The SDN controller also offers flow rules for screening or approving Internet of Things traffic on the SDN switches, which are controlled by the SDN controller.

This design included the implementation of a new computer known as a validator. It is the responsibility of an authentication protocol to verify the legitimacy of an IoT device. The trusted user profile is also transferred to the IoT device through the use of blockchain technology and reliable service information. As a result, the first Internet of Things system is reliable for communication. Following this, the registry's contact information is provided in case there is any additional interaction. This design may be utilized in conjunction with a variety of additional criteria, including system location, ownership, user license, and other factors, among others. In terms of application and device profiles, the architecture is adaptable.

In this study, a practical implementation model for an open-source technology blockchain and confidence list is shown.

- (a) A significant amount of time has elapsed before the monitoring is performed. It aids in the detection of anomalies.
- (b) Measurements of avoidance and response; et cetera
- (c) The traffic generated by DDoS attacks are restricted to edge networks. There are just a few downsides to this type of architecture:

1. The confidence list for the architecture is not encrypted/in plain text, and as a result, it will raise security concerns on a public

blockchain.

2. The increase in the size of the secret list translates into greater processing expenses for blockchain technology.
3. There is just an indication of a definition in this case. It is necessary to conduct an additional study into its practical use.
4. In the case of public blockchains, there is a privacy problem.
5. In such cases, the attacker must constantly examine and update the confidence list while also gaining access to the network by circumventing the restrictions.
6. As a result of the use of intermediary blockchains, SDNs, and validators, there are various delays required before a system can interact successfully.

CONCLUSION

A distributed denial-of-service (DDOS) assault is catastrophic. It stops legitimate users from accessing web-based services. When this type of event occurs, the Internet of Things system has a communication breakdown. Although there are blockchain-based techniques available to prevent DDOS attacks, they are not widely used. Blockchain technology ensures the authenticity, integrity, and dependability of transactions. This article has shed light on all of the contemporary blockchain-based methods for mitigating distributed denial of service attacks. It is the purpose of this article to give a critical examination of a blockchain-based mitigation approach. Following this thorough examination, it is discovered that there is still more work to be done in the area of blockchain-based approaches. The concerns of scalability and cost are two of the most pressing ones that must be addressed.

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CLASSIFICATION OF ADVANCED PERSISTENT THREATS AND ATTACKS DETECTION METHOD IN CLOUD COMPUTING BASED ON AUTOENCODER

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Abstract - Data security academics and enterprises alike are embracing machine learning for its ability in detecting assaults that an organization confronts, particularly ones that go undiscovered by traditional handwriting intrusion detection systems. Machine learning, in addition to the opportunity to handle vast volumes of data, also has the capacity to recognize contextual and group irregularities, which is an important feature of a good threat detection technique. A targeted and highly capable cyber attack is characterized as an advanced persistent threat (APT). To address these problems, the studies propose the CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, DAPT 2020 dataset, which contains assaults from the Advanced Persistent Threats category. This study intends to provide a unique method to APT detection that is based on the life cycle of an APT assault and uses high deep learning algorithms. The benefits and drawbacks of utilizing classifiers are then weighed in order to identify the dataset and the classifier Long short-term Memory(LSTM)-Recurrent neural networks (RNN), Naive Bayes-supports vector machine(SVM), Logistic Regression-MultiLayer Perceptron (MLP), Hierarchical cluster analysis(HCA) and the decision tree.

INTRODUCTION

APT (Advanced Persistent Threat) is a complex type of attack that steals personal data by staying in the infected system for a long time. When APT attacks take place in a dynamic and complex infrastructure such as the cloud, their detection by traditional methods is very difficult. APT attacks use various more complex methods and tools while attacking targets with the purpose of the theft of confidential and sensitive information. To overcome the limitations of existing methods the paper proposes auto encoder based deep learning approach for APT attack detection. The advantage of this model is that it achieves a high classification result by identifying complex relationships between features in a database. For attack detection and verification, the system consults the CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, DAPT 2020 database.

Additionally, the model simplifies the process of classifying large volumes of data by reducing the size of data in the encoder. Hence, in this study, machine learning methods of Auto encoder, Long short-term Memory-RNN, Naive Bayes-SVM, Logistic Regression-MLP and deep learning are

APT-attacks on the CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, DAPT 2020 dataset.

PROPOSED WORK

The key contributions of this research work are as follows:

- CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, DAPT 2020 is a data set that captures many features of real-world APT attacks. These attacks occur both at the network's interface and within the network. The four basic phases of an APT attack are included in the threat model that was used to create the APT dataset.

RECONNAISSANCE
FOOTHOLD ESTABLISHMENT
LATERAL MOVEMENT
DATA EXFILTRATION
POST-EXFILTRATION

- Compare our dataset to five prominent intrusion detection datasets: CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, and DAPT 2020. Consider applying cutting-edge semi-supervised methods to create a description of normal network behaviour and using it to find abnormalities, such as data imbalances, in cyber attack records, where attack traffic is much less than harmless traffic data. These algorithms are poor in identifying attack traffic at all levels of an APT, according to the findings.

DATASET

Create an artificial dataset with APT behavior characteristics similar to DAPT 2020. In this section, first give an overview of the overall configuration to facilitate data gathering, then explain the data collecting process, including a timetable and the instruments utilized for data collection. Finally, explain current state-of-the-art strategies for distinguishing between legitimate and malignant traffic. A number of users was given user and (some with) administrator identities for accessing formal and informal network services and doing typical business operations during the week to replicate usual traffic seen on real-world cyber security. For example, admin updated a Word Press website and categorized files, folders, and users. On Monday, we made sure there was no assault traffic on the network in order to provide a baseline for typical traffic. Then, as shown in Figure 1, our internal Red Team used a variety of attack strategies (team of experienced cyber- attackers).

Day	Activity	Tools Used	Details
Day 1, 8:00 AM-6:00 PM	Normal Traffic	ping, dig, GET, POST, curl, browsing, files upload, download	Baseline normal traffic based on user activities.
Day 2, 8:00 AM-6:00 PM	Reconnaissance	nmap, webScarab, sqlmap, dirbuster, nikto, burpsuite, application account discovery tools	Reconnaissance on public network, identification of vulnerabilities, directory structure, weak authentication, and authorization.
Day 3, 8:00 AM-6:00 PM	Foothold Establishment	PHP reverse shell, netcat, SQL vulnerability exploitation (sqlmap), XSS exploitation, authentication bypass, metasploitable	PHP reverse shell via DVWA, file upload, adding of malicious users was performed on badstore.
Day 4, 8:00 AM-6:00 PM	Lateral Movement	Nmap scan on local network, vsftpd 2.3.4 vulnerability, weak ssh authentication, mysql script for CVE-2012-2122, metasploit	Exploration of internal network from compromised VMs (Public VM), and obtaining foothold on critical local systems.
Day 5, 8:00 AM-6:00 PM	Data Exfiltration	Data exfiltration to C&C, SMB vulnerability CVE-2017-7494 used to obtain elevated privileges, Google Drive, PyExfil, ftp, scp	FTP put method from local machine to remote server, wput to remote location using anonymous user, scp large files to remote server, web based uploads to Google Drive.

Figure 1 data collection on a multi-tenant cloud system with known and unknown vulnerabilities

ALGORITHM

Logistic Regression (supervised ML algorithm):

A Python supervised machine learning technique for predicting discrete values in binary. This is based on a collection of unrelated variables. By fitting data into a logistic curve or logistic function, this approach can forecast the likelihood of an event occurring. It is also known as logistic regression because of this. The Sigmoid function, commonly known as logistic regression, takes any real-valued integer and maps it to a value between 0 and 1. This algorithm is useful for detecting spam emails,

predicting website or ad clicks, and predicting customer attrition.

Recurrent Neural Networks and LSTM:

RNNs are a sort of neural network that is both powerful and robust, and they are among the most attractive algorithms in use because they are the only ones having an internal memory. Sequential data is simply ordered information in which related items appear one after the other.

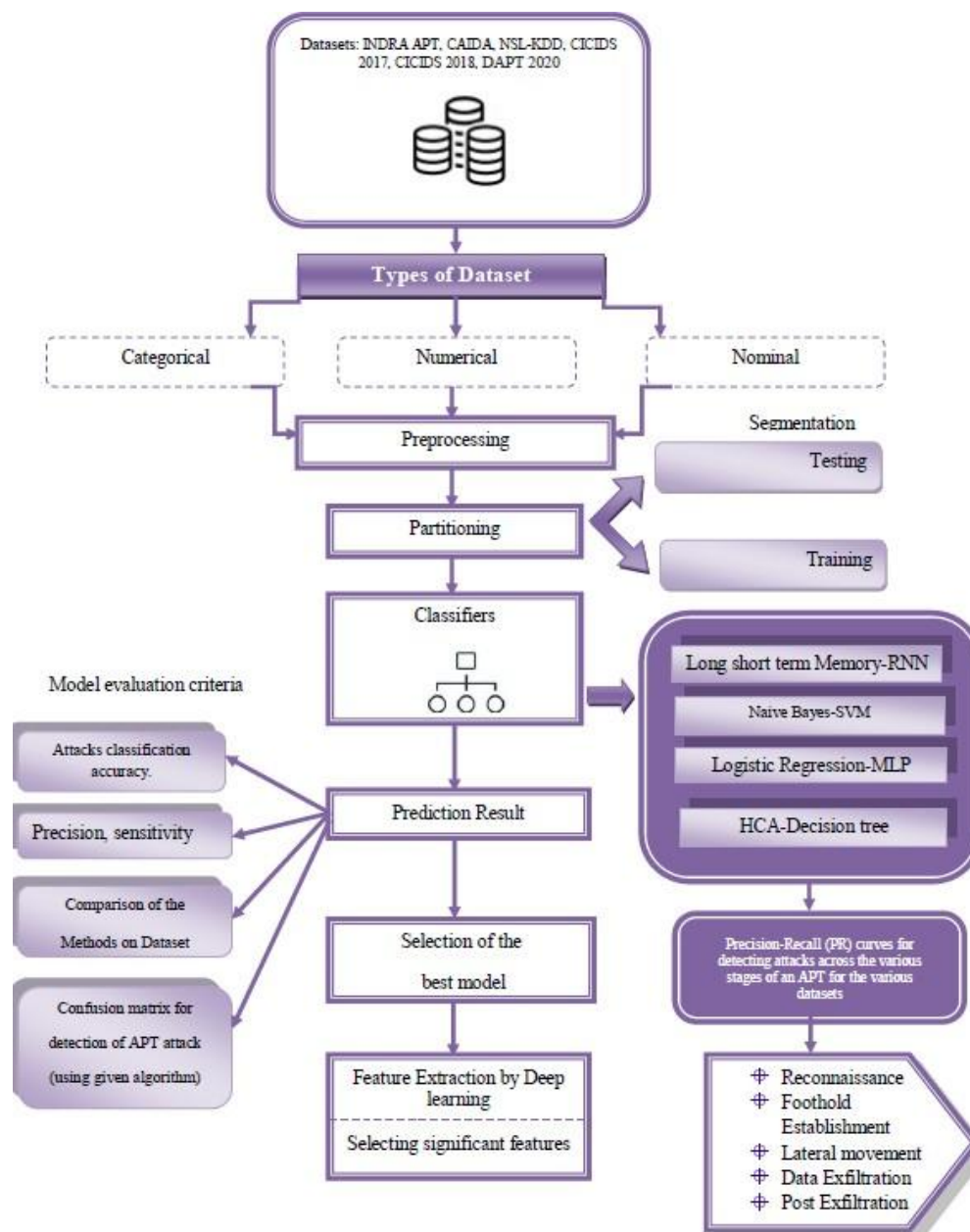


Figure 2 Flowchart of the proposed work

Financial information or the DNA sequence are two examples. Perhaps the most common sort of sequential data is time series, which is simply a list of data points in chronological order. Long Short-Term Memory (LSTM) networks are a type of RNN that can store more information. The layers of an RNN are built using LSTM as the building pieces.

Auto encoder

Auto encoder is an unsupervised artificial neural network that learns how to efficiently compress and encode data then learns how to reconstruct the data back from the reduced encoded representation to a representation that is as close to the original input as possible. An auto encoder is composed of an encoder and a decoder sub-models. The encoder compresses the input and the decoder attempts to recreate the input from the compressed version provided by the encoder.

Naive Bayes Classifier Algorithm

It is mainly used in text classification that includes a high-dimensional training dataset. Naive Bayes Classifier is one of the simple and most effective Classification algorithms which help in building the fast machine learning models that can make quick predictions.

Methodology

According to Figure 2, the proposed methodology includes 7 modules, each of which will be described in detail in the following. In this study, the modules include data collection from an external source (CAIDA, NSL-KDD, CICIDS 2017, CICIDS 2018, DAPT 2020 dataset), preprocessing, partitioning, classifiers, prediction result, selection of the best model and extraction of the features.

Fargana et al. (2021) suggested a deep autoencoder neural network for APT assault detection. The essence of the approach suggested in this article is that, unlike previous studies in which features are chosen physically, this study uses deep learning to choose useful features automatically.

According to the findings of Javad et al. (2019), the Naive Bayes classification algorithm has a higher detection accuracy for R2Land U2R attacks. Then, utilising the J48 decision tree, they achieved high accuracy of up to 82 percent for DoS attacks and

65.4 percent for Probe attacks. It's mostly used to figure out how to calculate data from unknown categories and how likely they are to belong to one of them.

The APT attack identification and tracking process was completed on the NSL-KDD dataset by Joloudari et al(2020), who compared our proposed method to other studies that employed machine learning methods to detect infiltration into the NSL-KDD dataset. The suggested 6-layer deep learning algorithm is compared to other academics' work on the NSL-KDD dataset as follows: On the NSL-KDD dataset, three artificial intelligence-based classification models were utilized to detect and categories APT attacks: Bayesian Network, C5.0 decision tree, and deep learning.

For large-scale picture classification, Simonyan et al. (2014) tested very deep convolutional networks (up to 19 weight layers). It was shown that representation depth improves generalization ability, and that state-of-the-art performance on the ImageNet test datasets can be reached using a standard ConvNet architecture with significantly enhanced depth.

Bodstrom et al. (2019) present a Deep Learning stack for detection and characterization that employs sequential neural network models. Instead of employing a single algorithm, we use a method that takes into account detection disparities between techniques. The stack uses this strategy to extract previously known data, discover abnormalities, classify and compare historical outliers, and look for their links in network traffic flow.

CONCLUSION AFTER THE RESULTS

Rather than examining anomaly detection as a whole, as is customary in all existing works, we will divide anomalies down into the four stages of APTs (Data Exfiltration, Reconnaissance, Foothold Establishment, Lateral Movement). This allows us to emphasize the numerous aspects of assaults (data imbalance ratios, absence of data) that make the semi supervised learning task challenging across the various APT stages. Demonstrate that, even in the context of current data, an abundance of attack data in one phase increases the overall outlier detection system's accuracy, despite the fact that it may be highly unreliable in another context.

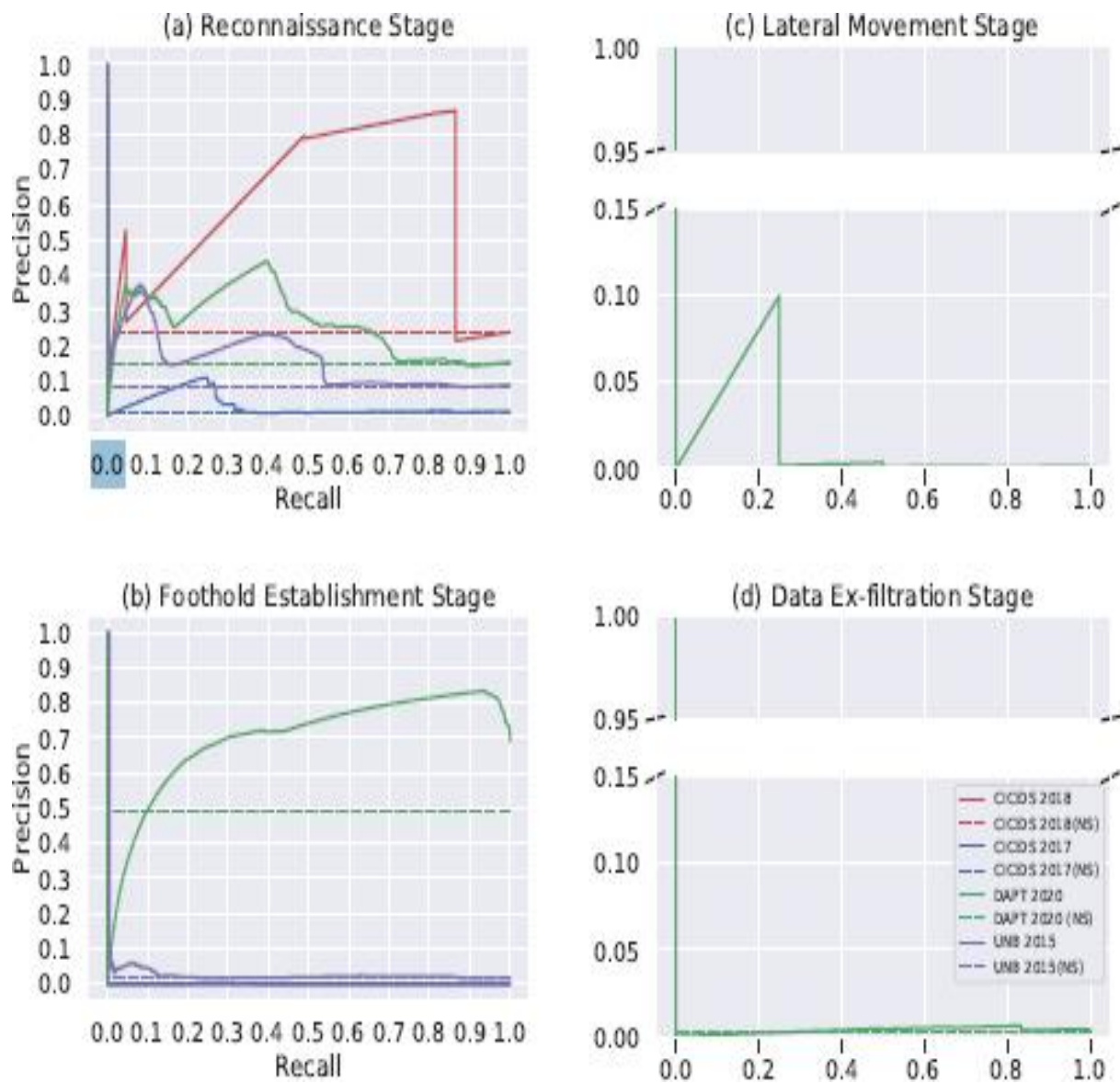


Figure 3 Precision-Recall (PR) curves for detecting assaults across the different phases of an APT using the Stacked Auto-encoder for various datasets (SAE).

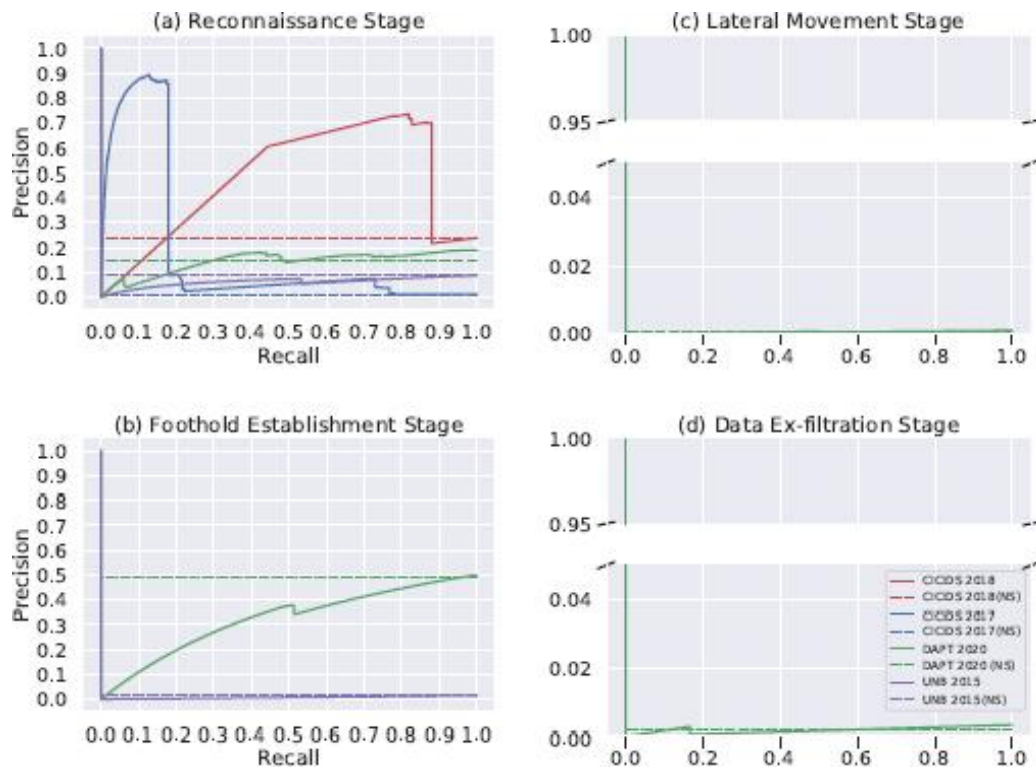


Figure 4 Precision-Recall (PR) curves for identifying assaults at various stages of an APT using the Stacked Auto-encoder with LSTM cells for various datasets (LSTM-SAE).

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CLASSIFICATION OF BROAD LEAF WEEDS IN THE PADDY FIELD BASED ON THE DENSITY USING COMPUTER VISION.

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Abstract - Agriculture is India's primary revenue source for nearly 9.87 million people. Almost 68% of India's population is agriculture-dependent. Most of the Indian economy depends on agriculture, in which crop productivity leads to save life. The agricultural crop production rate is based on various parameters such as temperature, atmospheric humidity, the availability of water resources, and so on. Weed recognition in agriculture plays a crucial role in reducing economic growth for farmers. Till date, farmers have followed traditional policies and practices to increase yield which are natural factors and out of human control. This helps farmers gain an insight into the local weed coverage and only spray out areas infested with weeds. In This paper provides methods for classifying images based on their weed density. The weeds that our work covers are categorized broad leaves in paddy plant. We aim to classify images by the density of weeds scattered into three classes. The first technique uses texture extracted from the image using GLCM and produces accuracy of 83% using the Radial Base Function (RBF) kernel in the Support vector Machine (SVM). Another technique proposed uses features like invariant scale and rotation moments in order to classify Broad leaf weeds based on the density. Then the classification accuracy of 82 percent. There is also a comparison of these two techniques in terms of timing. These techniques are used in MATLAB and tested on a set of 1000 images collected from a paddy plant.

Keywords – Precision agriculture, Weed Detection, Weed Classification, SVM, Random Forest.

INTRODUCTION

The Indian food sector is set to increase enormously every year and, as a result of its huge potential to add value, especially in the food industry, it contributes to global trade in food products. The sixth largest market for Indian food in the world, with retail accounts for 70 per cent of sales. 32% of India's global food market is in Indian food processing and ranks fifth in production, consumption, export and predicted growth. It is one of the largest industries in India

Rice is one of the most important food crops in the world (Bayer Crop Science, 2015). It is widely used in East, South, South-eastern Asia, the Near East, Latin America, and the western Indies. It is also used. Rice has secondary advantages, such as rice paw for bovine feed and for the cottage industry for hats and tents etc. In the paper industry, husk of rice is used as a source of fuel. Rice is also a major food crop in Asia

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and Pakistan, and is ranked second in basic foods (Bayer Crop Science, 2015). Taking into account the importance of rice, 2004 was devoted to rice by the United Nations.

Rice is also seen as a necessity to manage malnutrition in order to meet the growing demand for food at global level (Gnanamanickam et al., 2009). Weeds are the undesirable plants that compete in light, nutrients and water for crops, thereby affecting their normal growth. Weeds can also be used as a shelter for several pests or as a breeding place. Weeds are categorized in the following three main categories: Broad leaf, sedges, and grasses. Depending on their leaf structures (weed management, 2015). Broad leaf weeds have rounded, oval or heart shaped etc. leaves and their size is comparatively larger. Grasses and sedges have narrow and thin leaves. Weed density is normally variable across the field and so can be treated accordingly with weed control methods. To control all types of weeds, a range of weed control strategies have been developed over time. Hand weeding is one of the methods for manually identifying the presence of weeds. Weeds using the naked eye and taking them out by hand this procedure is time-consuming intensive, which raises manufacturing costs in places where labour expenses are very high. Hand hoeing is a method of weed removal that involves moving specially designed mechanical devices in between plants. Chemical sprays to manage weeds, either before or after their emergence, are widely employed around the world. Weed management utilizing biological approaches such as natural insects or bacteria that feed

on weeds is the subject of ongoing research (Weed Management, 2015) to lessen the harmful effects of pesticides on crops and the environment. Another issue with herbicide use is that weeds can develop resistance to these chemicals if they are used too frequently. Weeds impact rice like they do all other crops.

This work proposes two techniques to classify images based on weed density. The weeds we used in our data set are grasses which are a major threat to rice crop (Main weeds of rice in Asia, 2015). First technique classifies weeds based on texture features and the second technique classifies weed image based on shape and anatomy of plants and is robust to rotation and scale. Both techniques are compared in terms of their accuracy. Execution time analysis is also performed which showed that both of these techniques have the potential to be applied in real time to classify weed density in crop. The major contributions of this work include.

- Two methods of weed classification in rice crop based on weed density.
- A way to estimate grass density in rice crop which can be useful in other crops where grasses are commonly found and are a problem.
- Grass density classification in the

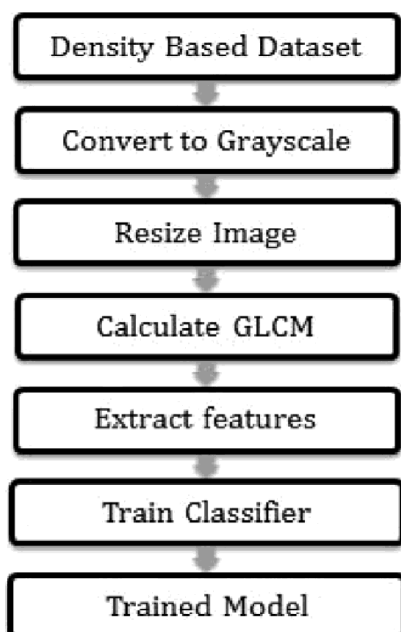
presence of dynamic backgrounds.

IMAGE ACQUISITION

Data set consists of around 100 images extracted from videos captured using mobile phone camera held at an angle of 90 degrees over the rice field. The rice field has rice plants randomly planted with spacing of approximately 15–18 cm apart and the plants are trans-planted using manual method. The height of camera is around 2–4 ft. above ground. The images used for this experimentation are real-time images that are collected from the paddy field. The crops are grown in the Thanjavur region, and the images are captured using the Canon SX730HS 20.3MP digital camera. Around 1000 images are recorded from the crop region, where 600 samples are utilized for training, and 400 samples are used for testing purposes. Thus, the validation ratio is partitioned as 60:40. Then, the images were gathered in the month of December 2020 as it is the specific season for crop cultivation.

RELATED WORK

The detection of weeds and weeds is an important research field (Thompson et al., 1991). We can obtain estimates of weed coverage and distribution across an area through the use of computer vision & image processing techniques. These estimates can then be used as a contribution to the treatment of weeds. An interesting application is to create a sprayer that can spray weedy areas in crops automatically (Kargar and Shirzadifar, 2013; Slaughter et al., 2008). Unpredictable field conditions, dynamic conditions which can affect the data set and differences in lighting conditions are the major challenges associated with this research area (Jeon et al., 2011)



Every growing stage dramatically changes plant

morphology, colour & texture as well as weeds. Most computer-based literature detects different types of weeds found in various pictures such as the classification of the large and narrow sheet weed in an image. A work (Ahmad et al., 2011) has classified weeds as wavelet transforming narrow and wide weeds. This task transformed the wavelet with hair wavelet to level one. Then the average of the top 200 coefficients for detail coefficients will be calculated and a core vector generated as a well trained model will be produced. The distance of every test vector from the central vector is then computed using the Euclidean distance and the picture is classified as narrow or broad leaf Weed based on k-Nearest Neighbour technique. Weiset al. (2009) detects and classifies weeds as monocotyledonous and dicotyledonous weeds into two classes. A total of 80 features, of which seventeen were useful for classifying and grouping using weighted Primary Component Analysis are extracted (PCA). They also used hyper-specific images for the collection of datasets. Simultaneous images are taken and normalized in Red and Infrared (IR). Then, to remove background objects, the difference of two channels is used. Weed classification is based on characteristics such as compactness, moments, curvature, Fourier coefficients etc. Three classes, i.e., species, growth stage and special attribute such as single leaves or overlapping, are specified during controlled clustering. Wheat pictures are used for exercises. Clustering is used to classify images, both monitored and unattended. The proposed weed detection for corn plants and the classification features for Jeon et al. (2011) include plant perimeter, internal plant area, width and short distance height. The precision of classification is determined. Captured with both the moving and the stationary robotic images. Using artificial neural network, weeds are detected (ANN). The recognition of maizes and weeds under different backgrounds is another project (Wu et al. 2009). The cloudy and sunny weather and various backgrounds are used, for example bare soil, corn stalk, dead plants, etc. for data set. The db1 (Daubechies) vector employs a two-level wavelet transform and the energy of the coefficient of the wavelet is calculated in two levels. Then the classification of seven features using the back propagation neural network is based on seven

features, including energy coefficient of the wavelet. Ghazali et al. (2008) have submitted a weed control system that classifies a weed as a large leaf or narrow sheet based on feature extracted from the GLCM, Fast Fourier Transform and Invariant Transform features of the Gray Level Co-occurring Matrix (GLCM) (SIFT). For classification, features such as regularity and GLCM contrast are used. FFT shows an image as a sum of exponential complexities. For two high and low FFT di-months, weeds are classified

Fig 1: Weed density classification using GLCM

feature set

into two types. SIFT is based on Gaussian picture difference. In terms of accuracy, SIFT has carried out the other two techniques. One of the works uses unnecessary plants located between plant lines to detect weeds. The genes for various crops such as maize, sugar beet, wheat, etc., are also included in Gée et al., 2008. The spacing is appropriate between rows. First, rows are detected with the Double Hough Transform (DHT), and then weeds are detected with a blob colour analysis based on the location. This technique cannot be used in fields where row distance between plants is not correct. Huang et al. (2018) proposed a technique which distinguishes grass weeds and rice from UAV images by making use of completely convolutionary web work. This technique does not take account of the localised density of weeds and images of the grade into just rice, weed and other classes. It is also tested during the flowering phase and in the advanced stages of growth. This will lead to better weed control in the early stages of weed growth, as suggested by our technique. An additional technique was developed (Ma and Deng, 2019) to characterize wide leaf weeds and rice crops. This technique was based on a fully convoluted network using the semantic segmentation method. Another work on the detection of weed located in sugar beet (Adel Bakhshipour, 2018) was based on SVM and Fourier descriptors and a set of invariant features based on neural networks. Barrero et al. (2016) proposed an approach based on neural networks to detect weed patches in pictures taken with a drone at 50 metres in height. The classifier includes 9 texture characteristic features containing GLCM and Harlick descriptors along with an ad colour feature (NDI). This method offers poor precision for weeds that look like rice plants like grasses. The most recent work is the classification of vegetation by Chowdhury et al. (2015) based on features derived from local binary patterns, followed by grey level matrix (GLCM). This work classified grass-density images to highlight images which pose a potential fire risk on roadsides. A combined nation of three classifiers (ANN), a neighbour-closest, and a linear vector support system (SVM) were used to act as a voting majority classificatory. Another work close to our techniques is the classification of the broad leaf weed density into three classes (Noor and Khan, 2014). The focus of literature on weed detection is different. The weed detection problem is addressed by the exact positioning angle of weed. In a captured video frame or picture, the weeds density can be estimated and sprayed based on the density of the exact location of the weed.

Weed coverage works are available but the problem of clashing the density of the grasses in rice fields cannot be tackled directly.

EXPERIMENTAL SETUP

Experimentation has been done extensively on system with operating system Microsoft windows-8 64 bit, 4 GB Random Access Memory (RAM), processor 1.70 GHz with core i5-3317 CPU. The proposed technique is implemented in MATLAB 2014 64 bit (MATLAB, 2014). For multiclass SVM. Random Forest implementation is used from open source project (random forest-matlab, 2015) with the classification module.



FIG - A



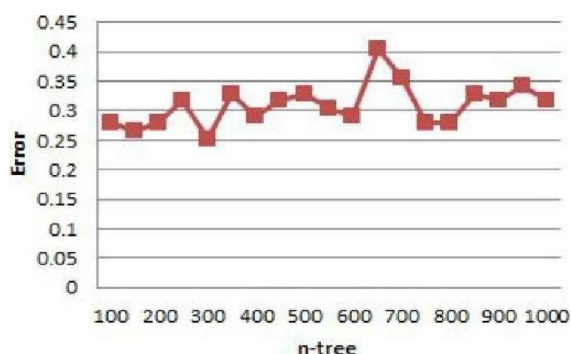
FIG - B

Fig a and Fig b Samples from density based dataset in paddy Field

METHODOLOGY

We developed computer vision algorithms that can classify grass weed in rice into three categories based on their density in each image. The categories are no weed, low weed and high weed. Testing of the developed technique is conducted on images that are captured over rice field. These images are roughly labeled into three classes by manual analysis of weed coverage i.e., ratio of weed size to image size. No weed class contains 0–1% weeds, low weed class has 1–5% weed coverage. The classifiers used are Support Vector Machine (SVM) with linear and RBF kernel and Random Forest. SVM is chosen because it has good generalization capacity and Random Forest because it has less number of hyper parameters that need tuning. Also Random Forest is ensemble learning and that's why it is likely to perform well.

GLCM is a way to define the texture of image using the information of intensity values that are co-occurring spatially. The first step of this algorithm is to convert the colored images into gray scale. It then resizes them to 200 x 200 pixels. These steps are applied to lower the computational cost. Then GLCM is calculated using MATLAB function 'graycomatrix'.



RESULT

Experiments to estimate weed density are conducted with two classifiers separately i.e., SVM and Random Forests and based on two different feature sets i.e., GLCM feature sets and moments feature set. Highest accuracy is achieved with moments feature set using Random Forests classifier. To calculate the accuracy 10-fold

cross validation is used. SVM (Cortes and Vapnik, 1995) is a technique of supervised classification that finds the maximum margin between the two classes with minimal loss of accuracy. For non-separable case slack variable is introduced and penalty C to cater for misclassified points. As C moves towards zero it means that misclassification is less important. It trades off margin width i.e., generalization capacity, with accuracy of SVM model. A larger value of C tends to over fit the data as the margin width decreases. A comparison is then performed to see which technique is more expensive in terms of execution time. Maximum time is taken by Random Forest for GLCM feature set for both training and prediction time. Note that this training time does not involve feature extraction time. The timing for different steps are mentioned.

CONCLUSION

Grasses pose a significant threat to the regular growth of the rice crop. To control such weeds, density-based precision chemical application can be used. Assist farmers in lowering their production costs. We devised two methods that can categorize rice field photos based on the density of grass weeds. First Homogeneity, contrast, correlation, and energy are all GLCM texture properties that are used in this technique. It works best with SVM and the RBF kernel. provides a 82% accuracy. Moments are another technique that is being investigated. Set of features It works best with Random Forest and provides a high level of accuracy. 70 percent of the time. In terms of efficiency, the second technique outperforms the first accuracy.

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IMPACT OF MACHINE AND DEEP LEARNING IN DRUG REPURPOSING

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Abstract - Deep learning has recently received massive attention on many areas of science and technology such as computer games, speech recognition, computer vision, natural language processing, self-driving cars, among others. Conventional Methods of drug discovery is timeconsuming and costlier. Drug repurposing is considered to be a promising method to identify the new drug target interactions for the existing drugs. To reduce the development costs and time, various approaches have suggested for repurposing of drug. In this paper, we are going to discuss about several machine and deep learning approaches used for drug repurposing.

Keywords - PREDICT, Drug repurposing, Signature Matching

INTRODUCTION

Drug repurposing (also called repositioning, recalibration, redistributing, or redefining) is the process of finding alternative applications for a drug that aren't related to its current usage or authorised indication. Drug reuse has gotten a lot of traction in recent years, thanks to drug makers' desire for expense options and the drug development pipeline's low overall success. Drug repurposing will aid in the development of novel treatments for disorders at a lower cost and in a shorter period of time. Although the safety profile of these products has been tested via a clinical research review, medication refurbishing is a successful methodology. A few scholars have studied medication remaking in recent times [12–20]. It's difficult to keep up with the latest advances in various computational approaches in the medicinal drug discovery area, such as which technologies were used and also what proposals are being submitted. Deep learning is a subset of machine learning methods that employs artificial neural networks (ANN) principles. The capacity of deep learning to uniquely learn associations between characteristics and create nonlinear feedback feature vectors [10] using a multilayer stack of neural networks is a massive benefit.

SIGNATURE MATCHING

A few of the statistical methods that will be used is sign comparison, which is based on identifying the distinctive signatures of medication. Chemical structures, transcriptomic (RNA), proteomic or metabolomic results, and negative affect patterns are only a few of the drug signatures [11] that have been properly considered. To evaluate the correlation among drug-disease or drug-drug projections, transcriptomic patterns matching is used [9, 10]. Differentially expressed genes (DEGs) are first tested to determine the drug-disease relation, then medications for a cell line or tissues, and finally DEGs are linked to stable specimens of DEGs.

To see how closely a drug-drug is related to a drug-disease [8] Different types of signatures are considered.

PREDICT [21] employs a logical algorithm to measure the correlations between different medications, diseases, and possible drugs as well as diseases, as well as the relation between these characteristics and new prospective features. By combining the drug similarities system, drugs and disease correlation matrix, and infection similarities matrices under one huge matrix, DRRS [22] considers the lowest point of the major matrix.[60] calculated drug-drug similarities and disease-disease similarity based on biological data.By performing clustering the quality of similarity matrix can be improved.

NeoDTI [23] used a non - linearity paradigm to perform edge learning or projected novel drugs and drug goals by incorporating different knowledge in heterogeneous systems TL-HGBI [24] integrates similarity and correlation data among illnesses, medications, and targeted therapies to infer new therapies for diseases dependent on a diverse channel. DrugNet [25] developed a network-based prioritisation approach to forecast new clinical indications for medications and therapies for diseases. I This approach detects novel drug-disease interactions by spreading data across a heterogeneous system built from all available

disease knowledge. [26] combines miRNA and infection similarities related to the functional similarities of miRNA, disease semantic similarity, or Gaussian interaction profile kernel commonality, and uses inductive matrix completion to determine the relationship between miRNA and disease.

To classify possible novel indications for a given drug, reference [27] suggested MBiRW, which uses several detailed similarity tests and the Bi-Random walk (BiRW) algorithm. Knowledge regarding medication or disease characteristics is combined with established drug-disease interactions, and systematic similarity tests are initially designed to quantify the resemblance between drugs and diseases, which has shown some promise in computational DR and other drug or disease interaction studies [28]–[35]. Any of these approaches [36–37] make assumptions about how drugs and drug targets could interact.

MACHINE LEARNING APPROACH

The network-based method [2], which usually includes details on the relationships between medications, genomes, and diseases, as well as interactions within each group, is another similar technique. According to Hodos et al., reliance on "neighbour pharmacological room" knowledge can limit the ability to discover medications with novel schemes of activities. Another related approach is network-based technique, which typically necessitates knowledge of the relationships among drugs, genomes, and diseases, as well as correlations within each grouping (e.g. drug-drug similarities). It can incorporate multiple sources of data, but it is still limited by the emphasis on a nearby pharmacological area, and adjusting specifications in system design or estimation is often ad hoc [37]. We use a broad structure for reshaping that focuses on various types of learning approaches. We want to let the various algorithms understand the relation between drugs, genes, and disease with their own manner, so we rely less on established drug pathways or the "nearby pharmacological space." Similarity tests are also used in kernel-based ML approaches like support vector machine (SVM). SVM has also been investigated as a promising ML solution for drug repositioning [38], with several promising candidates found. SVM is one of the most successful machine learning approaches for repositioning. We have used more in-depth validation techniques, such as evaluating enhancement for drugs used in drug testing and associations with publication help. Other benefits of ML techniques include the ability to "learn" which aspects to determine for realigning in elevated omics

results, where only a fraction of chromosomes or input attributes are often important, and many ML techniques will "learn" which variants to determine for reconfiguration. In recent days, using ML methods and researching the variable value of gene characteristics has created a new pathway to investigate the pathways of different diseases.

We're especially interested in prescription repositioning for mental health issues because there aren't many new therapies available. While computational drug repositioning has gotten a lot of press lately, compared to other fields like oncology, few studies have focused on mental health issues (except for [39–42]). Psychiatric conditions are the major source of disabilities globally [43], but progress in the discovery of novel pharmacological drugs has been slow in the last 2 years [1]. The complexity of animal studies to completely replicate human psychological disorders often limits the progress of experimental treatments [44]. Drug manufacturers expenditure has been diminishing in general [1], and new approaches to drug discovery are desperately needed in this area. Since depressive and anxious disorders are extremely clinically comorbid [45, 46], have major genetic associations [47], and share common pharmaceutical therapies [48], they are studied together here.

DEEP LEARNING APPROACHES

Deep learning techniques have also been commonly used for this function in recent years. [3–5] demonstrated that convolutional neural networks (CNNs) can effectively learn features in biological/chemical activities. In a prior ability to determine the ATC code of narcotics, CNNs were used, but their precision was poorer as when softmax has been used [6]. Recent new analysis [7] used a CNN to forecast drug ATC codes, but it took a lengthy sequence of technology and clustering. With a feature-based chemogenomics approach, [9] proposed the DSSL-DTI process. Deep semi-supervised learning is a deep learning model that uses semi-supervised learning methods to practice. Un-supervised pre-training and supervised fine-tuning are the two steps of this method. Greedy surface unsupervised pre-training aids in reaching the lowest cost feature value by initialising the initial criteria and serves as a regulator for improving data generalisation capacity [48]. Then, during the training phase, supervised fine tuning is performed to reduce generalization error [49]. [60] developed multimodal framework for improving drug repositioning through drug knowledge graph.

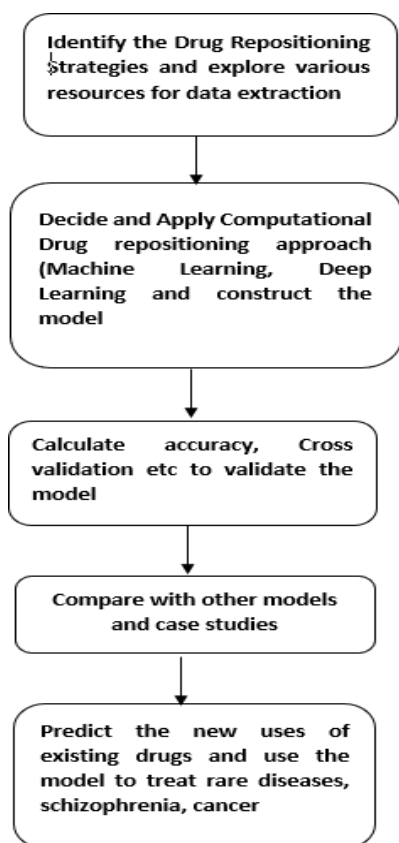


Fig 1. Workflow of Drug Repurposing Studies

Fig 1 depicts the general workflow of drug repurposing studies.[14] To determine whether the interaction is linear or non-linear. DNN is used to determine the most appropriate statistical method for converting inputs to outcomes Auto Encoder is used to discover different feature vectors in order to reconstruct the data. At the preprocessing step, an interface maps inputs into interpretations, and a converter maps interpretations through transcription. The Stacked Autoencoder (SAE) is made up of several stacks of auto - encoders that can train to program unsupervised data efficiently [12]. Deep learning technologies can be used to predict and identify specific units in DNA sequences including replication domains, translation feature linking sites (TFBS), gene deletion sites, promoters, enhancers, and transmission start points, among others. To distinguish different replicate domains types, a hybrid architecture was made by combining a pre-trained DNN and a hidden Markov model [34].

In terms of identification precision and reliability, it outperformed previous approaches significantly.

The correlations of some of the most widely used Deep Learning Frameworks are

summarised in Table 1. The pattern features of prokaryotic and eukaryotic promoters were analysed and predictive models developed using a CNN model in [53]. This research worked well for distinguishing between promoter and non-promoter series. A DNN model [54] was trained to infer the expression of genes involved using the microarray-based GEO dataset.

Deep learning technology has encountered the following challenges in drug appropriating research:

To prevent overfitting, deep learning models need a larger amount of data than standard models. While we use fewer input, the effects of deep learning models are much worse than standard machine learning models Despite the fact that a lot much study has been done and a huge volume of data is generated each year, Deep learning algorithms suffers with inconsistency due to data confidentiality and constraints.

Training variables must go through a sequence of dynamic processes such as forward propagation and back propagation since the structure of a deep learning model includes innumerable parameters. Deep learning model training necessitates a robust computational process. Selection and preparation of models: Since deep learning tech is improving at such a rapid pace, Finding a single paradigm that is appropriate for testing responses to complex problems is not an easy task. A small adjustment in hyperparameters can have a negative impact on the learning process. Even so, the Deep Learning algorithm has shown its efficacy in the area of drug repurposing. Some emerging technology, such as zero-shot learning [55], can help with less data size, to some point, one-shot learning [56] and emergent adversarial networks [57] should overcome it. We may also overcome difficulties in modifying hyperparameters by collaborating with multiple institutions and specialists from various fields. In the field of deep learning and drug repurposing, reinforcement learning [58] and incremental learning [59] are becoming increasingly common. Reinforcing learning is now being used to massively enhance artificial intelligence's capacity to learn on its own. Incremental, practice on the other hand, overcomes the issue of repeated exercise. Up skilling and processing all of the data takes time and takes up space. Consequently, Training time is significantly reduced when incremental learning is used.

Framework	Developed By	Platforms	Advantages
Caffee	Berkley Vision and Learning Center	Linux, MacOS, Windows	1.Fast way to apply DNN (Deep Neural Networks). 2.Good C, C++,Python and MATLAB Interface. 3.Hig Performance with or Without GPU's. 4.Open Source. 5.Suitable for CNN and RNN
Chainer	Preferred Networks in collaborations with IBM,	Cross Platform	1.Python Based Deep Learning Framework. 2.High Performance. 3.Provides number of extended Libraries. 4.Runs on top of NumPy and CuPy. 5.Suitable for,CNN and RNN.
TensorFlow	Google Brain	Linux, MacOS, Windows, Android	1.Supports Python and R Language. 2.Easy to build Machine Learning Models. 3.TensorBoard for Effective Data Visualization 4.Robust Machine Learning Production. 5.Suitable for DNN ,CNN and RNN.
PyTorch	Facebook AI Research, Twitter, Google DeepMind	Linux, MacOS, Windows	1.Lua Programming Language. 2.Easy to learn. 3.Dynamic Computation Graphs. 4. Suitable for DNN ,CNN and RNN.
Keras	Francois Chollet	Linux, MacOS, Windows	1.Runs on top of TF, Theano, CNTF. 2.Easy to use as it has simple API. 3.Highly modular Components. 4.Easily Extensible. 5. Suitable for DNN ,CNN and RNN.
Microsoft CNTK	Microsoft	Linux, Windows, Mac with Docker	1.Python and C++ Interfaces. 2.Scalability Better than Theano and TF. 3.Easy to Train. 4. Suitable for CNN and RNN.
MxNet	CMU,UW and Microsoft	Linux, MacOS, Windows, Android, iOS, Javascript	1.Ability to code in Variety of Coding Languages. 2.High Efficiency, High Productivity and Flexibility. 3.Supports LSTM,RNN,CNN.
DL4j	SkyMind	Linux, MacOS, Windows, Android,	1.Java Library for Deep Learning. 2.Process large volume of data in High Speed. 3.Provides Distributed Computing Framework. 4. Suitable for DNN ,CNN and RNN.
Theano	University of Montreal	Cross Platform	1.Tight Integration with Numpy for computation. 2. Fast Computation. 3.Run on Both CPU and GPU. 4.Suitable for DNN ,CNN and RNN.

Table 1.Comparisons of Deep learning Frameworks

CONCLUSION

Deep learning is unquestionably appropriate for drug repurposing. Deep learning and drug repurposing as a hybrid is a new technology. As a result, we've compiled a summary of related recent research and created a guideline for this subject. We went through some of the deep learning models that are widely used in drug repurposing research and summarised some of the strategies. Furthermore, we explored well-known deep learning models as well as the sequence of utilising deep learning technologies. Our survey would be useful for researchers who are involved in this area to gain a general overview of deep learning. While there are

several drawbacks to deep learning technology's approach to drug repurposing, this is being addressed.

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POWER CONTROL TECHNIQUES IN MULTI-RADIO MULTI- CHANNEL WIRELESS MESH NETWORKS: A SURVEY

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Abstract - The Multi-Radio Multi-Channel Wireless Mesh Networks (MRMC WMNs) are multi-hop networks in which transmission power management plays a pivotal role to reduce the co-channel interference among nodes. To establish the communication link between the longer distance nodes requires high transmission power. But higher transmission power leads to higher co-channel interference and reduces the link capacity. The multi-hop nature of MRMC WMN increases the demand for the higher capacity links as each node has to carry and forward the data towards the destination node. The nodes nearest to the gateway node also carry higher amount of data to transfer data outside the network.

To reduce the co-channel interference, a power control technique is highly required. The power control technique should restrict the transmission range of node up to their neighbor nodes. The controlled transmission power minimizes the co-channel interference and improves the network performance. In this paper, several mechanisms proposed by numerous authors have been studied that focused on the power control techniques to control the transmission power of each node.

Keywords—Multi-Radio Multi-Channel Wireless Mesh Networks, Power Control, Co-Channel Interference, MAC, Transmission Range.

INTRODUCTION

Wireless Local Area Network (WLAN) is a network in which all the devices are connected and communicated with each other wirelessly. Because the wireless signals are broadcast in nature so every user can share the same signals and covers a large area ranging from a small office to a large building [13]. WLAN is categorized in various standards such as IEEE 802.11a, 802.11b, 802.11g, 802.11n and 802.11s. These standards have their own advantages and disadvantages. Wireless network works based on ad-hoc and infrastructure modes. In ad-hoc mode, all the devices communicate with each other in a peer-to-peer manner. Ad-hoc network is a wireless communication network that is established using wireless interface equipped mobile nodes [26]. Whereas, in infrastructure mode an access point acts as the central device that forwards traffic towards other nodes. WLAN is supported by a number of transmission, modulation and channel assignment techniques. These techniques address the physical characteristics of the wireless network and channel properties. Wireless Mesh Network supports next-generation wireless communication systems to deliver

reliable services. All the devices in a Wireless Mesh Network (WMN) acts as mesh nodes and remain connected with other meshnodes as show in Fig.1. WMN is a multi-hop network because each mesh node communicates with other nodes through multiple hops and forward data on the behalf of other nodes [8]. Certain mesh routers have routing capability to forward the data towards neighbor nodes [14]. Mesh clients are connected with mesh routers through the wireless links to access the network services [4]. Mesh clients are mostly mobile nodes, which typically run on batteries. Thus, the power usage of mesh clients should be minimum. This can be achieved by reducing the radio functions e.g. single wireless interface, low antenna gain and low computational complexity.

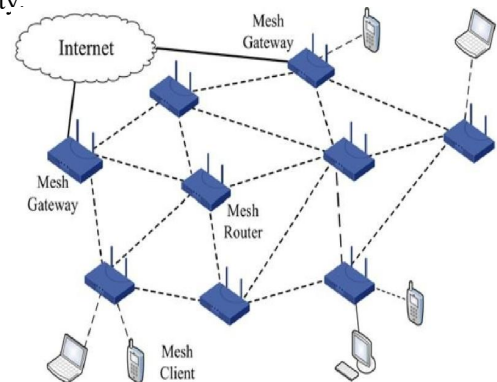


Fig.1. Wireless Mesh Network [14]

WMN architecture is a highly dynamic and cost-effective architecture that provides high speed and higher bandwidth network over a specific coverage area. WMN architecture maintains better signal strength by breaking long links into a series of shorter hops. Intermediate nodes in the network not only improve the signal quality but also make routing decisions. Mesh routers and gateway nodes are static in nature and form a wireless mesh backbone. Gateway nodes are connected with the wired network to provide the network services. Wireless mesh backbone plays an important role in data transmission to/from gateway nodes and has much impact on the Quality of Service [31]. WMN is classified based on the connectivity types e.g. Point to Point, Point to Multi-Point and Multi-Point to Multi-Point networks [22]. The transmission power determines the range of radio signal as shown in Fig.2, where a receiver can easily receive the signal. It is an important issue in wireless networks that affects the network performance and battery equipped devices [18]. Power control is a useful technique for controlling the transmission power of each mesh node. The main aim of a power control is to minimize the co-channel in-

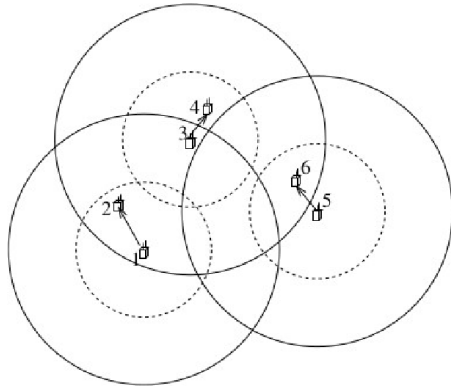


Fig.2. Transmissions and interference ranges [25]

In MRMC WMNs, higher transmission power not only increase interference but also degrades channel reuse. Mesh nodes use the minimum transmission power required to maintain connectivity with their immediate neighbor nodes. This leads to multi-hop communication instead of long direct links and results in lower interference in the network.

Power control is also useful to reduce the energy consumption of the network. The energy consumed by the power amplifier of the network interface card is directly proportional to the power of the transmitted signal, therefore it is necessary to control the signal transmission power in order to reduce the energy consumption of each node. The transmission power determines that who can receive the signals, so reducing the transmission power can adversely impact the connectivity of the network due to the reduction in the number of active links and partitioning of the network [12]. Thus, power control affects the network topology and routing protocol in the network.

The network with six nodes and three wireless links has been shown in Fig.3. For each node, interference range is represented by the outer circle and transmission range is represented by the inner circle [25]. If two nodes are within transmission range they can transfer data to each other. If transmission range is more than required level and nodes are using the same channel, interference will take place. The nodes 1 & 2 and nodes 3 & 4 are in the interference range of each other as shown in Fig.3, because they are operating on the same channel. This co-channel interference reduces the link capacity as well as the network performance. By controlling the transmission power to the desired level, interference can be reduced resulting in better network performance.

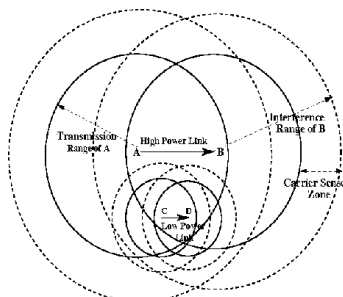


Fig.3. Interference among nodes [24]

The interference generated by the higher transmission range link between nodes A & B has been shown in Fig.3. Nodes A & B uses the higher transmission power in order to communicate to each other while nodes C & D uses the lower transmission power to transmit the data. If these nodes are operating on the same channels and node A transmits the data to node B, it interfere the link of nodes C & D [24]. Interference generated by nodes A & B reduces the link capacity between nodes C & D and affects the data communication of nodes C & D. In this case the transmission power of nodes A & B should be restricted up to these nodes only so that the link between nodes C & D is not disturbed.

Transmission power control gives the freedom in the designing of wireless networks in a flexible manner. In MRMC WMN, power control helps to manage following network functions.

A. Interference management:

In the wireless networks, signals interfere with each other due to their broadcast nature. The problem of interference becomes serious in interference-limited networks, such as CDMA based networks, where perfect orthogonal channels among users are difficult to assign. In this case, power control helps to minimize the interference and achieves efficient spectral reuse.

B. Energy management

Energy management plays an important role in extending the lifetime of nodes and for the better functioning of the network. Due to the limited power resources in mobile nodes, handheld devices and any other nodes operating on small power resources, network exists for a limited time period. Power control helps in minimizing the energy consumption for every node in the network and extends the life of the network.

C. Connectivity management

Due to uncertainty and time discrepancy of wireless channels, even in the absence of signal interference and energy limitation, the receiver node needs to maintain a minimum level of received signal strength so that node can stay connected with the transmitter node. Power control helps to maintain the link connectivity between network nodes for reliable communication.

Over the last decade, researchers have evaluated the performance of MRMC-WMN from the perspective of power control algorithms. These power control algorithms worked based on the unique constraints and dynamics for MRMC WMNs. Furthermore, the scalability of the network with dynamic wireless conditions made the task more challenging. A number of power control algorithms with different parameters have been studied in this paper for the performance enhancement of the MRMC-WMN.

EFFECTS OF POWER CONTROL

The power control decides the performance of medium access control because the channel reuse depends on the number of interfering nodes [11].

The appropriate selection of power level maintains the

connectivity among the network nodes and consequently power control ensures packet delivery to its destination.

The selection of power level affects the capacity of each link and the network throughput.

Power control also affects the network structure, which further has the cascading effect on the number of hops and end-to-end delay.

In a multi-hop wireless network, power control is a challenging task because it directly affects upper layers and scheduling. It is an important mechanism to increase the capacity of WMNs since it has a direct impact on reducing interference in wireless networks. Moreover, designing an efficient algorithm that dynamically controls the transmission power and consumes only required amount of energy is an important issue to be resolved.

CLASSIFICATION OF POWER CONTROL TECHNIQUES

Power control techniques are classified as static power control and dynamic power control.

A. Static Power Control

In Static power control, a fixed transmission power is assigned to each interface to transfer and receive data in the network. Transmission power remains the same during communication and can change only at the time of configuration [21]. Static power control is not applicable in the dense network because static power control can lead towards interference among nodes and degrades the performance.

B. Dynamic Power Control

Dynamic power control periodically changes the transmission power of node to meet the network requirements. It measures the network conditions and adjusts the transmission power of each node as per the requirements [19]. It gains benefit over static power control that it minimizes the interference in the network and improves the network performance. The implementation of dynamic power control is a challenging task because it depends on real time network conditions and these conditions change very rapidly.

POWER CONTROL TECHNIQUES

In [7] author proposed a simple transmission formula for a radio device to transmit and receive signals in free space. Author derived the effective area of an antenna which is used for receiving linearly polarized and plane electromagnetic waves. The paper finds the suitability of the formula for transmission calculations, having several meter long wavelengths. This formula is essential in the analysis and design of wireless communication systems. Authors in [23] implemented transmit power control approach for Ad-hoc 802.11b wireless networks. The design goal of this approach is to achieve adaptation to mobility, power efficiency, application transparency, band-

width efficiency, incremental deployment, and compatibility with many wireless standards. The decision taken by this approach to reset the optimal transmit power on a per event basis proved to be more bandwidth efficient than the existing approaches of resetting the transmit power on every packet basis.

An Interference Aware Topology Control Channel Assignment algorithm has been developed in [28] to assign least interference channel in the network. This algorithm identifies the least potential interference for every node. This algorithm uses the fixed transmission power which obtains the fixed interference range as shown in the Fig. 4. In Fig. 4 R represents the interference range of node B, due to the fixed transmission power interference range of node A is also equal to the node B.

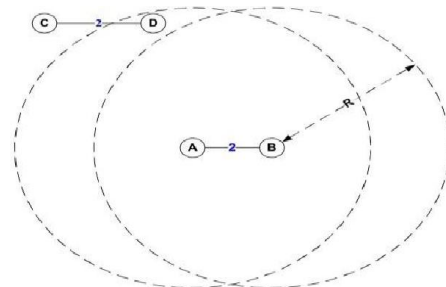


Fig.4. Interference range of nodes [28]

The algorithm using binary search finds the smallest least potential interference link and assigns the channel. It ensures that the assigned channel generates minimum co-channel interference among other nodes. Simulation results are obtained based on different parameters such as network size, number of available non-overlapping channels, number of NICs per node and channel capacity. The results depict better performance of this algorithm in term of blocking ratio as compared to Optimal BAR algorithm, Maximum Bottleneck Capacity Path heuristic and Common Channel Assignment algorithm.

In [29] authors proposed an Efficient Power Control algorithm for wireless sensor networks. Firstly, by using the RTS, CTS, DATA, and ACK frames, the proposed algorithm identifies the minimum required power level. Secondly, a power control table is created and periodically updated by the proposed algorithm. While reducing the power consumption, the proposed algorithm tends to avoid the collision in the network. Simulation results demonstrate that the proposed algorithm reduces power consumption by (20-30)% as compared to Local Mean Algorithm. Authors in [2] analyzed the effect of controlling the transmission power of each node and the data rate of each wireless links on the efficiency of the channel assignment. Authors described that a minimum power level must be decided for each node to maintain connectivity among nodes. Authors proposed a new channel, power and rate assignment algorithm and showed that it outperformed the previous proposals. In [25] authors investigated the power control technique to control the transmission power of each node in the network so that network performance can be optimized. Authors proposed a formal mathematical model for joint scheduling, routing and power control based on the branch-and-bound framework and convex hull relaxation.

The numerical results show the efficacy of the proposed solution and offer insights on the behavior of per-node based power control. A Two-phase Mixed Distributed/Centralized Power Control algorithm has been proposed in [10]. Firstly, a distributed power updating process is applied to maximize the coverage of the network. Secondly, the centralized channel assignment algorithm is applied to improve the network throughput. Numerical results show that the proposed algorithm performs better as compared to the existing algorithms in terms of downlink throughput and uplink throughput. Authors in [16] investigated how optimal throughput is affected with changes in power control. It has been observed that the availability of two power levels yield better performance as compared to only one power level. Authors develop an efficient computational tool using column generation with greedy pricing that allows computing the significant power levels for each node in the network. It shows 20% improvement in throughput as compared to a single power level throughput.

In [5] authors proposed Adaptive Power Control method that controls the transmission power based on the neighbor node's active links. The aim of power control method is to save the energy and to improve the network capacity. By controlling the transmit power, it affects the signal quality and decides that which neighboring nodes can receive the data. Simulation results prove that the proposed method improves the network throughput by 30% as compared to the IEEE 802.11 standard MAC in a grid topology. Authors in [3] proposed a new Channel, Power and Rate assignment algorithm for Multi-Radio Wireless Mesh Networks. Authors analyzed the effect of controlling the transmission power and rate of each link. This algorithm computes the total utilization of link and assigns a new channel to fulfill the flow requirement of the link. The proposed algorithm has been compared with FCRA algorithm, LACA and BSCA and found that the proposed algorithm performs better in terms of flow rates. In [14] authors argued that topology control, power control, channel assignment and routing functions are interlinked with each other. Authors present an overview of existing topology control techniques used by various authors. The Joint optimization approach for topology control, power control, channel assignment and routing has the advantages to enhance network performance in terms of throughput, interference, link connectivity, and fairness. The joint Channel Assignment and Flow Allocation algorithm has been proposed in [1] for MRMC WMNs. Proposed algorithm takes into consideration several important network parameters for channel assignment such as traffic load, path loss information, the signal to interference plus noise ratio and transmission power of each node. Results indicate the superior outcome in terms of throughput and network delay as compared to prior algorithms. In [30] author investigated the relationship between physical transmission power and network capacity in MRMC WMNs to formulate the joint channel assignment and routing problem. It is seen that the lower transmission power is able to utilize available channels more effectively due to the higher degree of freedom in channel assignment. Numerical results show that due to lower transmission power, network has

higher link capacity and better connectivity among nodes. Authors in [11] deduced the quantitative result of the per-node average throughput capacity of Cognitive Wireless Mesh Network with power control. Authors derived the per-node average throughput capacity of network based on two topologies i.e. square topology and triangle topology. Simulation results show that the link capacity with per-node power control is better than the other power control methods.

In [9] authors proposed joint channel allocation and power control algorithm for multi-channel network. Based on power control and interaction among allocated channels, lower energy consumption and lower interference channel has been selected. Virtual game playing technique reduces the cost of energy consumption by avoiding redundant information transfer. It also decreases the interference in the network and improves the execution complexity of the algorithm. Simulation experiments depict fair channel allocation and better convergence characteristics of the proposed power control algorithm. A routing algorithm with Power Control and Channel Assignment has been introduced in [15] for MRMC-WMNs to obtain minimum flow rate in the network. Based on the physical interference and Shannon capacity models, this algorithm considers available channels and power levels for routing metric. The proposed algorithm applies genetic algorithm to enhance the network performance. Simulation results show that the proposed algorithm performs better as compared to the existing algorithm in terms of fairness ratio and network throughput. In [20] authors proposed a joint Scheduling, Power Control and Routing algorithm and discussed the benefit of enabling continuous power control. Using a regular power control for each node in the network is advocated for better network capacity, lower spatial reuse and better network throughput. Authors compared the fixed power algorithm with variable power control algorithm and found that in fixed power algorithm, high transmission power coupled with high energy consumption that leads to higher capacity.

Authors in [27] focused on the interplay between the channel assignment, multi-path routing and power control while considering the physical interference model. Authors carried out an extensive number of experiments to investigate the impact of several network parameters such as offered loads, radio patterns and network density on the performance of the network. The obtained results show that a substantial saving of spectrum can be achieved by enabling parallel transmissions that carry heavy data traffic. In [8] authors summarized that to prevent interference among nodes some kind of power control is still required. As the power level of transmitting node is increased, a better signal strength is observed at the destination node. But the similar improvement in signal strength is also observed at the unintended nodes, resulting in additional interference. Therefore, in the SINR model, power levels must be selected very carefully. Two Concurrent Transmissions based award-winning protocols RedFixHop and BigBangBus have been designed in [17]. RedFixHop is the first protocol using the concept of disseminating information with concurrent packet acknowledgments, while BigBangBus proposes the novel

usage of longer preambles to decrease the BER introduced by the Concurrent Transmissions. Both protocols have been tested in multiple competitions, repeatedly beating state-of-the-art solutions in terms of energy efficiency, reliability and end-to-end latency. In [32] authors proposed a technique for dynamic transmission power for wireless mesh networks using supervised and semi-supervised learning. Authors described that first node of a mesh network will receive a set of transmission power metrics indicative of network conditions between second node of the mesh network and a plurality of child nodes associated with the second node. The first node will provide the set of transmission power metrics as input to a supervised machine learning process that probabilistically determines one or more minimum transmission power thresholds for nodes of the mesh network. The first node will obtain an output from the supervised machine learning process comprising an indication of a particular minimum transmission power threshold for the second node. The first node will control the second node to exchange packets with the plurality of child nodes using the particular minimum transmission power threshold.

CONCLUSION

The Multi-Radio Multi-Channel Wireless Mesh Networks (MRMC WMNs) are multi-hop networks in which transmission power management plays a pivotal role to reduce the co-channel interference among nodes. To establish the communication link between the longer distance nodes requires high transmission power. But higher transmission power leads to higher co-channel interference and reduces the link capacity. The multi-hop nature of MRMC WMN increases the demand for the higher capacity links as each node has to carry and forward the data towards the destination node. The nodes nearest to the gateway node also carry higher amount of data to transfer data outside the network.

To reduce the co-channel interference, a power control technique is highly required. The power control technique should restrict the transmission range of node up to their neighbor nodes. The controlled transmission power minimizes the co-channel interference and improves the network performance. In this paper, several mechanisms proposed by numerous authors have been discussed that focused on the power control techniques to control the transmission power of each node.

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PRIVATE CLOUD HOSTING FOR GCEB

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Abstract - Today Cloud Computing is the emerging Technology in IT Industries. Cloud computing is based on the Internet has most powerful architecture of computation. It recognized of a compilation of integrated and networked hardware, software and internet infrastructure. It has extend version of various grid computing and other computing. In this project, we have given a brief of evaluation of cloud computing by reviewing more than 30 articles on cloud computing and hosting. The outcome of this project the face of the IT industries before and after the cloud computing. Cloud hosting makes applications and websites accessible using cloud resources from anywhere and anytime. The traditional hosting,solutions are not deployed on a single server. The network of connected virtual and physical cloud servers hosts the application or website, ensuring greater flexibility and scalability.The centralized approach to administration aids both the service provider and users in defining, delivering, and tracking SLAs automatically on the web. Most cloud hosting services are provided through an easy access, web based user interface for any software, hardware, and service requests, which are instantaneously delivered. The software and hardware updates canhappened automatically.

INTRODUCTION

Collection of networks. The user can use the moderate of cloud computing boundlessly whenever demanded. Instead of setting up their own physical infrastructure, with required OS and Software's, the users ordinarily prefer the mediator provider for the service of the internet in cloud computing. The users

have to pay only for the used services. The workload can be shifted to various computing device reduce the workload in cloud computing. A load of service is handled by the networks which forms the cloud that's why the load on local computers is not heavy while running an application. So the required amount of hardware and software at the user side is decreased. We required to have a web browser to use cloud computing. We required to have a web browser like chrome to use cloud computing. Following are the key features of cloud computing:

- Resource Pooling and Elasticity
- Self-Service and On-Demand Services
- Pricing
- Quality of Service

Services offered by cloud computing that are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

The examples of cloud computing which are used by general people in day to day life are Facebook, YouTube, Dropbox, and Gmail etc. The cloud computing offer the scalability, flexibility, agility, and simplicity that's why its use is rapidly increasing in the enterprises services.

Components Of Cloud Computing

- Client Computers:

The end user can interact with the cloud using the client computers.

- Distributed Servers:

The servers are in different geographical places but acts like they as working with each other.

- Datacenters:

Data centers are the compilation of servers.

Services Of Cloud Computing

Software as a Service (SaaS):

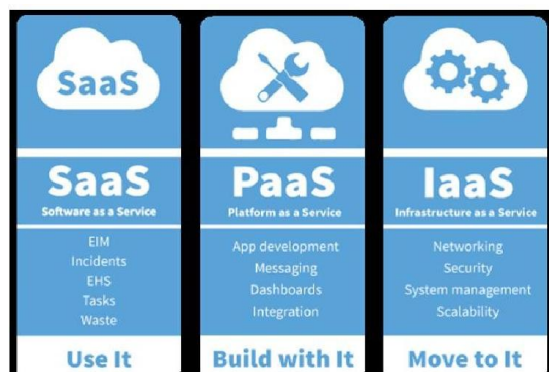
The way of carrying application as a service on the internet is known as software as a service. The place of installing the software on his computer, the user can simply access it via the internet. It making the user free from manage the complex software and hardware. The SaaS users do not need to buy any additional software or hardware, maintain, and update. The only thing user must have a good internet connection and then access to the application is very easy. Example, Microsoft Office 365, Google Apps etc.

Platform as a Service (PaaS):

A development environment and platform is given to the consumers as a service in PaaS, upon which user can deploy their own software and coding. The customer has the liberty to construct his own applications that can run on the 6 provider's infrastructure. A service providers offered a predefined composition of operating system and application server to obtain the management capacity of the applications. For ex, LAMP, Linux, Apache, MySQL, and PHP , J2EE, Ruby etc.

Infrastructure as a Service (IaaS):

Computing resources are provided by the IaaS in the form of storage, network, operating system, hardware, and storage devices on demand. IaaS users can access the services using a world wide area network, such as the internet. For example, a user can create and deploy the virtual machines by login to the IaaS platform.



Types Of Cloud Computing

Public Cloud:

The public cloud is the computing service supplied by the third party providers at the public internet. These services are available for any user at any time who wants to use them and they have to pay only for the services they consumed.

Private Cloud:

The computing services provider over the internet and private network come under the private cloud and these services are offered only to the selected persons in place of common people. A higher security and privacy is delegated by private cloud through the firewall and internal hosting.

Hybrid Cloud:

Hybrid cloud is combination of public cloud and private cloud. In the hybrid cloud, each cloud can managed by independently but data and applications can be shared among the clouds in the hybrid cloud.

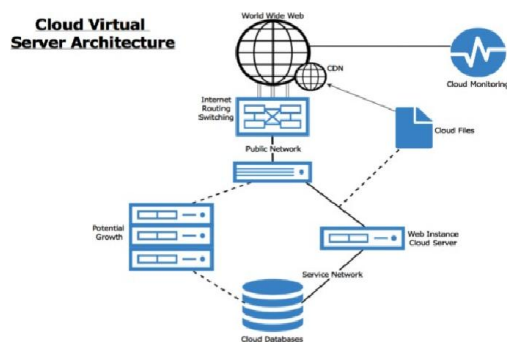
Cloud Hosting

Cloud hosting is provider of computing resources from a cloud computing provider or facility to host data, services and/or solutions. Cloud hosting is an Infrastructure as a Service (IaaS) cloud delivery model that provides a suite of remote and virtual services. This delivered on an on-demand basis and hosted on top of a cloud computing infrastructure. Cloud hosting referred primarily to the use of virtual hardware, network, storage and composite solutions from a cloud vendor. It is enabled through virtualization, whereby the entire computing capacity of an infrastructure or datacenter is distributed and delivered to multiple users simultaneously. The user underlying infrastructure to host its own applications, services and data. For example, a physical server can be virtualized and consolidated to host several cloud servers, all sharing the processor, memory, storage, network and other resources. Cloud hosting provides flexibility in scaling hosted resources. The cloud hosting may also combine the capacity of several servers to provide a single cloud hosted server. The example of cloud hosted solutions are cloud servers, cloud desktops, cloud storage and more.

Virtual Hosting

Virtual hosting is the act of using a remote hosting service provider to host websites, data, applications and/or services. Virtual hosting enables the IT services and solutions that can be deployed, hosted and executed from the remote server or computing facility, where the backend infrastructure is completely managed by the provider.

Virtual hosting is also known as Web hosting. Virtual hosting is a broad term that incorporates a lot of different hosting services and solutions. Virtual hosting generally allows multiple IT appliances, such as websites and applications, to share a single Web server. Traditionally, virtual hosting was limited only to website hosting, where websites were hosted and executed from a hosting service provider. However, with the advent of cloud computing and other managed services, virtual hosting now includes other solutions, such as virtual server hosting, virtual application hosting, virtual storage hosting and/or entire virtual data center hosting.



Power On The Gceb Cloud

1. Power On VM's
2. Creating users
3. Updating users
4. Create catalogue
- 5) Create new virtual machine
 - i) Install required software
 - ii) Convert the VM to Template
 - iii) Deploy the Template And Publish
5. Student Request
6. Staff Approval

Power On Vm's

Switch on the cloud server and storage wait few minutes. Then turn on another pc with LAN connectivity and open the command prompt check the connection with cloud server type ping 192.168.0.223 the reply is successful then proceed the next steps otherwise check the connectivity of cloud server, storage, system if any problem in connectivity check cable connected with server and connection port and system with connected port then again try the ping test with server if not connected replace with new LAN cable then try the ping test.

```
Microsoft Windows [Version 10.0.18362.1013]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\user>ping 192.168.0.223

Pinging 192.168.0.223 with 32 bytes of data:
Reply from 192.168.0.223: bytes=32 time=1ms TTL=64
Reply from 192.168.0.223: bytes=32 time=1ms TTL=64
Reply from 192.168.0.223: bytes=32 time=1ms TTL=64
Reply from 192.168.0.223: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.0.223:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

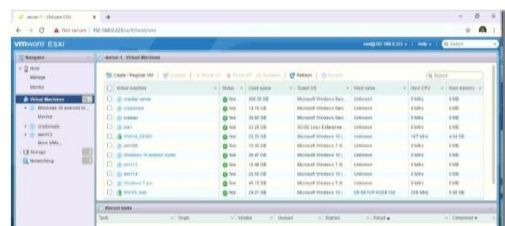
C:\Users\user>
```

The ping test is completed successfully open the browser type 192.168.0.223 hit ENTER the login page of VMware sever use username and login to the server. If any privacy error you got then click the advance button click on the proceed to 192.168.0.223(unsafe) then use the username and password login to the server.

After login in the server click the Virtual Machines Select and Power on the following VM's

1. vcenter domain,
2. vradomain,
3. vraiaas,
4. vra1

Click the refresh button know VM's status



Creating Users

Login or take remote to vra domain (192.168.0.225) Search Active directory user and computers>>select create new user or new group. Give the first name and last name, username then click next .Unselect the user must change password at next logon select the user cannot change the password and click next finalize and click finish.

Updating User

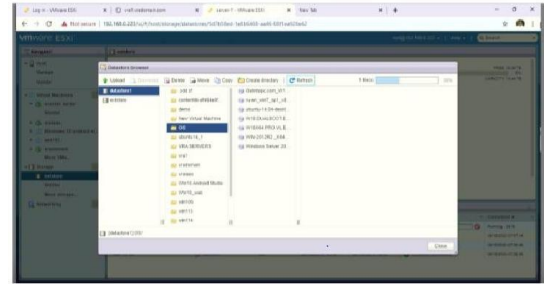
Creating user successfully must the user add in to the group MBU-admin and update group use gpupdate command in run window. Open the MBU-admin click members

You will see members in the group. Click add button>>Advance>> Click find now option then select the user will add to the group and click ok. Click ok the user added into the group . Open run window type gpupdate click ok . The modifications updated successfully.

Create New Vm's

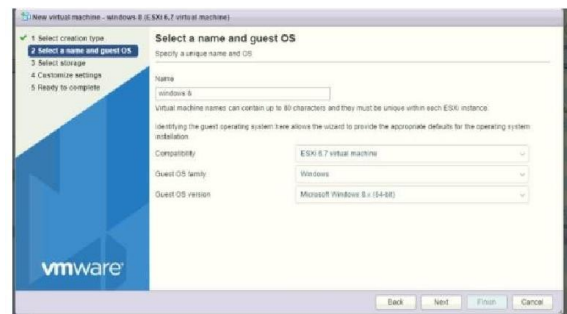
We can create any type of platform in the cloud machine load required OS in ISO format to datastore 1(storage) using LAN sharing. Login to the VSphere(ESXI) 192.168.0.223 and click storage.

Select the datastore browser browse file in the folder os. Click upload select file. Click the refresh button know the status file upload finished. Successfully the ISO file uploaded on the datastore then follow the next procedures.



Right Click on the Virtual Machines select Create/Register VM.

Select create a new virtual machine and click next Give the name to the virtual machine and select the OS family (like windows,mac,linux) then select the OS version click next.



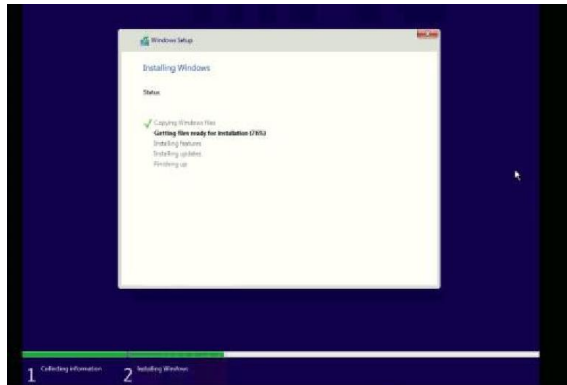
Select the datastore1 and click next



Set the no of CPU and RAM capacity, Hard Disk capacity. Click the hard disk drive select the thin provisioned.

Click the CD drive option select datastore1 select required OS file.

Ensure the CD drive connect at power on Then click next and check once again hit finish your vm is ready select your vm and power on the machine.



Press any key for boot from cd drive then normally OS installation process

Format disk and click next the installation continues. After complete installation open the control panel turn off the windows firewall and windows update. Click advance option ensure the update options OFF. Allow the remote connections Go to system properties>>Remote settings>>allow remote connections

Install Software In The Vm

Set the IP address connect the internet download the software and install or browse the local shared files then install required software. Control panel >>Network and Internet>>Network and Sharing Center>>Change adapter settings>>double click the Ethernet go to properties select TCP/IP version 4 and Set the IP Address (ask your network admin). Open RUN window type shared system id address browse the required files.

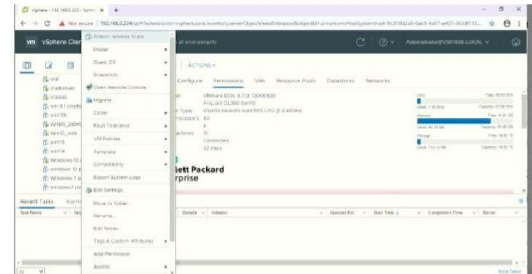
Browse the file from 192.168.0.74 copy and paste your VM the run the setup file.

Vm To Template

After complete the installation remove IP address power off the VM then open Vsphere (192.168.0.224) open Vsphere client.

Login to the Vsphere sever select the datacenter (192.168.0.223) select the VM and right click on the VM select clone>>clone to template.

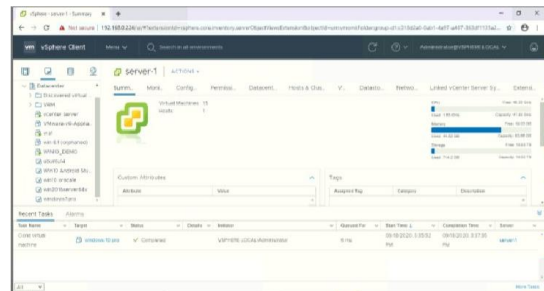
Give the template name select the location (server 1>>datacenter) click next



Select the computing resource (192.168.0.223) click next

Select the storage datastore 1and select thin provisioned click next. Preview the settings and click finish wait few minutes complete the process.

After complete the process click Home>>VM and Templates you will see the template it's ready.



Deploy The Template And Publish:

Login to the vra domain as staff

Click on infrastructure>>computing resources>>192.168.0.223>>inventory>>refresh

Click design new>>give the name>>description>>ok
General: ID: windows 10 pro (based on user convenient) Machine prefix: win (to identify it's a windows or linux) Build: Action: clone
Workflow: clone Clone from: windows 10 oracle template (desired template name) Machine Resource: Preview the details and save then click finish select new catalogue and publish.

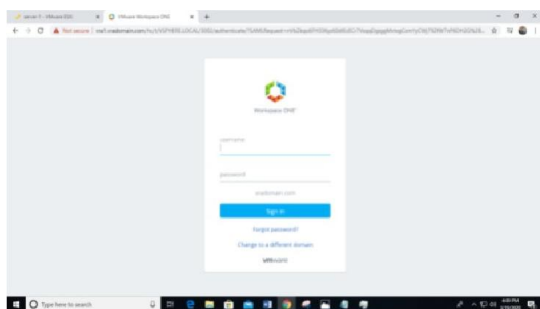
Display in Catalogue Click Administrator>>catalogue>>entitlement>>cloud Iaas entitlement>>item & approval>>entitled items>>add item>>apply policy>>click show all >>select staff approval. After the entitlement>>catalogue item>>select template (windows 10 oracle) >>set icon>>services select (must select Iaas service) >>ok>>done.

User Request

User should be set the DNS (192.168.0.225) in the IP properties. Open the browser type <https://vra1.vradomain.com>

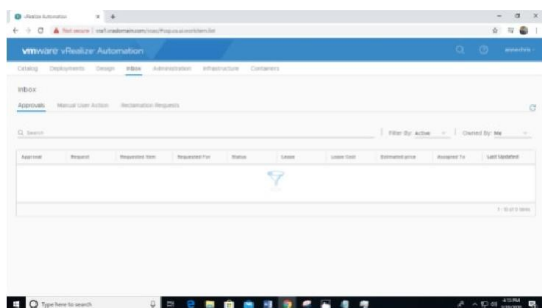
Login with username and password the list of items display in the catalogue user can request to use any system wait for approval after go to deployments power on use it.

Connect the remote console.



Staff Approval:

Staff login to the vra domain and check the inbox for request from users staff approve or reject with comment.



User after complete their needs destroy their machines free up the memory space or admin can destroy machine. One user get the approval before destroy the virtual machine would be active state.

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REAL-TIME FACIAL EXPRESSION AND EMOTION RECOGNITION USING CUSTOMIZED CNN MODEL

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Abstract - Recognition of the gesture is a technology that involves sensors to scan and read hand gestures. When both a gesture and a face expression are done, the audience has more insight and may respond properly. Gestures may be strongly related to the social circumstances, whilst facial expressions appear to be associated with the emotional state of being. Recognition of facial expression plays a major part in the transmission of human emotions and intentions. Deep learning has gained a lot of user's attention in the field of image classification. Emotions are used for not only diagnosis of the human brain but also used as a recommendation system to assist users in assisting the situation and responding to it. This motivated us to develop a system that can effectively and efficiently recognize emotions from the facial expressions of the user. In this proposed article, we try to develop an application that can be used for the prediction of expressions for both still images and real-time video. However, in both cases, we have to provide an image to the model. The model will generate seven probability values corresponding to seven different expressions. The highest probability value to the corresponding expression will be the predicted expression for the image. We have conducted experiments on the FER_2013 Data set, which we collected from the KAGGLE website.

Key Words - Emotion Detection, KAGGLE, HAAR Cascade, Recommended Systems, Psychology, Facial Expressions.

INTRODUCTION

In general, for effective communication, there are two main powerful tools like human emotion and facial expression. Facial expression is one of the main tools which is very expressive. Although we know that the linguistic component of any message contains only eight percent of valuable information, which is having an effect on the original message, whereas the tone or audio indicates more than forty percent of signal and the remaining in turn signified or portrayed fifty-six percent of the total message [1]. Nowadays, it is becoming a challenging task to identify or detect facial features in the fields of video surveillance cameras or image cameras, biometrics, and a lot more. There are nearly seven basic emotions in the universe to detect the current emotion of human beings, namely neutral, angry, disgust, fear, happy, sad, and surprise, and these basic emotions can be recognized from human facial expressions [2]. In general, solving the problem of recognizing facial features is a very complex job because each and every individual has several facial features when compared with one person to other people.

In general, there are a lot of factors that influence the

features like physical characteristics, sex, genes, and age. In the real-world environment, there are many factors that have to be taken emotion recognition system. The main step for any face processing system is the ability to classify the face accurately and then try to detect the emotion [3] from that facial expression. This system needs to work in any environment like dark light, bright light, moonlight, sunlight, face with spectacles, presence of mustache, presence of beard, without beard and presence of facial hair, etc. [4]-[7]. These are some problems that the system should be able to overcome to create an ideal system. A general emotion detection system has four stages of process flows:

- 1) Face Detection
- 2) Preprocessing
- 3) Feature Extraction and
- 4) Emotion Recognition

The system is going to identify the emotions collected from an input image, and initially, we try to load the input dataset, which contains a set of images. All the images are given to the system for training purposes, and once the images are loaded into the application, they are preprocessed, and features are extracted [8]. All the features are extracted and kept ready for classification of the input image. If any user wishes to find out the emotion, he needs to load the image either through webcam, or he can browse for an image and then try to train with already pre-loaded images, and now after classification is done, emotion is detected. During the process of emotion detection, the accuracy of emotion depends on the quality of the image and factors which are influenced by emotion detection. If the image is clear and having a bright appearance, then the emotion will be accurately detected, and if the input contains any noise or factors which affect the image recognition, then emotion may not be accurate [9].

In this current article, we try to use the ability of deep learning algorithms or models to detect the emotion of humans and try to find out the inner feeling of the human based on emotions [10]. In current days there was a lot of deep learning work which is going on for image classification. One of the best models is Convolutional neural networks (CNNs) which are proposed by Yann LeCun in 1988 [11]. This model is mostly applied to all types of image classification, recognition, and image segmentation. The CNN is mainly built on the top of artificial neurons and consists of hierarchical multiply hidden layers. The proposed CNN model takes input as a sample image either collected from web camera or from the video sequence and then multiply weight, add bias and then apply activation function. In this proposed article, we try to use some pre-trained CNN models like the Inception V3 model, VGG19 Model, RESNET 50, and Customized CNN model for finding the accuracy [12]-[15]. In the end, we try to find out the different accuracy for every individual CNN model, and our proposed customized CNN model gives more accuracy compared with

several pre-trained models, which are present in the deep learning literature.

LITERATURE SURVEY

In this chapter, we'll go over the research that went into proving the efficacy of our suggested strategy. In the software process, a survey of literature is a necessary stage. We discovered that Neural Networks are the best since they are economical and less sophisticated than other approaches [1] after reading a few publications. The architecture is determined by a number of elements, including the method used. Furthermore, the validation accuracy varies between 40 and 50 percent in most publications with three to five phrases. Various methods such as electroencephalography (EEG) [7], galvanic skin response (GSR), speech analysis, photoplethysmogram (PPG) signal, Rough Contour Estimation Routine (RCER) technique for extracting features from a human face such as eyebrows, eyes, and mouth with the help of Point Contour Detection Method (PCDM) [16] have been used in a few papers to enhance and identify the pinpoint accuracy of eye and mouth. In another article, the authors try to find new ways to see the basic movements of facial muscles, such as Action Units (AU)[17], a hybrid model using a feed-forward neural network, and Naive Bayesian. [2], a sparse autoencoder [8] is used, but complex. Accuracy can be improved by using the correct hardware settings. From a literature review, we conclude that there are many opportunities to improve precision and representation without using hardware adjustments to better run software models. **PROPOSED SYSTEM**

The goal of this project is to create a software that can anticipate emotions from still photos and video in real time. In order to forecast the emotion in live video, the image must be collected at any point and provided to the model. The system detects the face using the HAIR waterfall as soon as the picture of the video streams is captured, trims it and changes the image size to the set size before returning it to the prediction model.

7 likelihood values are generated by the model, which correspond to 7 phrases. The predicted expression for the image is the highest probability value for the associated expression.

EXPRESSION	GENRE
Angry	Angry management
Disgust	Motivational
Fear	Instrumental music
Happy	Melodrama/horror
Neutral	Happy
Sad	Comedy/mental health
Surprise	Relax/Happy

PROPOSED METHODOLOGY

In this chapter, we will try to explain the suggested CNN models that are used for expression recognition from facial expressions, and we will try to determine which model delivers the highest accuracy when matched to prior trained CNN models. In this post, we employ nearly three already trained CNN models and one model with new logic to identify emotions. These are their names:

1. Inception V3 model,
2. VGG19 Model,
3. RESNET 50 and
4. Customized CNN model

1) INCEPTION V3 MODEL

Inception V3 is a popular image recognition model that has been demonstrated to attain more than 30 percentage accuracy on the ImageNet dataset. The framework represents the result of several concepts explored over the years by many scholars. Our model obtained 39 percent accuracy when used for our suggested 7 emotion detection application. In Inception V3, we can clearly discern the architecture of the pre-trained model used to calculate emotions from face features.

2) VGG 19 MODEL

VGG19 is a version of the VGG model that has Nineteen tiers in total (16 folding layers, three fully connected layers, 5 MaxPool layers and 1 SoftMax layer). Except for the variation in layer, VGG16 and VGG 19 are quite identical. In reality, due to an increase in several buried layers, VGG 19 provides more accuracy than VGG 16. In this suggested

application, we use VGG 19 on a specific data set to get a 39 percent accuracy.

3) RESNET 50 MODEL

ResNet50 is a multilayer perceptron with 50 tiers and 5 levels of intensity. You can submit a network-trained version that has been trained on over a million photos from the ImageNet database [1]. The network can categorize photos into 1,000 different item groups, such as keyboard, mouse, pencil, and various animals.

We employed the RESNET 50 CNN model in this proposed application and found it to be 40 percent efficient.

4) CUSTOMIZED CNN MODEL

To evaluate the accuracy of emotion identification on several facial photos, we try to apply some customized models by taking example CNN architecture and adding some user-defined features. Total params: 9,946,055

Trainable params: 9,939,143

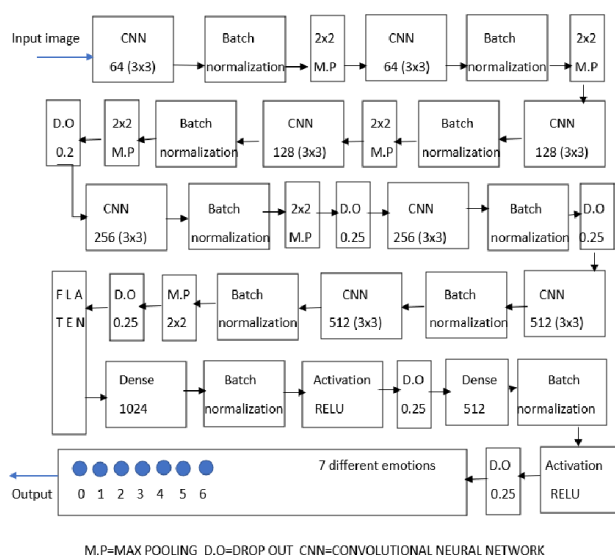
Non-trainable params: 6,912

Using this model on the proposed dataset, we obtained a test

application's major focus is on features extracted using Python and image processing tools, as well as employing deep learning Neural algorithms for emotion identification. Our implementation is broken down into three stages. The first step is picture preprocessing, followed by face identification using image or video, and last by detecting emotion and attempting to propose videos based on emotion.

In this section, we attempt to use several pre-trained CNN models as well as a customized model to determine the correctness of specified CNN models. The application is broken into the five parts listed below. These are their names:

accuracy of 60 percent with 100 iterations.



IMPLEMENTATION STAGE

During the execution phase, the conceptual structure is automatically transformed. During this step, we will partition the program into segments and then program them for the array. Here, we use the Python programming language in conjunction with the Google Collaboratory platform to design and execute programs that use the GPU supplied by Google Collab rather than CPU memory. We utilize the FER 2013 dataset from the KAGGLE website and then apply several predefined and custom models to test for correctness. The suggested

1. Data Set Pre-Processing
2. Labels Assignment
3. Import Libraries and Convert into Categorical Data
4. Apply customized CNN Models and Find accuracy
5. Recommendation

1) DATA SET PREPROCESSING MODULE

The sample comprises a large number of photos with various facial expressions and emotions, which are gathered and imported into the program. Once the dataset has been imported, it will attempt to preprocess the photographs in select directories and subfolders based on your specifications. When the dataset is parsed, it attempts to verify that all photos have the same attributes, such as size, kind, and variation. After loading and preprocessing the dataset, you may utilize the preprocessed pictures to train your system. We constructed a dataset with just frontal facial photos and no emotionless (neutral emotionless) files. Some photographs have different lighting and illumination settings.

2) LABELS ASSIGNMENT

This module tries to label preprocessed photos for categorization. I'm attempting to make two labels here. The first is the fer2013 x label, and the second is the fer2013 y label, which distinguishes the two types. The fer2013 x folder includes all of the photos that have been preprocessed and are being used to train the machine. All seven emotion-related subfolders are contained in the fer2013 y folder. The system trains using the fer2013 x data based on the test data, detects the emotions in this test image, and attempts to allocate the findings to the fer2013 y folder. The seven labels are as follows:

Emotions = ['ANGRY', 'DISGUST', 'AFRAID', 'HAPPY', 'NEUTRAL', 'Sad', 'SURPRISED']

3) IMPORT LIBRARIES AND CONVERT INTO CATEGORICAL DATA

This module will attempt to load all of the libraries required by your program. Import the Pandas, NumPy, and Matplotlib libraries first, and then use the TensorFlow API to transform the input image to category data. In this case, we're attempting to load the complete amount of photographs and feelings in the fer2013 x folder. Once the photographs have been translated into groupings, they are saved in the proper folders and used for model training.

4) APPLY CUSTOMIZED CNN MODELS AND FINDING ACCURACY

Here, we apply some of the pre-trained and adapted CNN models to a particular dataset before examining the best model for recognizing emotions from images or videos. It's hard to find subtle emotions. Raising emotions gives you the opportunity to improve your cognitive accuracy. Based on the properties, there are AEMM (amplitude-based) and PEMM (phase-based) motion extensions [13].

Suppose $I(x, t)$ is the image profile at position x at time t . If the image is transformed by the displacement function $\delta(t)$, the image is given by:

$$I(x, t) = f(x + \delta(t)) \text{ and } I(x, 0) = f(x).$$

Softmax classifier equation:

$$\sigma(z^*)_i = \frac{e^{z_i}}{\sum_{j=1}^k e^{z_j}}$$

σ = Softmax

z^* = input vector

e^{z_i} = Standard exponential function for input vector

K = Number of classes in the multi class classifier

e^{z_j} = Standard exponential function for output vector

The Rectified Linear Units (ReLU) activation function is defined by:

$$f(x) = \max(0, x),$$

x is the input to the layer.

To prevent overfitting and increase the model's generalizability, we employed a categorical cross-entropy loss function and L2 regularization.

Loss (category cross entropy) + regularization term = cost function Period of regularization:

$$\frac{\lambda}{2m} * \sum ||w||^2$$

Here, lambda is the regularization parameter. It is the hyperparameter whose value is optimized for better results.

Categorical cross entropy:

$$\text{Loss} = - \sum_{i=1}^{\text{output size}} y_i \cdot \log \hat{y}_i$$

Where \hat{y}_i is the i -th scalar value in the model output y_i is the corresponding target value and the output size is the number of scalar values in the model output.

Here we use the Inception V3 model, VGG19 Model, RESNET 50, and Customized CNN model for finding the accuracy.

S.No	Model Name	Accuracy
1	INCEPTION V3	39 %
2	VGG 19	39 %
3	RESNET 50	40 %
4	CUSTOM CNN	60 %

5) RECOMMENDATION OF YOUTUBE LINKS

When an emotion is registered in this module, users will receive YouTube link recommendations to assist them modify or refresh their current mood.

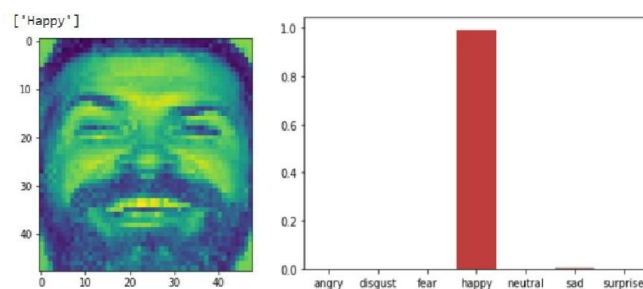


Fig. Testing Emotion by plotting Sample Image

In this section, we plot some example photographs from local storage and attempt to assess emotions based on those visuals.

The graphic above clearly shows that the images taken from the train folder have a pleasant mood.

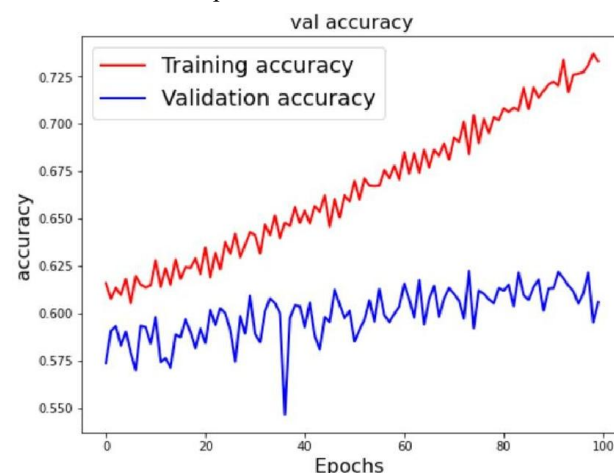


Fig. PERFORMANCE ACCURACY GRAPH

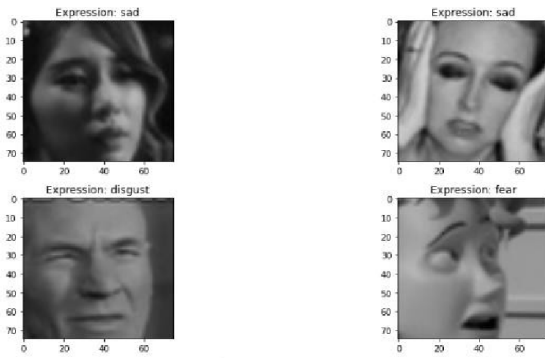


Fig. Some other Emotions by plotting Sample Image

```

"link": "https://www.youtube.com/watch?v=ap1405-G7UA",
"title": "[M/V] SEVENTEEN(\\uc138\\ube10\\ud2f4) - \\ub3c5 : Fear",
"channel": "SEVENTEEN",
"duration": "3:03",
"views": 40950344,
"thumbnails": [
  "https://img.youtube.com/vi/ap1405-G7UA/default.jpg",
  "https://img.youtube.com/vi/ap1405-G7UA/hqdefault.jpg",
  "https://img.youtube.com/vi/ap1405-G7UA/mqdefault.jpg",
  "https://img.youtube.com/vi/ap1405-G7UA/sddefault.jpg",
  "https://img.youtube.com/vi/ap1405-G7UA/maxresdefault.jpg"
],
"channelId": "UCfkXDY7vwkcJ8ddFGz8KusA",
"publishTime": "1 year ago"

"index": 1,
"id": "wCEGtnLjHao",
"link": "https://www.youtube.com/watch?v=wCEGtnLjHao",
"title": "[SEVENTEEN - Fear] Comeback Stage | M COUNTDOWN 190919 EP.635"

```

Fig. YouTube Links Recommendation

CONCLUSION

Our approach is separated into three parts: facial expression, extraction of features, and deep learning CNN model classification. The extraction of features was a critical component of the experiment. The MTCNN for face drawing and accuracy was determined using different CNN models, and the variance between each classifier in identifying emotions from the FER2013 dataset was finally calculated. This suggested application can recognize 7 emotions and feelings from sample record photos or video files with high accuracy. The fitted model generalized the findings from the training set to the test set better than the deep learning pre-trained model. The emotion identification algorithm produced findings with an average accuracy of up to 60% for the suggested input dataset in the epoch range. You may expand the same work to multiple additional models and link to other platforms in the future to increase accuracy and add more emotions.

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SECURITY CONCERNS REGARDING MOBILE CLOUD COMPUTING

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Abstract - Mobile Cloud Computing (MCC) is investigating massive tempest in IT due to anyplace whenever information access. Mobile contraptions are empowered with well-to-do utilizer experience particularly, Smartphones. Apple, Google, Facebook and Amazon are the main four horsemen in the mobile world. That is the reason the mobile cloud computing innovation is developing quickly among the clients and simultaneously it presents the nascent security dangers withal. In MCC, abundance of examinations is being done to kill the issues to make IT more solid and secure in light of the fact that all the more valuable information is put away in the cloud climate. As the Internet-empowered mobile contraptions including cell phones and tablets propagate to develop, web-predicated threatening dangers will sustain to augment in number to make more involute. Getting information is more basic in the Mobile Cloud Environment. In MCC, Security is the significant issue. In this paper, the functioning ideas of MCC and its various security issues and arrangements given by scientists are broke down.

Keywords - Mobile Cloud Computing, Threats, Security, cloud computing

INTRODUCTION

Mobile cloud computing (MCC) has been acquainted with be a likely innovation for mobile administrations. MCC coordinates the cloud computing into the mobile climate and defeats deterrents identified with the exhibition (e.g., battery life, stockpiling, and data transfer capacity), climate (e.g., heterogeneity, adaptability, and accessibility), and security (e.g., dependability and protection) talked about in mobile computing. The expression "mobile cloud computing" was presented not long after the idea of "cloud computing"

dispatched in mid-2007. It has been drawing in the considerations of business visionaries as a beneficial business choice that decreases the turn of events and running expense of mobile applications, of mobile clients as another innovation to accomplish rich experience of an assortment of mobile administrations for minimal price, and of specialists as a promising answer for green IT. Mobile cloud computing is acquiring stream. As per the most recent review from Juniper Research, the quantity of mobile cloud computing supporters is relied upon to fill quickly in the following five years. Cloud-based mobile market will produce yearly income of \$9.5 billion of every 2014 from \$400 million out of 2009, at a normal yearly increment of 88%. Network administrators, Mobile clients and Cloud suppliers are profited from MCC. Association of the paper as follows: Section I presents the Mobile Cloud Computing. The inspiration for composing this paper. Segment III, clarifies the functioning engineering of MCC. Area IV portrays different issues and dangers in MCC. Segment V arrangements with different existing structures. In Section VI passes on the potential answers for the security issues. Segment VII, Conclusion of the paper is illustrated.

MOTIVATION

The generally utilization of mobile telephone lead to the success of mobile administrations. Dream of "Data readily available anyplace, whenever" has become valid. Notwithstanding, mobile gadgets actually need assets contrasted with a regular data preparing gadget like PCs and workstations. Likewise, the impediment of battery confines working time. Step by step instructions to expand capacity of

mobile telephone has turned into the significant specialized issue for mobile computing. The worldview of cloud computing brings openings for this interest.

Cloud computing give new enhancement, utilization, and conveyance model for IT administration. Cloud-put together administrations are with respect to request, versatile, gadget free and dependable. Hence, there comes Mobile Cloud Computing, which targets utilizing cloud computing procedures for capacity and preparing of information on mobile gadgets, in this manner lessening their limits.

WORKING

The mobile cloud computing is an improvement of mobile computing and an expansion to cloud computing. In mobile cloud computing, the past mobile gadget based escalated computing, information stockpiling and mass data handling have been moved to 'cloud' and accordingly the prerequisites of mobile gadgets in computing ability and assets have been diminished, so the creating, running, sending and utilizing method of mobile applications have been completely changed. Then again, the terminals which individuals used to get to and procure cloud administrations are reasonable for mobile gadgets like cell phone, PDA, Tablet, and iPad however not confined to fixed gadgets, (for example, PC), which mirrors the benefits and unique goal of cloud computing. In this manner, from the two parts of mobile computing and cloud computing, the mobile cloud computing is a mix of the two advances, an improvement of disseminated, lattice and unified calculations, and have wide possibilities for application.

As displayed is the Fig1, mobile cloud computing can be partitioned into cloud computing and mobile computing. Those mobile gadgets can be PCs, PDA, cell phones, etc. which associates with an area of interest or base station by 3G, WIFI, or GPRS.

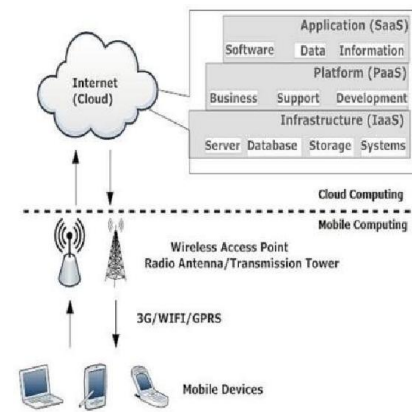


Fig. 1. Architecture of Mobile Cloud Computing

As the computing and significant information preparing stages have been relocated to 'cloud', the ability necessity of mobile gadgets is restricted, some minimal expense mobile gadgets or even non-cell phones can likewise accomplish mobile cloud computing by utilizing a cross-stage mid-product. Albeit the customer in mobile cloud computing is changed from PCs or fixed machines to mobile gadgets, the principle idea is still cloud computing. Mobile clients send administration solicitations to the cloud through an internet browser or work area application, then, at that point, the administration part of cloud apportions assets to the solicitation to build up association, while the checking and ascertaining elements of mobile cloud computing will be executed to guarantee the QoS until the association is finished.

A. Characteristics

The critical qualities of mobile cloud computing are Reliability, Scalability, Security, Agility, Device Independence, Low Cost, and Diminished Maintenance [3].

B. Service Models in Cloud

As per NIST, Cloud Computing administrations can be promptly separated into three layered assistance models. It is otherwise called the SPI model where SPI represents Software, Platform and Infrastructure.

- Software or Application as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Software as a service (SaaS)

It is a model of software arrangement whereby the supplier licenses an application to the clients for use as a service on demand. The capability gave to the End clients is to utilize the supplier's applications running on a cloud infrastructure. The applications are accessible from various customer gadgets through a slight customer interface like an internet browser (e.g., web enabled email). The end clients doesn't manage or control the fundamental cloud infrastructure including network, servers, operating frameworks, storage, or even individual application capabilities, with the conceivable exemption of restricted client explicit application configuration settings. Today SaaS is presented by companies like Google, Salesforce, Microsoft, Zoho, and so forth.

Platform as a Service(PaaS)

It is the conveyance of computing platform and arrangement stack as a service. The capability gave to the end clients is to send onto the cloud infrastructure client created or acquired applications created utilizing programming languages and devices upheld by the supplier. The end client doesn't manage or control the basic cloud infrastructure including network, servers, operating frameworks, or storage. PaaS suppliers offer a predefined combination of OS and application servers, for example, WAMP platform [4] (Windows, Apache, MySQL and PHP), LAMP platform (Linux, Apache, MySQL and PHP), and XAMP(X-cross platform) restricted to J2EE, and Ruby and so forth Google App Engine, Salesforce.com, and so on are a portion of the popular PaaS examples.

Infrastructure as a Service (IaaS)

It is the conveyance of PC infrastructure (typically a platform virtualization climate) as a service. The capability gave to the end clients is to arrangement handling, storage, organizations, and other fundamental computing assets where the end client can convey and run arbitrary software, which can incorporate operating frameworks and applications. The client doesn't manage or control the basic cloud infrastructure however it has authority over operating frameworks, storage, sent applications, and conceivably

restricted control of select systems administration parts. A portion of the normal examples are Amazon, GoGrid, 3tera and so on.

C. Cloud Application Deployment Models

There are three sending models for Cloud computing: public, private, and hybrid [4]-[7].

Public Cloud

In this model, computing assets are dynamically provisioned over the Internet via Web applications or Web services from an offsite outsider supplier. Public clouds are controlled by outsiders, and applications from various clients are probably going to be combined as one on the cloud's servers, storage frameworks, and organizations.

Private Cloud

The physical infrastructure may be possessed by and managed by the organization or the designated service supplier [9] with an augmentation of management and security control planes constrained by the organization.

Community Cloud

This model of Cloud computing is utilized by a gathering of Entities and organization or individuals .This cloud utilized by a gathering of elements who have sharing interest.

Hybrid Cloud

This model of Cloud computing is a synthesis of at least two Clouds (public or private) that remain one of a kind substances however are bound together by standardized or proprietary innovation that enables data and application portability.

D. Mobile Cloud Computing vs Cloud Computing

Both cloud computing and mobile computing have to do with utilizing remote frameworks to transmit data. Past this, these two terms are very unique. Cloud computing relates to the particular plan of new innovations and services that allow data to be sent over disseminated networks, through remote associations, to a remote secure location that is usually maintained by a merchant. Cloud service suppliers usually serve different customers. They arrange access between the customer's local or shut organizations, and their own data

storage and data backup frameworks. That means that the merchant can intake data that is shipped off them and stores it safely, while conveying services back to a customer through these carefully maintained associations. Mobile computing relates to the development of new gadgets and interfaces. Smartphones and tablets are mobile gadgets that can do a great deal of what traditional work area and laptop PCs do. Mobile computing capacities incorporate accessing the Internet through programs, supporting various software applications with a center operating framework, and sending and getting various sorts of data. The mobile operating framework, as an interface, upholds clients by giving instinctive symbols, familiar search advancements and easy touch-screen commands. While mobile computing is largely a customer facing service, cloud computing is something utilized by many organizations and companies. Individuals can also profit from cloud computing, however the absolute generally sophisticated and advanced cloud computing services are aimed at ventures. For example, large organizations and considerably smaller operations utilize explicit cloud computing services to make various cycles like store network management, stock handling, client relationships and even creation more productive. An arising image of the distinction between cloud computing and mobile computing includes the rise of smart telephone and tablet operating frameworks and, on the cloud end, new systems administration services that may serve these and different gadgets.

E. Mobile Security Service Layers

The security services in mobile environment are separated into three unique layers.

- Backbone layer
- Infrastructure layer
- Application and Platform layer

The backbone layer comprises the security surveillance on cloud physical frameworks. This aides in checking the servers and machines in the cloud infrastructure. The infrastructure layer screens the virtual machines in the cloud. Various activities like Storage verification, VM migration, Cloud Service Monitoring, VM Isolation, Risk Evaluation

and Audits are carried out in this layer to secure cloud have services. Application layer performs activities like client management, key management, authentication, authorization; encryption and data integration.

F. Challenges and Solutions

The main target of mobile cloud computing is to give an advantageous and rapid strategy for clients to access and get data from the cloud, such helpful and rapid technique means accessing cloud computing assets adequately by utilizing mobile gadgets. The major challenge of mobile cloud computing comes from the characteristics of mobile gadgets and remote organizations, as well as their own limitation and limitation, and such challenge makes application planning, programming and sending on mobile and disseminated gadgets more complicated than on the decent cloud gadgets [13]. In mobile cloud computing climate, the limitations of mobile gadgets, quality of remote communication, sorts of application, and backing from cloud computing to mobile are all important factors that affect assessing from cloud computing.

G. Limitations of mobile gadgets

While talking about mobile gadgets in cloud the principal thing is asset constrain. However smartphones have been further developed clearly in various aspects like capability of CPU and memory, storage, size of screen, remote communication, detecting innovation, and operation frameworks, actually have genuine limitations, for example, restricted computing capability and energy asset, to convey complicated applications. By contrast with PCs and Laptops in a given condition, these smartphones like iPhone 4S, Android serials, Windows Mobile serials decrease multiple times in handling capacity, multiple times in memory, 5 to multiple times in storage capacity and multiple times in network bandwidth. Normally, smartphone should be charged everyday as dialling calls, sending messages, riding the Internet, community accessing, and other web applications. According to past advancement drifts, the increased mobile computing ability and rapid improvement of screen innovation will lead to an ever increasing number of complicated applications conveyed in smartphones. On

the off chance that the battery innovation cannot be worked on in a brief time frame, how to adequately save battery power in smartphone is a major issue we meet today. The handling capacity, storage, battery time, and communication of those smartphones will be improved reliably with the advancement of mobile computing. Be that as it may, such tremendous variations will continue as one of major challenges in mobile cloud computing.

H. Quality of communication

In contrast with wired organization utilizes physical association with guarantee bandwidth consistency, the data transfer rate in mobile cloud computing climate is constantly changing and the association is intermittent because of the current clearance in network overlay. Furthermore, data focus in large undertaking and asset in web access supplier normally is far away to end clients, especially to mobile gadget clients. In remote organization, the organization latency delay may 200 ms in 'last mile' yet just 50 ms in traditional wired organization. Some different issues, for example, dynamic changing of application throughput, portability of clients, and considerably weather will lead to changes in bandwidth and organization overlay. Thusly, the handover delay in mobile organization is higher than in wired organization.

I. Division of application services

In mobile cloud computing climate, because of the issue of restricted assets, a few applications of process serious and data-escalated cannot be conveyed in mobile gadgets, or they may burn-through massive energy assets. Hence, we have to separate the applications and utilize the capacity of cloud computing to achieve those reasons, which is: the center computing task is handled by cloud, and those mobile gadgets are liable for some basic tasks as it were. In this preparing, the major issues affecting performance of mobile cloud computing are: data handling in data place and mobile gadget, network handover delay, and data conveyance time. For a given standard, giving a quality guaranteed cloud service ought to think about the accompanying facts: optimal division of application among cloud and mobile gadget, interaction between low-latency and code offload, high-bandwidth among cloud and mobile gadget for rapid data

transmission, client arranged cloud application performance, self-adaptation mechanism of mobile cloud computing, and optimal utilization and overhead of mobile gadgets and cloud servers.

The accompanying strategies can be utilized to reaction to the challenges:

- Upgrade bandwidth for remote association, make the web content more suitable for mobile organization utilizing regional data places.
- Convey the application handling hub at the 'edge' of cloud to decrease data conveyance time.
- Duplicate mobile gadgets to cloud utilizing virtualization and image advances, to handle Data-Intensive Computing (DIC) and Energy-Intensive Computing, for example, infection scanning in mobile gadgets.
- Dynamically upgrade application push in cloud and the division with mobile terminals.

TYPES OF SECURITY BREACHES AND ISSUES

However there are several advantages in mobile cloud biological system, there are a few issues and challenges in mobile cloud computing. A portion of the major issues in security are Data Ownership, Privacy, Data Security and other Security issues [7].

J. Data Ownership

Cloud computing gives the facility to store the personal data and purchased digital media, for example, digital books, video and audio documents distantly. For a client, there is a chance of hazard to lose the access to the purchased media data. To avoid these kinds of dangers, the client ought to know about the various freedoms regarding the purchased media. MCC uses the setting information like locations and capabilities of gadgets and client profiles, which can be utilized by the mobile cloud server to locally improve the access management.

K. Privacy

Privacy is probably the greatest challenge in the mobile cloud computing climate. A few applications which recruit cloud computing store client's data distantly. Outsider companies may offer this important information to some administration agencies without the authorization of the client. For example: Mobile gadgets use location based services which help their companions and different people to get the updates about the location of the client [6].

C. Data Security and other Security Issues

Mobile gadgets are famous for malicious code. There are many chances to lose or steal the data because mobile gadgets are for the most part unprotected. An unauthorized individual can easily access the information put away on the mobile gadgets. The top mobile threats that affect security are Data misfortune from lost/taken gadgets.

- Information stealing by mobile malware.
- Data leakage through ineffectively composed outsider applications.
- Vulnerabilities inside gadgets, OS, plan and outsider applications.
- Shaky organization access and unreliable access focuses.
- Uncertain or rebel marketplaces.
- Inadequate management devices, capabilities and access to APIs.
- Near Field Communication (NFC) and vicinity based hacking.

Data can be sniffed by the gate-crashes during remote communications. Data access can be hindered because of numerous focuses. This leads to the data secured particular services. To shield the mobile gadgets from data misfortune, slim customer like anti-malware, antivirus ought to be installed to screen the malicious code. Malicious code incorporates infections as well as phishing from malicious social organizations and domains, botnets, spam and wholesale fraud. Remote convention encryption gives got communication where interlopers cannot hack the organization.

LITERATURE SURVEY

Anand Surendra Shimpi [8] proposed a safe framework for preparing data in mobile cloud computing. This framework stores data in a got fashion which helps in securing the client's privacy. In addition, he has carried out an undertaking named "Center Drive" which works on the driving safety of teenagers. Jibitesh Mishra [9] proposed a protected architecture for MCC to integrate mobile applications with the various cloud services. This architecture works on the storage and handling of data on mobile gadgets in a got manner. It helps in maintaining the uprightness and security of data. Itani et al [10] proposed a framework which was energy effective for mobile gadgets to assure mobile client's respectability for example utilizing incremental cryptography and confided in computing, the data/records of clients are put away in the cloud. This framework brings about saving 90% of preparing energy on the mobile gadgets when compared to other conventional procedures with greater security. Eugene E. Marinelli [11] created Hyrax, a platform from Hadoop which supports cloud computing on Smartphones. It allows client's applications to use data and computing measure on networks on Smartphones. It offers a sane performance in data sharing and tolerates hub departure. Eugene also executed a disseminated media search and data sharing approach. Jon Oberheide [12] proposed an architecture which contains three parts:

L. Host Agent

It is a lightweight interaction that sudden spikes in demand for each gadget and examines the activities of the records on the framework. It stores the exceptional identifier (like hash) in the cache for documents got. In the event that another document doesn't hold record identifier, it will be shipped off the Network Service.

M. Network Service

This service analyses the records sent by the host agent. There can be numerous instances of Network Services that are running on the cloud utilizing virtualization procedure which supports parallel discovery of different records sent by various host agents.

N. Caching

Local private cache (LPC) and Global shared cache (GSC) are the two cache agents where LPC can be placed into the identifier of reviewed documents and GSC cache dwells on the Network Service which has the identifiers of all examined records got up until this point. Security and privacy are always a main point of contention when the data are shared between mobile gadgets and the cloud. Despite the fact that WPA2 (Wi-Fi Alliance, 2012) gives layer-2 encryption of the data, layer-6 encryption is as yet a prerequisite because it requires some external applications like bioinformatics or computational science that are executed on mobile gadgets and distantly on leased/commercial cloud platforms (like Google (2012, AWS (2012), Microsoft (2012)) which require an additional layer. To battle and ensure against the security threats, the current mobile gadgets run the threat recognition services on the mobile gadget itself. This service burns-through both computation and force [13].

To forestall wildcat access to mobile gadgets and to give security to cloud-access, there are two measures which can be trailed by endeavours that maintain a gathering of smartphones for workers.

O. Cloud-access security

Strong authentication technique guarantees that main legitimate client with authorization can access cloud-based services. It tends to be trailed by ventures to maintain a superior security level utilizing security mechanisms like one-time passwords (OTP) and Open Authentication (OATH) in the mobile cloud climate

P. Embedded gadget character assurance

It is feasible to insert a personalized configuration profile on each worker's mobile gadget, accordingly executing a credential or personal security token on their mobile gadget. Consequently, workers with reliable gadgets that act accordingly with corporate security strategy can access corporate data and applications.

Q. Security Policies

There are some other security features and strategies that can be upheld to maximize the security on mobile gadgets, especially in a corporate setting. Certainly the Mobile Cloud is an enabler for working on the smartphone and tablets security levels that are increasing increasingly more prevalent in business and everyday use.

POSSIBLE SOLUTIONS FOR THE SECURITY ISSUES

Of all the above talked about issues, data security is the most prevalent issue during data transfer. Here are some potential arrangements. The primary arrangement is to accompanied another model of safety where identification services like Intrusion Detection System (IDS) and Cloud Intrusion Detection System Services (CIDSS) take place in the cloud which clearly saves the gadget CPU interaction and memory.

This location services arrangement have several advantages:

- Better location of malicious code.
- Diminished utilization of assets on mobile gadgets.
- Decreased Software intricacy of mobile gadgets.

Then, it is feasible to achieve the security by carrying out the homomorphic encryption mechanism with the combination of level-6 encryption that can be adopted when the data passes between the cloud, mobile and cloudlet with next to no necessity of external applications. Level-6 encryption is mainly utilized for secure text encode and decipher which requires the utilization of JavaScript and programs. To save the mobile assets, level-6 encryption ought to depend and be executed distantly on the cloud. This arrangement gives the best security and scalability feature during data sharing. On the off chance that the data with malicious codes are downloaded by a client, the cloud account and data will be extracted and the unfair accounting will happen.

Just confirmed data ought to be downloaded and the applications with abnormal activities ought to be impeded. Through broadcasted SSID, the information can be leaked

and unauthorized client can gain access. Disable the SSID broadcast and use an enhanced key authentication algorithm.

Here are a few stages given for winning the battle of breaches:

R. Focus on the targets and set the danger tolerance.

Ensuring data assets in the workplaces has been a challenge to the security professionals for quite a long time. In all actuality there is no such thing as 100% secure. Hard choices ought to be made at various degrees of assurance required for various parts of the business.

S. Ensure the data with proactive security plan.

Security planning is anything but an easy task for an organization. This incorporates understanding the threat landscape (for example hacking cybercrime attacks, media and social scams, and so on) and attempting to ensure the organization against these threats, require both strategy and innovation.

T. Prepare the reaction to the inevitable sophisticated attacks.

With the development of advanced continual threats, hackers aim on discovering vulnerability. It is certain that eventually the organization will move towards data breach. Since the malware attacks are on the increase in today's innovation, the brought together and tried reaction plan is under critical state for the right assets and abilities.

U. Advance the way of life of safety awareness.

Note that the careless mistakes of one worker will affect the master plan of boss security official. That's the reason each worker should work in a gathering with security professionals to guarantee the safety of big business data. Security should be based on the way of life of the organization.

CONCLUSION

This paper investigates the ideas of Mobile Cloud Computing (MCC), challenging security issues and breaches, assorted remaining alive security frameworks and definitively a few arrangements that increase the security in

the Mobile Cloud Environment. The vast majority of the frameworks ignored the security of utilizer data privacy, data storage and energy safeguarding data sharing. Data privacy and mobile application that uses cloud are the most challenging factor. To get greater security in mobile cloud climate, threats should be addressed and concentrated accordingly. To address all these security issues, the data security plan should be created which diminishes the security dangers and additionally to reduce expenses and elaboration to adopt the cloud computing in mobile climate. It is essential to remember that the planning of things to come framework arrangements ought to be more expense effectual and ought to give more predominant security and performance.

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AUTOMATED EXTERNAL NIPAH VIRUS DEFECT DETECTION SYSTEM IN FRUITS USING IMAGE SEGMENTATION

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Abstract - The purpose of Agriculture isn't only to feed ever growing population but it's an important source of energy and a result to break the problem of global warming. Plant conditions are extremely significant, as that can negatively affect both quality and volume of crops in husbandry product. The emergence of Nipah contagion (NiV) infection into the gormandizer population and latterly into the mortal population is believed to be due to changes in ecological conditions. It can be substantially affected in banana. Banana complaint opinion is veritably essential in earlier stage in order to cure and control them. Generally the naked eye system is used to identify the conditions. In this system experts are involved who have the capability to descry the changes in banana color. This system involves lots of sweats, takes long time and also not practical for the large fields. Numerous times different experts identify the same complaint as the different complaint. This system is precious as it requires nonstop monitoring of experts. Plant conditions can increase the cost of agrarian product disaster of a patron if not cured meetly at early stages The directors need to cover their crops and descry the first symptoms in order to help the spread of a

complaint, with low cost and save the major part of the product. Hiring professional agronomists may not be affordable especially in remote insulated geographic regions. Machine literacy algorithm in image can offer an indispensable result in factory monitoring and such an approach may anyway be controlled by a professional to offer his services with lower cost. It includes image segmentation which includes active figure system and image bracket approach which includes neural network algorithm to prognosticate colorful types of conditions.

INTRODUCTION

The purpose of Agriculture is not only to feed ever growing population but it's an important source of energy and a solution to solve the problem of global warming. Plant diseases are extremely significant, as that can adversely affect both quality and quantity of crops in agriculture production.

The emergence of Nipah virus (NiV) infection into the pig population and subsequently into the human population is believed to be due to changes in ecological conditions. It can be mostly affected in banana. Banana disease diagnosis is very essential in earlier stage in order to cure and control them. Generally the naked eye method is used to identify the diseases. In this method experts are involved who have the ability to detect the changes in banana color. This method involves lots of efforts, takes long time and also not practical for the large fields. Many times different experts identify the same disease as the different disease. This method is expensive as it requires continuous monitoring of experts. Plant diseases can increase the cost of agricultural production and may extend to total economic disaster of a producer if not cured appropriately at early stages. The producers need to monitor their crops and detect the first symptoms in order to prevent the spread of a disease, with low cost and save the major part of the production. Hiring professional agriculturists may not be affordable especially in remote isolated geographic regions. Machine learning algorithm in image can offer an alternative solution in plant monitoring and such an approach may anyway be controlled by a professional to offer his services with lower cost. It includes image segmentation which includes active contour method and image classification approach which includes neural network algorithm to predict various types of diseases.

METHODOLOGY

Nipah virus infection in humans causes a range of clinical presentations, from asymptomatic infection (subclinical) to acute respiratory infection and fatal encephalitis. Nipah virus can be transmitted to humans from animals (such as bats or pigs), or contaminated foods and can also be transmitted directly from human-to-human. Fruit bats of the Pteropodidae family are the natural host of Nipah virus. There is no treatment or vaccine available for either people or animals. The primary treatment for humans is supportive care. The identification

of species is the first and essential key to understand the plant environment. Botanists traditionally rely on the aspect and composition of fruits, flowers and leaves to identify species. But in the context of a widespread non-specialist-oriented application, the predominant use of leaves, which are possible to find almost all year long, simple to photograph, and easier to analyze from two-dimensional images, is the most sensible and widely used approach in image processing. In the process of virus identification from pictures of bananas in a natural background, retrieving an accurate contour is a challenging and crucial issue. In this project we introduce a method designed to deal with the obstacles raised by such complex images, for simple and lobed objects. A first segmentation step based on a light polygonal model is first performed, and later used to guide the evolution of an active contour. Combining global shape descriptors given by the polygonal model with local curvature-based features, the bananas are then classified over datasets. And implement classification algorithm to classify the diseases and to provide suggestion based on diseases.

EXISTING SYSTEM

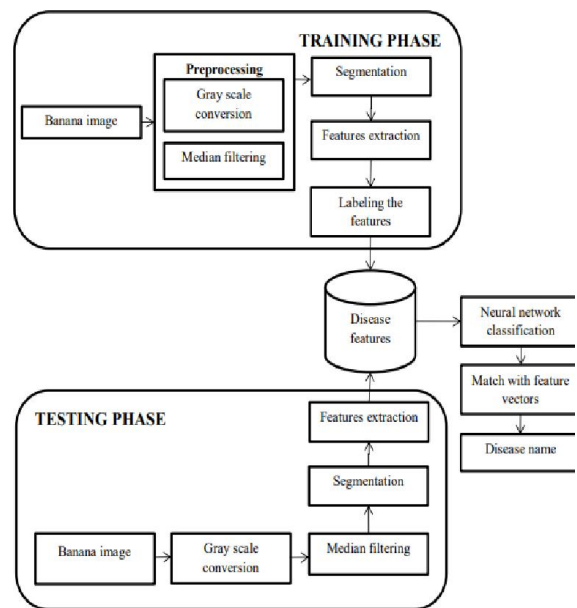
Fruit bats of the family Pteropodidae – particularly species belonging to the Pteropus genus – are the natural hosts for Nipah virus. There is no apparent disease in fruit bats. It requires naked eye method by farmers to detect diseases, when fruits like banana, mango and dates got eaten by this kind of bats there is a color change occurs between 24 to 48 hours. It is possible to identify in case of small quantity of plantations but in acres it is impossible to identify the infected fruits. It is also not possible to classify the type of disease. Only a specialized government personnel can classify such diseases. Classification is implemented by manual clustering classification method to find the diseases. In some cases, the irrelevant features are extracted at the time of classification.

PROPOSED SYSTEM

Detection of Nipah virus in fruits requires the Image segmentation technique, the captured image of defected fruits are required for Image processing. In digital image processing and computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as image objects). Image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The result of image segmentation is a set of segments that collectively cover the entire image. Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color, intensity, or texture. Image segmentation algorithm called Extended Fuzzy C means (EFCM) is presented in this paper which preprocesses the image to reduce the noise effect and then apply FCM algorithm for image segmentation. Active contour is a type of segmentation technique which can be defined as use of energy forces and constraints for segregation of the pixels of interest from the image for further processing and analysis. Active contour described as active model for the process segmentation. Contours are boundaries designed for the area of interest required in an image of the fruits. Contour is a collection of points that undergoes interpolation process. The interpolation process can be linear, splines and polynomial which describes the curve in the image. The convolutional neural network (CNN) is a class of deep learning neural networks. CNNs represent a huge breakthrough in image recognition. A classic CNN architecture would look something like this:

Input-> Convolution-> ReLU->
 Convolution-> ReLU-> Pooling-> ReLU->
 Convolution -> ReLU -> Pooling->
 FullyConnected
 A CNN convolves (not convolutes...) learned features with input data and uses 2D convolutional layers. This means that this

type of network is ideal for processing 2D images. Compared to other image classification algorithms, CNNs actually use very little preprocessing. This means that they can learn the filters that have to be hand-made in other algorithms. CNNs can be used in tons of applications from image and video recognition, image classification, and recommender systems to natural language processing and medical image analysis. Finally the disease is classified using Convolution neural Network Algorithm.



CONCLUSION

An image processing based approach is proposed in this work for fruit disease identification by using C#.NET image processing. In Banana specie the proposed algorithm was tested. With very less computational efforts, the optimum results were obtained.

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FOOD WASTE MANAGEMENT AND DONATION SYSTEM USING WEB APPLICATION

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Abstract - The raised generation of food waste is a global and public problem. It has several angles, all of which can profit from a clear understanding of the size and nature of food waste generated across all phases of the food product and consumption cycle. In this design, we can apply food waste operation system to give mindfulness about food wastes and negative impacts of unused, unwanted mortal scrap's junks and give system for furnishing knowledge to duly managed with minimal number of extinctions, and to achieve practical benefits.

Keywords - Food Donation, Phone, Volunteer, Web application, Food wastage reduction.

INTRODUCTION

The increased generation of food waste is a global and national problem. It has several facets, all of which can benefit from a clear understanding of the size and nature of food waste generated across all phases of the food production and consumption cycle. Of most concern to many stakeholders is the impact food waste has on the generation of greenhouse gas emissions such as methane and carbon dioxide. However, there are also growing concerns about the economic and environmental viability of existing food waste disposal systems, as well as interest in

food waste as a resource input to agriculture. In this project, we can implement food waste management system to provide awareness about food wastes and negative impacts of unused, unwanted human garbage's/junks and provide system for providing knowledge to properly managed with minimum number of wastages, and to achieve practical benefits. We can implement three types of modules such as admin, orphanage and user module. Admin can maintain and monitor the overall information. The volunteer can manage the food wastage with proper delivery to poor people or proper disposal management. This project can be implemented in real time.

OBJECTIVES

The main objective of developing this project is to help the orphanage people and food needy people. This system also acts as a mediator between food provider and orphanage people, food needy people or user. Using this application the food provider can get the information about orphanage details, volunteer details etc.

LITERATURE SURVEY

A Web Application that provides donors and seekers with a forum to donate and collect food once they have successfully logged into the system. The system consists of three primary donor, volunteer and admin modules. The donor completes tasks such as registration/login and adds items to the donation/request to be contributed and viewed.

The recipient does tasks such as requesting items, displaying requested items and claiming donations. The manager will track the collection and upgrade it. The administrator and the donor will also see the position of the recipient. The donor-donated objects will be displayed to other users as a reminder in the donation tab and the message will be saved in the backend folder. 'Food donation portal', a paper published in 2015, briefly outlines the food donation practices and provides a forum connecting donors to NGOs. A concept to eliminate food waste, minimize food waste and improve the food donation network is introduced and an impact on society is made possible via this medium. The paper 'Beyond Food Sharing: Promoting the Elimination of Food Waste with ICTs', released in 2016, maintaining food security is essential to tracking citizens' quality of life at various levels of society. In the recent economic crisis, a significant number of people have been living in conditions of food hunger and poverty, especially in developing regions. Despite the knowledge and concern about the value of food and the elimination of food waste and food surplus management, the role of ICTs in this area is still uncertain and poorly reported.

METHODOLOGY

In this project the user can register and login the system using his/her user's name and password. After registration process the user can search the orphanage details then donate the food to orphanage. In this project the orphanage can register the system. After register and login process the orphanage can update his/her orphanage profile. This project can be implemented in real time as software for user friendly access. Using this application, the user/donor can donate the food. Using this application, the user can donate the food; first he/she can send the food donation request to the particular orphanage admin. The orphanage admin can accept or reject the user's request. In this project the volunteer can register and login the system using his/her user's name and password. The volunteer can view the orphanage request about food collection request.

EXISTING SYSTEM

The existing system is handled manually. The system follows large number of paper work for maintaining orphanage and donation details and user can be difficult to search the orphanage in manual process. In current system the user doesn't know about orphanage details and where it will be located. In this existing system takes lots of time for searching particular orphanage information. Food waste generated by disease, spoilage, restaurant plate waste, and plant and animal material produced during processing are not suitable for human consumption.

DISADVANTAGE

- Expensive to build and operate.
- High energy requirement

- Requires skilled personnel and continuous maintenance.
- Unsightly - smell, waste, vermin

PROPOSED SYSTEM

Food wastage is increasingly becoming a topic of concern due primarily to the negative impact it has on the economic and agricultural industry. Research has shown that, households seem to be the highest producers of food waste and some of this, is as a result of food being disposed because they are expired. The main objective of this thesis was to provide a viable solution that allows users to track the life cycle of their food inventory efficiently. Orphanage details of endowment process have simplified the working information and make a user-friendly environment.

ADVANTAGES:

- To encourage food donations.
- Reducing food waste is environmentally important as it keeps food out of landfills.
- Finally, reducing food waste is socially important when the rescued food is redirected to emergency food providers working to eliminate hunger in our communities.

MODULES

Login & Registration: This phase involves login & registration for both the guest and Agent. The user's details are maintained confidential by maintaining separate account for each user. At the same time only, the agent can view the details of the register guest.

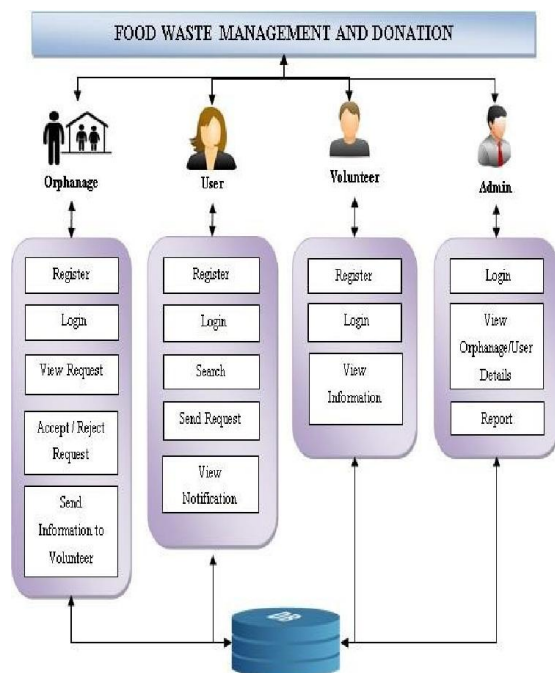
Admin Module: In admin module, the administrator maintains the agent details as well as the donator details. The administrator collects the food from the agent. The administrator gives the orphanage details directly to the donator.



Notification: This phase involves the notification to the agent by the guest. The user will send the notification which contains the location of food available via notification bar. This is achieved by using notification button.

Donator Module: In donator module, the donator gives the wastage of food to the orphanage. the donator gives the request to the admin for the purpose of to collect the wastage food. The donator views the orphanage details and agent details.

Receiver Module: In Agent module, the Receiver maintain the orphanage details. It can also maintain the donator details. The Receiver give the request to the admin for collect the food from the donator. After collect the food the agent gives the alert message for the donator.



RESULT

Food waste management applications should consider a goal beyond just food waste reduction to boost user participation. Additionally, application designers have to consider the integration of behavioral change techniques, such as persuasive technology and focus on user interaction design by making the interaction as simple as possible. Social networks could be considered to engage users in the activity. For example, the use of Facebook or Instagram to create an environment where users could contribute to food waste reduction and donation. Future developments should consider the integration of a gamified layer to a core activity to achieve user motivation and long-term engagement with the application.

CONCLUSION & FUTURE WORK

The proposed application shall reduce food wastage and also fulfill other requirements like clothes, books, utensils, etc. of needy organizations. As mentioned above in the description there is a lot of food wastage that occurs daily at restaurants and cafes. Instead of throwing away the same as trash (which usually is the scenario), it can be used to feed the homeless. Also, since the pickup is arranged for by the enterprise, the restaurants/cafes need not worry about it. Benefitters will be both the restaurants/cafés (reducing the carbon footprint and wastage), and the needy In future work, there was no standard food information system on food packages that gives the user the information of both the name of the food, as well as its expiry date. The viable improvement would be getting the food name from the product bar code and read the expiry date using OCR tools. However, the level of ease of using this option is only slightly greater than using the manual option of filling the food information. Some companies have started trials with using QR code on their food packages to provide detailed information. Notwithstanding, there is still lot of hurdles to pass for it to become a standard. But for the meantime, this application presents a viable and effective solution.

ACKNOWLEDGEMENT

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IOT BASED SOCIAL DISTANCING AND MONITORING FOR QUEUE

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Abstract - In This Period Maintaining social distancing norms between humans has become an important precaution to hamper the transmission of SARS COVID-19. We present a completely unique method to automatically detect pairs of humans during a crowded scenario who aren't adhering to the social distance constraint, i.e., about 1.5 feet of space between them. Our approach Will makes no assumption about the gang density or pedestrian walking directions. We use a mobile robot with commodity sensors, namely a camera and a 2-D lidar to perform collision-free navigation during a Crowd and estimate the space between all detected individuals in the camera's field of view. In addition, With It I also equip the robot with a camera that wireless-transmits thermal images to a security/healthcare personnel who monitors if any individual exhibits a higher-than-normal temperature. In indoor scenarios, this mobile robot can also be combined with static mounted cameras to further improve the performance in terms of number of social distancing Culprits detected accurately pursuing walking pedestrians etc. We highlight the performance benefits of our approach in several static and dynamic indoor scenarios..

Key Words - SARS COVID-19, 2-D lidar, Robot, Static & Dynamic

INTRODUCTION

As We Humans aren't ready for the novel coronavirus and neither were the machines. The pandemic has come at an awkward time, technologically speaking. Ever more sophisticated

robots and AI are augmenting human workers, rather than replacing them entirely. While it would be nice if we could protect doctors and nurses by turning more tasks over to robots, medicine is particularly hard to automate. It's fundamentally human, requiring fine motor skills, compassion, and quick life-and-death decision-making we wouldn't want to leave to machines. "Robotics and automation could play a major role in combating infectious diseases, such as Covid-19," As epidemics escalate, the potential roles of robotics are becoming increasingly clear. "Additionally, robots could enable a form of telemedicine that would keep humans out of areas of contagion. "SARS COVID-19 could be a catalyst for developing robotic systems that can be rapidly deployed with remote access by experts and essential service providers without the need of traveling to front lines," they wrote. A cruel irony of the coronavirus pandemic is that medical professionals know better than anyone that social distancing is critical for slowing the rate of new infections, yet they're forced to be the closest to the disease. And those that need social interaction perhaps more than anybody the elderly are the ones who need to isolate the most, since they're the most susceptible to the disease.

EXISTING SYSTEM

We present a novel method to detect breaches in social distancing norms in indoor scenes using visual sensors such as RGB-D and CCTV cameras. We use a mobile robot to attend to the individuals

who are non-compliant with the social distancing norm and to encourage them to move apart by displaying a message on a screen mounted on the robot. We demonstrate our method's effectiveness in localizing pedestrians, detecting breaches, and pursuing walking pedestrians. We conclude that the CCTV+ robot hybrid configuration outperforms configurations in which only one of the two components is used for tracking and pursuing non-compliant pedestrians. Our method has a few limitations. For instance, our method does not distinguish between strangers and people from the same household. Therefore, all individuals in an indoor environment are encouraged to maintain a 6-foot distance from each other. Our current approach for issuing a warning to violating pedestrians using a monitor has limitations, and we need to develop better human-robot approaches. As more such monitoring robots are used to check for social distances or collecting related data, this could also affect the behavior of pedestrians in different settings. We need to perform more studies on the social impact of such robots. Due to COVID restrictions, we have only been able to evaluate the performance of COVID-robot in our low to medium density laboratory settings. Eventually, we want to evaluate the robot's performance in crowded public settings and outdoor scenarios. We also need to design better techniques to improve the enforcement of social distancing by using better human-robot interaction methods.

PROPOSED SYSTEM

The proposed system of what we developed from the existing one is we have settled up robots and we have elongated the detection distance as more than 3 metres. The robots which we develop are exclusively to develop the detect the distance and the actions of each and every individual. And all the individuals in an indoor environment are encouraged to maintain a 6-foot distance from each other. our method does not distinguish between strangers and people from the same household. We demonstrate our method's effectiveness in localizing pedestrians, detecting breaches, and pursuing walking pedestrians. We conclude that the CCTV+ robot hybrid configuration outperforms configurations in which only one of the two components is used for tracking and pursuing non-compliant pedestrians

Figure1: Overall architecture of COVID- Robot and Social Distancing Monitoring.

So, the theme we produce is very flexible, essential and it will be very useful.

As more such monitoring robots are used to check for social distances or collecting related data, this could also affect the behavior of pedestrians in different settings. The robot consists of a 4-wheel design system used to drive the people.

METHODOLOGY

The robot consists of a 4-wheel design system used to drive the robotic vehicle. It makes use of a line following principle to constantly move along with the queue and monitor for social distancing violations. The robotic uses IR sensing to travel along with the queue to and from in order to detect violations. The robot is now equipped with obstacle detecting ultrasonic sensor in order to detect obstacles in the vehicle path. The robotic vehicle uses another ultrasonic sensor for detecting distance between 2 individuals in a queue. In any 2 individuals are found having less than 3 feet distance between them, the robot instantly sounds a buzzer and alert to inform about the violation. Also, it sends alerts of these violations along with a camera picture using wi-fi over IoT to inform the higher authorities/head office to update them about violations with proof so instant disciplinary action can be taken. Thus, this project allows for automatic maintaining social distancing in queues to help prevent spread of the virus.

CONCLUSION

Hereby we conclude that our model is a equipped well and it is said that it is efficiently used and the outcome of our project would definitely be the massive reach. and the way we approach our model is the thing which can extremely be useful for the welfare of the society, since it is the most important thing for each and every people to follow the social distancing and the norms to be followed for the welfare of people .it is used for the monitoring of the people to follow the social distancing.

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SMART MIRROR TV

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Abstract - The legacy TV is now being replaced by IP-connected Smart TV which offers more advanced computing ability and connectivity. Smart TV also allows the user to put in and run more advanced applications supported a selected platform. Smart TV is predicted to play the role of a hub which mixes big variety of solutions for digital living services in range in the near future. In this paper, we presentThe purpose of this TV is to keep users leaning back and watching TV screen and then to provide them with an intuitive and convenient way to monitor and control TV. This paper depicts the planning and development of smart mirror which can make our lifestyle easier and time efficient. Smart Mirror may be a simple mirror which has been enhanced by the assistance of technology. The aim of the smart mirror is to supply a simple thanks to information service like news feeds, weather, clock etc. It also provides some basic AI features like real time interaction with users and so on.The future is here! Imagine yourself reading news feed or checking todays weather while dressing or shaving ahead of the mirror.

INTRODUCTION

The concept of smart mirror has evolved for decades, though no one solution has broken through the mainstream yet. Smart mirror technology generally consists line of two parts: Most systems use either power line communication

Universal power-line bus, which is based is a reliable, cost-effective, two-way communications technology which enables control products to utilize existing power-lines for both residential and

commercial applications. All INSTEON devices are peers, meaning that any device can transmit, receive. Without requiring a master controller or complex routing software. Adding more devices makes an INSTEON network more robust, by virtue of a simple protocol for communication retransmission and retries.

All functions can be controlled, monitored and signaled via a uniform system without the need for extra control centers. Wave is a low-power wireless technology designed specifically for remote control applications. It uses simple, reliable, low power radio waves that easily travel through walls, floors and cabinets. So, Z-wave protocol is optimized for reliable, low latency communication of small data packets with data rates up . ZigBee is used in applications that require a low data rate, long battery life, and secure networking. includes the home automation profile. One of the great benefits of ZigBee is its flexibility. It was designed so specific application software known as profiles could be developed and deployed.

IMPLEMENTATION

The DTV middleware has been developed also by the other group in this also by the other group in this research project. To demonstrate the proposed framework, a small-scale model of home has been assembled in B. Small-Scale Model of Home four different kinds of home devices are built in the model. Considering the real circumstances, the legacy devices such as the lamp, the thermostat, and the door-lock are connected to the bus through transceivers. is currently a widely used communication exploration project group. The primary part of the Television top box is a DTV which contains double center CPU offering

execution at GPU offering the execution sound/video decoder, show motor, etc. The moreover upholds different I/O interfaces like Ethernet, HDMI, USB, etc. introduced on the TV. The DTV middleware has been grown additionally by the other bunch in this exploration project. The Android applications and the JavaScript APIs for Web applications are upheld.

SOFTWARE

The shrewd TV has been gathered by another bunch in our exploration project group. The primary part of the Television top box is a DTV which contains double center CPU offering DMIPS execution, GPU offering the execution of Megapolygons/s at MHz, sound/video decoder, show motor, etc. The moreover upholds different I/O interfaces like Ethernet, HDMI, USB, etc. The Android is, introduced on the TV. The DTV middleware has been grown additionally by the other bunch in this exploration project. The Android/Java application programming interfaces for Android applications and the JavaScript APIs for Web applications are upheld. server module, and gateway server module, and gateway server module. The module performs monitoring of the states of the local server modules and the gateway server module, checking of the availabilities of the home appliances, and controlling the activities of the home appliances. We have defined application programming interface architecture which makes it easy for home device manufacturers to add their products with least modification of other modules. The local server module performs relaying command and report messages between the module and the gateway server module. . The local server module records all access histories, related to the commands and reports, into a database. The gateway server module performs transforming the command and report messages to deliver them to home devices or to the module, and controlling the based socket communication

HARDWARE

The most recent adaptation of the Raspberry Pi board to be delivered is the Raspberry and that is the most famous in 2021. The Raspberry was delivered as a modification of the Raspberry Model B+. Many accompany memory cards of differing sizes, with some conveying MicroSD cards of 16GB or more. The sorcery reflection of things to

come will not simply say you're the prettiest of all. It'll likewise let you know the time, date, climate outside, forthcoming schedule arrangements, and then some. Truth be told, you can make a particularly keen mirror at this moment. It'll cost you generally to begin a DIY sorcery reflect without any preparation, however you can undoubtedly reduce expenses and get it down to around.

ARCHITECTURAL

The design of the system is a combination layered architecture and a client-server architecture. The user interact primarily with the GUI that is built upon the OS we use for the development for our system. When they attempt to make requests to edit their settings directly, they will be making a call as an application to the underlying OS, which will change The system itself communicates with remote clients via the Internet. When receiving information for interface modules, the system acts as a client to the web services. In interacting with other smart devices, the system will act as a server for information. highlights an example of a layered architecture.

CONCLUSION

This paper depicts the design and development of smart mirror which will make our everyday life easier and time efficient. Smart Mirror is a simple mirror which has been enhanced by the help of technology. The aim of the smart mirror is to provide an easy way to information service such as news feeds, weather, clock etc. The group will start with basic cases and functionality testing, before moving on to our alpha and beta testing In practice, we met around once a week, mostly to discuss the scoping of the project, as well as work on the actual code itself. In the end, while the timeline was optimistic, more time than expected was spent on the actual coding, and thus, the implementation portion ran into the last few weeks, overlapping with the testing. This paper depicts the design and development of smart mirror which will make our everyday life easier and time efficient The aim of the smart mirror is to provide an easy way to information service such as news feeds, weather, clock etc.

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Analytical Characterization Of Sustainable Bio- Fuel Obtained From Pyrolysis Of Wood Barks Of Bael

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Abstract-The present investigation emphasis on characteristics of pyrolysis products was obtained by intermediate pyrolysis of wood barks of bael (WBB) and appropriateness of engine performance adaptation. The superior volatile matter (73.69%) contented WBB biomass was selected as the feed stock in this study. Pyrolysis experiment was done by a fixed bed reactor at 600°C and obtained 40% bio-oil yield. Investigation of bio-oil by FTIR established the occurrence of methyl, ester, alkanes, ketones and oxygenated chemicals have been alternates for fossil fuels. According to GC analysis, the presence of CH₄, H₂ and C₂H₆ evolved syngas in WBB pyrolysis process can be used C.I engines at dual fuel mode operation. An engine test reveals that adding of the pyrolysis oil diminished BTE (%) and increasing BSEC (MJ/kWhr). Based on engine results, it was proposed that equal to 20% of WBB bio-oil can be used as a fuel substitute for diesel engines.

Keywords-wood barks of bael, pyrolysis, FTIR, GC analysis, engine test.

I. INTRODUCTION

In the present world, the population was ever increasing dramatically which in turn increasing the energy demand [1]. Enormous researches are investigated in bio-oil research. Since the present energy requirements are inevitable. In the year 2030, energy consumption rate of the Asia Pacific zone is expected to be increased up to 1.5% [2]. Biofuel reduces the global warming rate by adopting a closed carbon cycle. Important benefits of biofuels are non-toxic, eco-friendly, not harmful to the environment, renewability, availability and bio-degradability [3]. Bio-oil derived from biomass can be used in C.I engine fuel instead of fossil fuels without any C.I engine modification [4]. Bio-oil obtained from waste biomass attains the greater attention of biofuel researchers in an earlier decade. Based on Indian biofuel policy 2017, it was suggested that about 20% of biofuel can be blended with fossil fuel [5]. The non-edible oils, fish oils, oils processing wastes and animal fats can be used as a feed stock material for bio-fuel productions [6]. In the pyrolysis process, biomass is degraded in an inert atmosphere which in

turn generates bio-oil, bio-char and syngas as main products[7]. Bio-oil obtained from the thermo chemical conversion having a greater amount of organics, so it can be used as a fuel in furnace and Boilers. Bio-char can be used in various fields like organic fertilizers, chemical manufacturing, and solid fuels [2]. Syngas comprises the volatile organic components of CH_4 , CO_2 , H_2 , N_2 , it can be utilized in power source to reactors and industries [8].

Bael tree comes under the family of rutaceae[5]. It is holy tree to India which is generally seen in Lord Shiva temples. According to the numerous literature reviews, not at all significant research has been done in WBB pyrolysis products. The present research to focus on the characteristics of WBB pyrolysis products valorization and investigated the possible of WBB pyrolysis oil as a diesel engine fuel. The intermediate pyrolysis of WBB was carried out in 2kg fixed bed pyrolysis reactor at a temperature of 600°C and heating rate of $10^\circ\text{C}/\text{min}$ in which higher pyrolysis oil yield was identified. Quantity and quality of the pyrolysis products yield are strongly based on biomass characteristics and the processing conditions[9]. WBB biomass characterized using proximate and ultimate analysis. The WBB bio-oil characterized through physicochemical characteristics, and FTIR investigation. The sub pyrolysis product syngas was analyzed by using gas chromatography (GC) method. The most important benefits of this research were to characterize the WBB pyrolysis products are to find out the correct applications towards commercialization in the suitable market.

II. MATERIALS AND METHODS

A. Biomass material

The WBB was collected from Western Ghats at free of cost. As per processing step, WBB was dried out in daylight in order to remove the moisture content present in the feed stock.

B. Proximate analysis and Ultimate study

Fixed carbon (FC), Volatile matter (VM), ash content (AC) and moisture content (MC) of the WBB analysis adherence to ASTM D3172-07 by PerkinElmer 2400 analyzer. The ultimate examination gives info about the elemental composition. It was carried out by using PerkinElmer elemental analyzer which determines the percentage of C, H, N, S and O present in the sample material.

C. Fourier Transformer-Infra Red spectroscopy study

FTIR (Fourier Transformer-Infra Red spectrometer) study the molecules and functional groups occurred in the pyrolysis products. FTIR analysis was done by PerkinElmer Spectrum FTIR SP 10S/W (Model L160000E) spectroscopy and the absorption frequency range of the equipment was 400 to 4000cm^{-1} with a resolution of 4 cm^{-1} .

D. Fuel properties

The physical and chemical characteristics of WBB bio-oil were obtained as per ASTM standards. Physicochemical properties of the obtained pyrolysis bio-oil are very important characteristics because of these properties influence the usage of engine application and towards the commercialization of the pyrolysis oil.

E. Gas Chromatography analysis



FIGURE 1. Gas Chromatography

Figure 1 shows the Gas Chromatography (GC) analysis of evolved gas. In WBB pyrolysis process the evolved syngas was analyzed through Gas Chromatography by Shimadzu GC-2014 gas analyzer. The evolved pyrolytic gas initially passed through the silica filter fitted gas flow path finally collected the gas bleeder. This syngas collected bladder was employed for the gas chromatography analysis.

F. Engine testing



FIGURE 2. Test Engine rig

The portrayed of test engine shown in Figure 2. Single cylinder compression ignition engine test engine integrated with electrical loading was employed in this experimentation. Testing of pyrolysis oil/diesel blends in a diesel engine is one of the major milestones in the valorization of the pyrolysis products. A diesel engine test rig was

attached with AVL 250 MDS system and AVL smoke meter to examine the emission composition while operated with bio-oil. The C.I engine test was carried out at standard operating conditions. In this study binary blends of pyrolysis oil were analyzed [A10 (+10% WBB bio-oil + 90% diesel), A15 (15% WBB bio-oil + 85% diesel), A20 (20% WBB bio-oil + 80% diesel)]. Owing to the dissimilarity in viscosity between the bio-oil and diesel, it becomes unavoidable to emulsify the bio-oil with diesel fuel. Surfactants (Span-80 and Tween-80) are employed to emulsify the bio-oil blends. Afterward accomplishment of emulsification mixture test fuels, the engine testing was carried out in triplicate. The specification of C.I engine specification is shown in Table 1.

TABLE 1. Engine Specification

Sl.No	Specifications	
1	Make	Kirloskar Co. Ltd
2	Type of injection	Direct injection
3	Engine speed	1500 rpm
4	Injection timing	23° bTDC
5	Cooling system	Water cooling
6	Number of stroke	One
7	Number of Cylinder	Four
8	Cylinder stroke	110 mm
9	Cylinder bore	87.5 mm
10	Rated output	3.5 kW
11	Compression ratio	17.5:1

G. Experimental set-up for the pyrolysis process

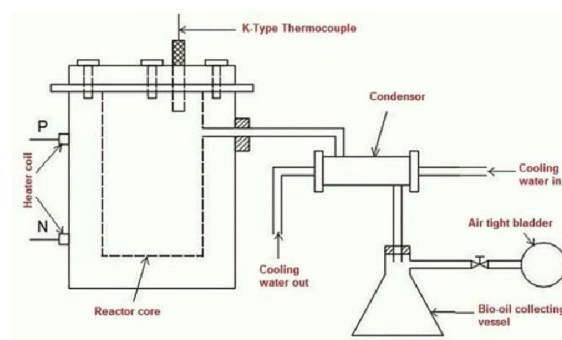


FIGURE 3. Pyrolysis reactor

WBB pyrolysis products were derived from intermediate pyrolysis carried out in 2kg fixed bed reactor which is shown in Figure 3. This reactor was fabricated by SS 310 grade material, owing to the extreme operating temperatures during the pyrolysis. The SS 310 grade material can withstand temperature up to 1000°C. The reactor was equipped with an electrical heater (240 V/9.5 A) and the reactor temperature was regulated by a PID controller integrated with a K-type thermocouple. During the pyrolysis reaction evolved pyrolytic gas was condensed by a shell and water tube-cooled condenser arrangement.

Initially the reactor was cleaned properly to ensure no char derived by the previous experimentation. Pyrolysis reactor outlet tube was joined with water tube-cooled condenser. Inside the reactor core 2kg of AM seed cake was filled and the reactor is sealed with a gasket. The gasket was to ensure the inert atmosphere for the pyrolysis process. Pyrolysis process heating temperature was monitored by a PID controller. The reactor heating rate was varied through dimmer stat, and the prerequisite temperature of 600°C was set in the PIDC panel. Once the reaction starts, the syngas was passed via the condenser set-up. The condensable setup of the evolved gas got collected in the oil collector; however the non-condensable gas was collected for gas chromatographic analysis. At the end of the pyrolysis process remaining by-product of bio-char was removed after cooling of the reactor in the air.

III. RESULT AND DISCUSSION

A. Elemental analysis of WBB biomass

TABLE 2. Elemental analysis

Sl.No.	Proximate analysis*	Weight %
1	Moisture content	3.01
2	Ash	2.19
3	Volatile	73.69
4	Fixed carbon	21.11
	Ultimate analysis*	Weight %
1	Carbon (C)	40.0497
2	Hydrogen (H)	6.1474
3	Oxygen (O)	52.2853
4	Nitrogen (N)	1.4732
5	Sulphur (S)	0.0005
6	H/C molar ratio	1.67
7	O/C molar ratio	0.76
8	Calorific value (MJ/kg)	20.17

Table 2 illustrates the results of proximate and ultimate analysis of WBB biomass. The increased volatile matter=73.69% and a lower value of fixed carbon=21.11% confirm the suitability of WBB for pyrolysis process and producing a greater quantity of bio-oil. The VM in the biomass was disintegrated into organic vapours during pyrolysis. The lesser value of moisture=3.01% and ash content=2.19% in biomass material portrays that WBB can be employed as lesser quality of solid fuels [2]. The ultimate analysis conducted by as per ASTM D5291-96 and reveals that the feedstock is composed of carbon (40.0497%), hydrogen (6.1474%), oxygen (52.2853%), nitrogen (1.4732%) and sulphur (0.0005%). Reduced H/C and O/C molar ratio and fair calorific value confirm the suitability of the feedstock to be used as solid fuel.

B. FTIR analysis of AM pyrolysis products

Figure 4 shows the FTIR spectra of WBB pyrolysis products. Table 3 shows the organic functional compounds existent in the WBB pyrolysis products. The FTIR investigation depicts the pyrolysis products contain alkanes, amines, alkyl, methyl and ester, compounds which are most inevitable

components of bio-fuel. The N-H stretching between 3500-3700 cm^{-1} represents the amines compounds. The wide O-H stretching between 3300-3400 cm^{-1} shows the presence of alcohols and phenols compounds. The wave band between 3000-3100 cm^{-1}

¹denotes the alkyl organic compounds [10]. The broad of C-H stretch at 2840-3000 cm^{-1} exhibit the alkene. The occurrence of α , β unsaturated ester group specifies the absorbance frequency of C=O stretching between 1715-1730 cm^{-1} .

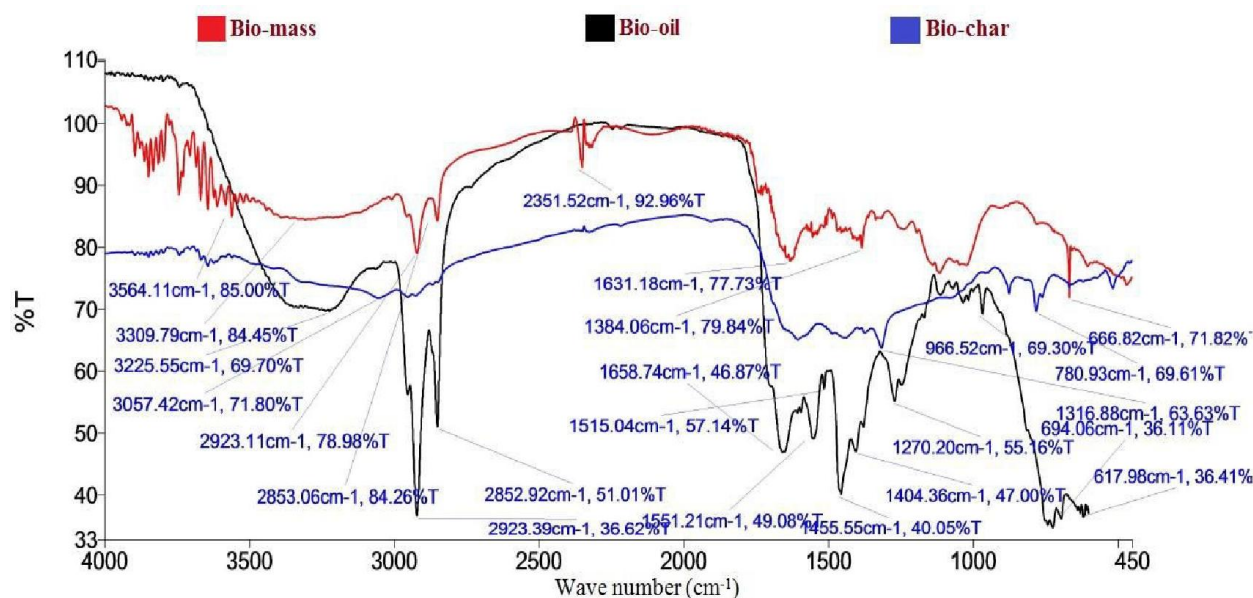


FIGURE 4. FTIR analysis

The existence of C=C stretch at 1566-1650 cm^{-1} depicts the occurrence of cyclic alkene group [11].

TABLE 3. FTIR analysis

Absorption frequency (cm^{-1})	Functional groups	Compounds
3500-3700	N-H stretching	Amines
3300-3400	O-H stretching	Aliphatic amine primary
3000-3100	C-H stretching	Alkene
2840-3000	C-H stretching	Alkane
1715-1730	C=O stretching	α , β -unsaturated ester
1600-1650	C=C stretching	conjugated alkane
1626-1662	C=C stretching	Alkane
1566-1650	C=C stretching	Cyclic alkene
1500-1550	N-O stretching	Nitro compound
1465	C-H bending	Methylene group
1450-1375	C-H bending	Methyl group
1380-1385	C-H bending	Alkane
1200-1275	C-O stretching	Alkyl aryl Ester
1163-1210	C-O stretching	Ester
1020-1075	C-O stretching	Vinyl Ether
665-730	C=C bending	Alkene

The nitro compound N-O bending wave band was detected at 1500-1550 cm^{-1} and C-H bending between the frequencies of 1380-1385 cm^{-1} designates the alkane. The wave ranges from 400-1500 cm^{-1} is known as fingerprint region where the wave frequencies are heavily occupied. The frequencies between 1163-1210 cm^{-1} reveal the presence of ester [12]. The spectrum analysis of alkene group by C=C bending band between 665-730 cm^{-1} . In the region of 1465 cm^{-1} exposed the existence of alkane methylene by C-H bending and it was notable that this is the starting of the fingerprint region. The peak at 1247.12 cm^{-1} specifies the presence of ether (C-O bending). The C-H bending region of 1450-1375 cm^{-1} exposes the methyl group. The stretching vibration (C-H) at the end of the fingerprint region elucidates the existence of vinyl ether.

C. Physical and chemical properties of WBB bio-oil

TABLE 4. Physicochemical Properties

Property	WBB pyrolysis oil	Diesel
Calorific value	41.35	45.40
Kinematic viscosity	7.83	3.49
Density	1.055	0.845
Flash point	79.12	65.57
Fire point,	52-98	74-105
Cetane number	42.65	50.06
pH	4.71	-
Water content	23.60	-

The physicochemical properties of diesel and bio-oil are given in Table 4. The maximum value of fire and flash points equate with neat diesel specifies that pyrolysis oil is safe during transit. In general, bio-oil is higher viscous which produces the maximum difficulties of fuel spray and injection in engine operation. This can be overcome by up gradation methods (hydro de-oxygenation, emulsification, and esterification). Later reducing the viscosity of the bio-oil by using emulsification technique. As compared to diesel, the calorific value of bio-oil is low, where as it can be compensated when blended with neat diesel. Sulphur of the bio-oil is lower as compared with diesel, which is lead to influential factor for SO₂ emission.

D. GC analysis of syngas

Among the syngas composition, carbon dioxide (CO₂) was found in a large percentage (11.684% of concentration). Thermal decomposition of C-O and -COOH evolved the CO₂. The second-highest percentage of gas present in the syngas composition was CH₄ (methane) (10.063%) in the retention time of 4.423 min. CH₄ and C₂H₆ together gases are greatly flammable. At higher pyrolysis temperature, the thermal collapse of benzyl and

methoxyl compounds to produce the methane and the aromatic components dehydrogenation to form the hydrogen group. Syngas contains H₂, CO, CH₄, CO₂ and C₂H₆ types of gas composition, so it can be used in power the reactor [12]. The advantages of syngas usage were reduced emission compare to diesel fuel [13].

E. Brake thermal efficiency (BTE %)

Since Figure 5, the BTE values increase in proportion with BMEP (brake mean effective pressure). It is evident that BTE of different blended fuels was recorded higher than that of diesel fuel.

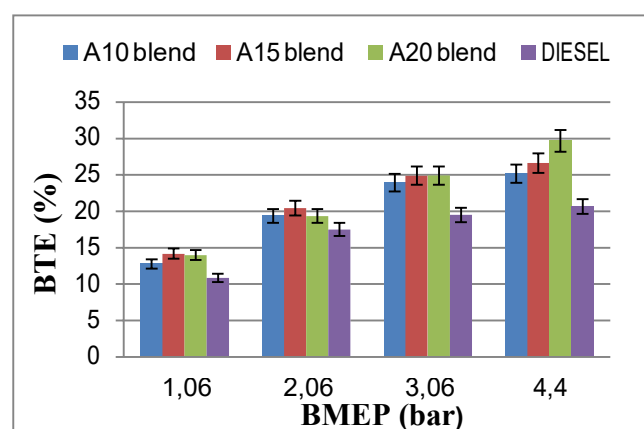


FIGURE 5. Brake thermal efficiency

A20 blend indicated the maximum BTE compared with other blends. At maximum loading, BTE values are (A10, A15, A20 and diesel) 25.18%, 26.62%, 29.67% and 20.64% correspondingly. The great O₂ content in bio-oil augments the combustion which leads to increase the BTE (%) [14].

F. Brake specific energy consumption (BSEC in MJ/kWhr)

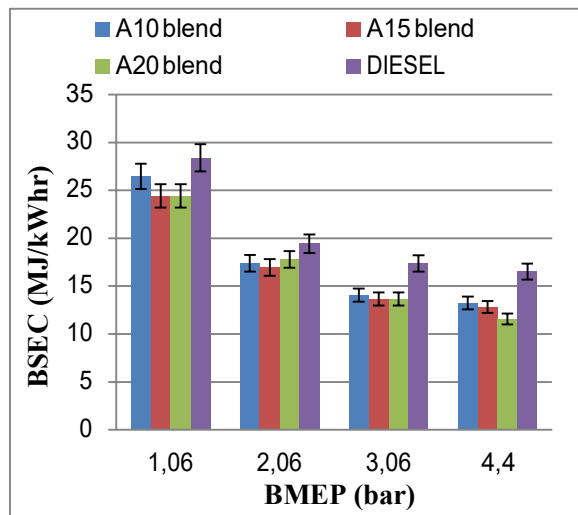


FIGURE 6. Brake specific fuel consumption

The BSEC diminished with the rise in BMEP for all bio-oil blends (Fig.6). At 100% load, BSEC values are 13.232, 12.8185, 11.578 and 16.54 MJ/kWhr for A10, A15, A20 and diesel respectively. The lesser BSEC was attained in A20 opus, and maximum BSEC obtained in diesel fuel. Lower BSEC was detected for different pyrolysis oil mixtures at all engine loading conditions as associated with neat diesel, this is owed to fuel up gradation, diesel mixed with pyrolysis oil and augmented O_2 content existing in the WBB bio-oil opus.

IV. CONCLUSION

The pyrolysis temperature at 600°C was caused in a higher amount of bio-oil yield of 40%. Physicochemical properties and FTIR analyses results were indicated that WBB bio-oil contains hexadecane, pentadecane, octadecane nitrile are rich in the range of C_{13} - C_{26} like diesel fraction and which indicate the WBB bio-oil instead of fossil fuel. According to GC analysis, methane and ethane have a high percentage of the composition. In general, methane and ethane highly inflammable nature, which is used as an alternate energy source for modified

engines. The ultimate application of the pyrolysis oil was engine operation. From the engine test consequence was specified that bio-oil addition augmented the BTE (%) and decreased the BSEC (MJ/kWhr) when compared with base line diesel. According to the engine investigation, it is evidently suggested that up to 20% of WBB bio-oil can be emulsified with diesel and employed as an engine fuel to attain enhanced engine operation.

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Design and Analysis of Aqua Silencer

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Abstract— An aqua silencer is a concept which is designed to replace conventional one unit engine silencers on board structure. It is made to deal with the control of overall sound at the engine exhaust of the machine. Sound produce due to engine can be controlled by using water as sound produce in water is less hearable than produce in open air. It is mainly so of small sprockets in water molecules which lowers its amplitude, thus lowers of sound level. Exhaust emissions are controlled by applying a layer of activated charcoal on a perforated value. Activating charcoal is highly porous and possesses free extra valances and has good absorption properties. So, it absorbed the gases from the engine and releases much low portion to the atmosphere. The sound and smoke coming out of the aqua silencer is considerably less than conventional silencer. Therefore serious attempts should be made to conserve the earth of environment from degradation.

INTRODUCTION

Aqua silencer is made to reduce the noise and emission in IC engines. The main objective why we go aqua silencer is, in today's life the air pollution causes physical ill effects to the human beings and alsoto the nature. The main reason allied the air pollution is automobile releasing the gases like corpbonic acid gas and unburnt Hydrocarbon. Carbon emission is the free of carbon into the atmosphere. The carbon emissions are directly referred to the hothouse gas emissions. The main benefactor to climate change. Since hothouse gas emissions are often calculated as carbon dioxide equivalents, they are called as carbon discharge, when discussing global warming or the hothouse effect. In industries the burning of fossil fuels has go in high value, simultaneously increase of carbon dioxide level in our aerosphere. thus the quick increase of global warming. In orderto avoid this classification of gases, aqua silencer is introduced. Currently, overall exhaust emissions, crankcaseblowby & vaporize losses are the main

exhaust discharge in case of automobile catalytic converter is used for getting jurisdiction above carbon monoxide (CO), unburnt hydrocarbons (UBHC) & oxides of nitrogen (NOx), and many more gasses. damper is used for controlling unpleasnt noise at tail pipe of vehicle wear out system. It also control the wear out gas recirculation (WOGR) for controlling crankshaft blow by. Evaporative losses are occurred due to engine parking it under direct sunlight. The reason of continuously increase the air pollution is the vehicle exhaust gases, release dangerous gases like Carbon Monoxide (CO), Oxides of Nitrogen (NOx), Unburnt Hydrocarbons (UBHC) & Lead (Pb), etc. Automobile industry exhaust is not the only cause of air pollution, other sources like electric power generated stations, TPP industrial processing, domestic fuel consumption, refuse burning etc. also give heavily to humiliation of our environment

1. Objectives

The massive study and research going to reduce emission level in auto-mobiles at many level. Our main objective of work is to give our knowledge to control the emission level at low value as possible in IC engine, reduce noise level and also reducing back pressure as much as possible. There has been an increase issue in recent in recent years about transportation and outlets of industrial waste into environment. The engine emission contains smoke which creates air contaminant other species. Hence, removal of these defilement was necessary concern over years. There are many other expensive technique developed in countries. In which adsorpted is less exorbitant and economically feasible. It has been used for current study using some cheap cost chemicals as an effectiveness adsorbent. Therefore the objective of the project work is to test the ability an Aqua Silencer in minimizing air pollution.

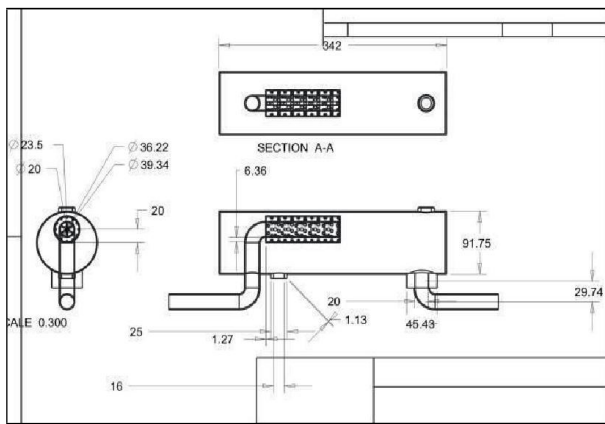


Figure-1: Drafted view of aqua

Silence Scope of the Project

Modifications and the scope of this project can be done by implementing nano tubes inside the perforated tube. The nano-tubes are the polymers which has the manganese which trap exhaust pollutants inside and separates hydrogen molecules. These hydrogen particle can be used as regenerative to charge the fuel cells. The nano tubes are fitted in penetrate tube is which submerge inside the water. So the distillation process is reduced and doesn't require unconnected technique. Nano tubes can be used instead of charcoal in AS. It is relatively expensive, next modifications are being carried out to increase more abilities

CONSTRUCTION & WORKING

Basically an aqua silencer is installed with a pierce tube which is ascend at the end of the exhaust pipe. The pierce tube is having holes of different diameters.

Generally 4 sets of holes are drilled on the pierce tube. When an electrical conductor, such as copper or aluminum, moves through the field of a permanent magnet or an electromagnet, electromagnetic induction creates eddy currents, which disappear some of the kinetic energy into Joule heat and results in slowing the motion of the conductor. This principle is utilized in the raising of magnetic brakes. This confirmation shows magnetic braking applied to a rotating metallic disk.

This might, for example, serve to control opposition to motion in exertion machines. Magnetic braking can also find appeal in roller coasters and railroad trains, in which the metallic director has the shape of a linear rail. In difference to conventional friction brakes, there is no direct contact between surfaces, which makes magnetic braking more dependable and decrease wear and tear. A magnetic brake is a device that grip strong magnetic forces to slow a vehicle down. There are several different types of magnetic brake systems, including ones that use electromagnets to drive traditional friction pads, and those that grip magnetic aversion itself to provide resistance.

By grow or reduce the total of galvanic

, the cease power of an swirl current fuse can be ditto reduced up or down. preferably than pads pressing harder on a rotor, the impervious magnetic force is louden. Though there is no physical contact, the process still cause increased slowing, along with heat, as a result of the opposition. Eddy current brake systems are used mainly in larger vehicles, like trains. A sub-type of the Eddy.

weaker than those between water molecules. It gets strenuous with water due to chromophore effect. It is found to be 20% effective for the water evaporation rate. The entire unit is then deposit in a water vessel. A small opening is provided for the outlet of the overtire gases at the above of the vessel and at the base a drain plug is ascend for regularly cleaning of the vessel. Also a padding plug from which water can be filled is ascend at the top of the vessel. A non- return valve is providing at the entry of the overtire pipe which avert the back flow of water and overtire gases in the engine cylinder. Therefore aqua silencer decrease noise water supplies because it has excellent belongings of alluring gases. The operate carbon is mostly available in the dust form is added to the water one before or after the concretion with precipitation. But it is always added before strainer.

Effects of dissolved gasses on water

The water gets polluted by the dissolved gases. When the gases liquefy in water, there are some of the following effects which are establish by the acids, carbonates, bicarbonates in water. The water is a good preoccupy medium. Action of dissolved SO₂

When SO_x is variegated in water, it form SO₂, SO₃, SO₄, H₂SO₄, H₂SO, i.e. sulfur Acid (H₂SO₃), it forms Hydrogen Sulphide which causes corrosion of metals and spread rotten egg smell. Action of dissolved CO₂ The dissolved carbon dioxide forms bicarbonate at lower PH and Carbonates at higher PH. This levels 40-400 mg/liter. They form a scale in pipes and boilers. Carbonic acids are formed which eroding to metals and causes hothouse effect. Effect of dissolved NO_x When NO_x is mixed in water, it undergoes oxidation to form ammonia as well as Nitrate, Nitrite and Nitric acid. This combined of protein and amino acids is pretentious by Nitrogen.

2. EXPERIMENTAL SETUP

= 1

motor power (P) = 6.15kw (8.36ps) @

8000rpm Max. RPM (N) = 8500 rpm

authorize back pressure for blunderer

= Not available (in H₂O)

Transmission Loss Noise target

(blunderer)

= 30 dB.

To find frequency barrel Firing Rate (CFR)

CFR = RPM/120 for 4-cycle motor CFR

= 8000/120

= 66.66Hz

motor firing rate (EFR)

EFR = No. of cyl. X barrel firing rate EFR

= 1 X 66.66

= 66.66Hz

Muffler volume calculations Swept

volume (V_s) = $(\pi \times d^2 \times L)/4$

= $(3.14 \times 50^2 \times 49.5)/4$

= 97193.022 cm³

= 0.09714375 Lit.

Volume to be contemplate for calculation

Volume = (No. of cylinders) x V_s

= (1) x 0.09714375

= 0.0971930 Lit.

As no. of cyl = 1 for hero splendor.

Silencer Volume (V_m) = Factor* x

contemplate Volume

= 25 x 0.0971930 Lit.

= 2.42982556 Liters.

*presume Factor = 25

For volume of silencer the factor should be

at least 12 to 25 times the volume to be

contemplated

. Volume can be changed depending on the space restriction.

Internal geography of muffler and concept design Diameter of blunderer calculated as

$V_m = (\pi/4) \times D^2 \times L$

$2429825.5568 \text{ mm}^3 = (3.14/4) \times D^2 \times$

$0.350D = 94.01\text{mm}$ OR $D = 94 \text{ mm}$.

Here, we take L= 350 mm after studying various muffler lengths of similar engine blunderer and overall space available on a motorcycle for ascend of a blunderer and hence we select the same length.

Tail pipe design

Generally Tail Pipe Diameter and shape is taken the same as selected by OEM or manufacturer for lesser flow resistance and optimum flow characteristics. Hence, Tail Pipe Diameter

= 23.48mm (From Hero Honda splendor).

Parameters	Before Installation of Aqua Silencer	Considered After Installation of Aqua Silencer
Carbon Monoxide (CO)	0.387 %	0.084 %
Non-Methane Hydrocarbons (HC)	524 PPM	239 PPM
Vibrometer Reading (Avg.)	113.66 db	99.33 db

Table – 1: Comparison of results.

3. Result Discussions

We obtained results by before accession and after accession of Aqua Silencer. Figure 7 show that the pollution composed reports for the model Hero Honda Splendor and motor vehicle no is **MH12 AL 5046**

without fix Aqua Silencer and Figure 8 Use the Aqua Silencer. Here we have seen that total amount of pollution which producing by the standardsilencer. Here we clearly seen the HSU % at different PPM.

4. CONCLUSIONS

We finish from our experimental results that Aqua Silencer is more efficacious than standard silencer by decrease the exhaust gasses discharge by using penetrate tube and charcoal. 1000 level is decreased by using area based water. By using penetrate tube the back pressure will remain constant and vehicle's fuel utilization will remain same. With the help of PUC reports the HSU% is decrease.

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Design and Analysis of Highway Wind Power Generation Using Wind Turbine

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Abstract - Energy is a very important in our every day's life. We use the limited resources whereas the population consuming the same is increasing day by day. Nowadays the need of electricity is more excessive than its generation, hence the main the objective of our work is to produce electricity in low cost with no effect on environment. The aim of work is to create a wind turbine to reclaim wind energy from vehicles on the highway. An appreciable amount of wind energy is created due to the pressure difference produced by the moving vehicles on the highways. This wind energy can be applied for the generation of electrical energy with the help of vertical axis wind turbines. This work objective is to extract this energy in the efficient manner. The turbine can be established on the center of the roads so that the wind from two sides of the center will act tangentially in reversed direction on two sides of the turbine there by expanding the effective wind speed acting on the turbine. This wind flow will bank on the velocity of the vehicle, size of the vehicle and intensity of the traffic. Based on the report made an excellent wind turbine design has to be made. The wind power mobilized through this method can be used for street lighting, traffic signal lighting, toll gates etc.

Key Words: Renewable Energy, Vertical Axis Wind Turbine, Wind Power.

I. INTRODUCTION

Worldwide wind energy is the quickest growing source of clean energy. A main issue with the technology is variation in the source of wind. There is a near consistent source of wind power on the highways due to briskly moving vehicles. The motivation for this project is to contribute to the global trend towards clean energy in a possible way. Almost wind turbines in use today are ordinary wind mills with three airfoil shaped blades incriminate around a horizontal axis. These turbines must be turned to face into the wind and in general desire significant air velocities to achieve. Another way of turbine is one where the blades are arranged vertically or transverse to the axis of orbit. These turbines will regularly rotate in the same direction nevertheless of the fluid flow. Due to the self-reliance from the direction of the fluid flow, these turbines have begin applications in

surface current flows. To see how active this sort of turbine would be in air, a coiled turbine based on the designs and patents of Dr. Alexander M. Gorlov was chosen. His turbine was developed to advance upon the design of Georges J. M. Darrius by developing the efficiency and removing oscillating stresses on the blades, caused by the blades beating their aerodynamic stall in the course of rotation, which often appear in fatigue failure in the blades or the nodes that achieved them to the shaft. The turbine grabs the Darrius type turbine, which has a majority of blades arranged bi- sect to the axis of rotation, and adds a helical twist to their way, insuring that regardless of the area of the turbine, a portion of the blade is always positioned in the position that gives maximum lift. This emphasize reduces the oscillation that are common in a Darrius type turbine. In his analysis, Gorlov claims that his turbine is automatically more efficient than Darrius' and has attained overall readiness between 30% and 35%. For this analysis, a helical turbine was approved inside and outside a wind tunnel using an electric generator (inside tests only) and a torque meter mated with a tachometer to measure the output function of the turbine and determine its efficiency. In the end, the turbine did not come close to the declared 30% efficiency, embracing at best an efficiency of about 0.35%. Further investigations should be made to regulate why the results from this investigation were as low as they are.

II. LITERATURE SURVEY

Chongyang Zhao, Jun Luo, "Experiment Validation of Vertical Axis Wind Turbine Control System based on Wind Energy Utilization Coefficient Characteristics," [1], states that wind power generation system experimental platform is established and wind generator external characteristics are measured. Wind energy utilization coefficient characteristics is in good agreement with wind energy utilization coefficient characteristic theory. Aravind, Rajparthiban, Rajprasad, "Mathematical Toolbox and its application in the Development of Laboratory Scale Vertical Axis Wind Turbine", [2], states that power generated is directly proportional to the wind speed available. Design of vertical turbine due to its advantage of operating at a low wind speed over that of horizontal turbine. Yan Li, Fang Feng, "Computer Simulation on the Performance of a Combined-type Vertical Axis wind Turbine", [3], states that A combined type straight-bladed vertical axis wind turbine (CT-SBV A WT) was designed in this study by setting a Savonius rotor having good starting performance into the SB-VA WT Savonius rotor set in the SB-V A WT can greatly improve the starting performance of the SB-V A WT.

Madani, Cosic, Sadarangani, “A Permanent Magnet Synchronous Generator for a Small Scale Vertical Axis Wind Turbine”,[4], states that A design of surface mounted permanent magnet synchronous generator with concentrated windings. The design features low harmonic contents in the air gap flux density and in the induced voltage. Chongyang Zhao, “Experiment Validation of Vertical Axis Wind Turbine Control System based on Wind Energy Utilization Coefficient Characteristics”, [5], states that Wind generator external characteristics are measured. Speed ratio and wind turbine characteristics are analyzed.

III. OBJECTIVES AND SCOPE

The main datched is to harvest and recapture the huge amount of wind energy from the automobiles for running on the highways. The untouched and appreciable amount of wind is nearly mew to drive the vertical wind turbine, which will use the kinetic energy of the wind to produce the electrical energy. Expanded turbulence levels yield greater change in wind speed and direction. Unlike traditional horizontal axis wind turbine (HAWT), vertical axis wind turbine adequately captures turbulent winds which are natural in urban settings. An effort is made to build a vertical axis wind mill of 50W quantity. Our aim is to design the turbine which will abduction the maximum of wind in any direction by insatlling it at optimum place and height by seeing both the cost and security of the system. This system can be used in large number to generate the massive amount of useful electrical energy. This energy can be stored and conveyed to nearest rural places where we can accomplish the demand of electricity. The attention of design directs us to look into the various attitude such as manufacturing, noise, cost which leads us to our additional aim of considering the system to overcome the usual technical glitches. The project advise involves the design of a pint-sized wind turbine that can be comfortably mass produced and fitted on every highway medians to aidelectricity utilization.

IV. DESIGN

Blades of the wind turbines are classified into two categories;

- Drag type
- Lift type

V. ANALYSIS OF DIFFERENT BLADES

In reference to air velocities, when trial the ranges, the Consecutive blade has been detected to have less efficiency in analogy to other blades. The logic for this is because there is a equitable quantity of drag force acting on both blades, as they are placed 120° apart while doing with the same quantity of airstream.

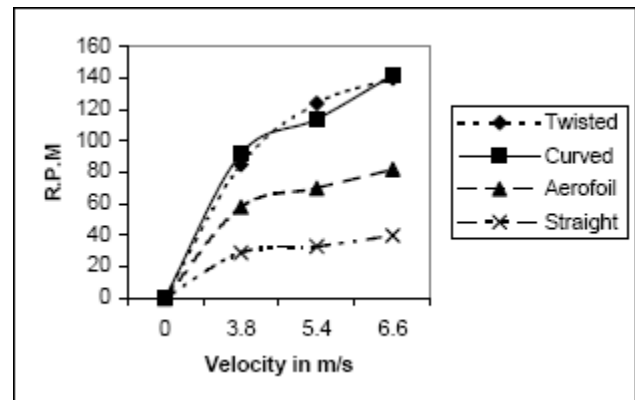


Fig.1

The turbine has three blades at an angle of 120° to all other. Such layout of the blades so that can belt maximum wind energy arresting it. The blades are one piece structure binder in the form of an arc, having a deflection less than that of a semi-circle. Curved type of design doesn't need much effort to get increased correlated to other stated designs. Due to the fact that, GI steel sheet has a long list of dominance like good tensile and compressive strength, rugged and approaching long life, high stiffness to weight ratio, good defiance against corrosion, it is employed for the arrangement of blades. Glass fiber reinforced plastic (GRP) would have been the perfect choice for the blades but this would become too overpriced and hence abrogate the objective of producing a low cost wind turbine. The dimensions of the blades are defenseless on the width of the road concealment and considering it chosen the dimension of the blades as 100×50 cm². The cross-arms are Y-shaped steel rods which are square in random-sample. The wind turbine's hub is the connecting section between the blades dominant to the main shaft. Each blade is associated to the hub with the help of three steel rods.

VI. BLOCK DIAGRAM

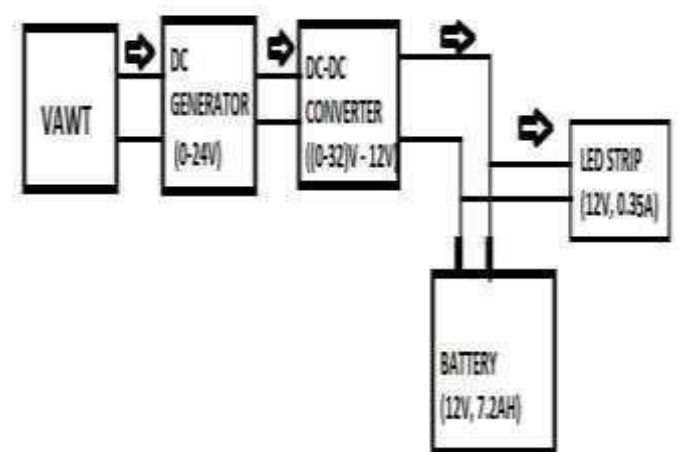


Fig.2

A. Centre Shaft

The shaft of the turbine consists of a single 1.5m length of steel aligning 25mm in diameter. The use of steel over a luminous metal such as cast iron was based on the opportunity of materials. The top and bottom ends mild steel of length 1inch each are commonly fixed to give strength to the hollow shaft. A solid shaft revolving at 75 rpm is simulated to be made of mild steel.

B. Bearing

For the creamy operation of Shaft, bearing mechanism is recycled. To have very limited friction loss, the two ends of shaft are rotated into the same dimension bearing. The Bearing has diameter 2.54cm. Bearings are generally rotated for supporting the shaft and creamy operation of shaft.

C. DC Generator

An electrical generator is a machine which apply **mechanical energy** (or power) into **electrical energy** (or power). Induced **e.m.f** is composed in it according to **Faraday's** law of electromagnetic induction.

This **e.m.f** element a current to flow if the conductor circuit is closed.

Hence, two basic fundamental parts of an electrical generator are:

- a) Magnetic field.
- b) Conductor or conductors which can act to cut the flux.

D. Permanent-magnet field DC Generator

Permanent-magnet DC machines are generally found in a wide variety of **low-power** operations. The field winding is recouped by a permanent magnet, resulting in elementary construction. Leading among these is that they do not require exterior excitation and its correlate power dissipation to magnetic fields in the machine the space enforced for the permanent magnets may be less than that enforced for the field winding, and thus machine may be **smaller**, and in some cases **low-cost**, than their externally excited counter parts. Consider that the rotor of this machines consists of a conventional DC armature with commutator segments and brushes.

E. LED Strip Light

A LED strip light is a flexible circuit board colonized by Surface mounted light emitting diodes and other ingredients that usually comes with a sticky backing. Traditionally, Strip

lights had been used completely in accent lighting, back lighting, task lighting and decorative lighting applications.

F. Hardware



Fig. 3

VII. CONCLUSION AND FUTURE SCOPE

The main objective of this project is to build a small scale Vertical Axis Wind Turbine to develop power. These turbines are easier to construct and less contribution is needed. The application of vertical axis wind turbine on road dividers, on side of train tracks and potential power supply for isolated area would be a great credit to the ministry of Nonconventional energy Resources as it would diminish the burden on the expenditure of conventional energy sources. They can be equipped on any highway with the width being the only restraint. Since, turbine size is small, it can strap a limited amount of wind. Therefore they can be used for street lighting on any busy road and light up the announcement hoardings. Furthermore, these turbines can find utilization in lighting up financial buildings. Other application could be in departure on highways, traffic lights, industrial buildings, simply in household neighborhoods.

Since the battery is compact we can use it in some other position for any low voltage purpose. Thus there is equity between the cost and the power available. The developing trends in the technology have shown a way to the use of non-conventional energy sources so accurately and a little effort at the side may find an accurate solution for the boom of the electrical energy by the society.

In order to properly design a generator there are many ingredients that are required to be studied such as wind speed, power, current, voltage and many more. In order to determine the important generator parameters, MATLAB script file was developed using all necessary equations. Additional restraints such as efficiency, copper and iron losses. This resulted in Successful design estimations.

Successful determination led us to application of this design. MATLAB Simulink Software was used to make this VAWT

simulation model. All the determined values were Insatlled and observed the output. It was significant to change a few values to improve Output voltage and current waveforms were evaluated and compared with calculated Values.

The next step is to test each blade analitically, both to validate the previous models as well as calculate conclusively whether the new blade increases output power.

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Design and Simulation of Electromechanical Brake System

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ABSTRACT

The primary goal of an automotive brake system is to achieve a complete and safe stop as fast as possible. The need for better fuel economy, simplified system assembly, more environmentally friendly systems, ease of vehicle maneuverability, and improved safety systems has resulted in new types of braking systems. Electro mechanical brake systems (EMB) represents the replacement of traditional components such as the pumps, hoses, fluids, belts and vacuum servos and master cylinders with electronic sensors and actuators, motors. The ElectroMechanical

Braking Systems represents a complete change in Requirements from the previous Hydraulic braking systems. As new tendency of brake systems (EMB), responds more quickly, more environments friendly, more intelligent than the conventional systems.

Keywords

Antilock braking system, electric parking brake, electronic wedge brake.

I. Introduction

This project has been initiated as a new tendency of brake system in automobile field. Active safety control systems such as Anti-lock Brake System (ABS), Electronic Braking force Distribution (EBD), Traction Control System (TCS) and Electronic Stability Program (ESP) need to improve their existing braking functions in order to be truly effective

in improving driving safety. Therefore, brake systems will need to be faster and more sophisticated when controlling braking forces at the wheels. Figure 1 shows the development trend of braking control systems. The future development in braking technology will progress towards brake-bywire; therefore, brake manufacturers will need to take a greater interest in the development of ElectroMechanical Brake (EMB)

System. The driver's foot pressure measured by a sensor on the brake pedal is communicated to EMB controllers that relay the signal to the electric motor. The electric motor actuates the brake actuators then applies the required pressure at the brake pads to smoothly control the vehicle speed. Adoption of electro-mechanical technology in braking systems can offer potential benefits. Improved safety, by reducing the risk of brake fire, through the removal of flammable hydraulic fluid from the brake vicinity. [1-3]. Improved reliability and maintainability, by removing the possibility of hydraulic leakage and associated maintenance tasks. Potentially improved efficiency through better control of braking torque. Reduced system mass when considered in the context of the removal of Hydraulic pumps, reservoirs and valves. Improved efficiency and stability of brake control due to the quick and accurate generation of brake torques by electric motors. This paper investigates the modeling and simulation of EMB systems for Santro Hatch back vehicle. The performance simulation for the EMB was performed using MATLAB/Simulink. The control performance of the EMB system was evaluated via simulation of the braking, during various driving conditions.

II. Overview of EMB systems

An Electro Mechanical Brake system consists of the following components as shown in fig1

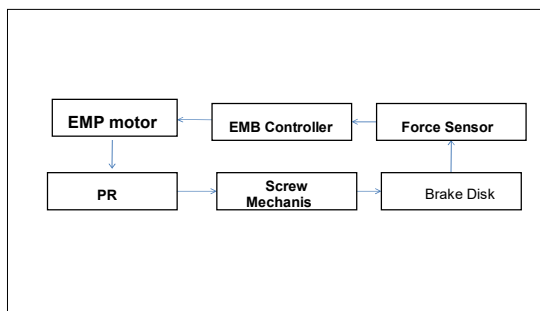


Fig 1, Block diagram of the EMB system

EMB motor as the most important part can convert electrical energy to mechanical energy. [1-2] PRG as reduction gear can decrease the rotate speed and increase the torque of EMB motor. Screw mechanism can convert a rotational movement of the motor into reciprocal movement of the screw. Screw can drive brake pads to provide brake clamping force. Input signals of EMB controller are a signal from a braking stroke sensor for sensing a stroke amount of

a braking pedal by a driver and a signal from ABS controller.

A. Force sensor

The Pedal Force Sensor measures the force exerted on the brake pedal during braking. The Pedal Force Transducer mounts quickly and easily using a rubber strap [10]. Measurement range: 0 – 1500 N, Linearity: 0.1%, 0.7% with integrated signal option Analog output: 1 mV/N. Dimensions digital display unit: 80 x 160 x 65 mm.



Fig 2 pedal force sensor

B. EMB Controller

EMB controller is a motor controller in nature. It adopts force control architecture with cascaded force, speed and current control loops. Three loops are all PID control. This method motor through limiting the maximal current and speed of the motor. EMB controller are designed beginning with the inner most control loop and then working outwards. The motor current controller is addressed firstly, then the motor velocity controller, and lastly the caliper clamp force controller.

C. EMB motor

The Brushless Dc motor is usually chosen as an actuator of the EMB system. In order to generate the proper braking force, Brushless DC are used to excellent output efficiency and remarkable durability, respectively. Figure shows the BLDC Motor technical specification.

NMB-Partnumber		BLDC40P30A-24V 25.1.050	BLDC40S30A-24V 25.1.050D
Rated Voltage	[V]	24	24
Rated Speed	[rpm]	3000	3000
Continuous Power	[W]	44	63
Rated Torque *1)	[mNm]	140	200
Continuous Stall Torque	[mNm]	155	297
Efficiency at Rated Speed	[%]	83.1	89.4
Current at Rated Speed	[A]	2.3	3.0
No Load Speed	[rpm]	3700	3400
Resistance per Phase *2)	[Ω]	1.46	0.50
Inductance per Phase	[mH]	1.50	0.50
Torque Constant	[mNm/A]	60	66
Speed Constant	[rpm/V]	158.4	143.6
Mech. Time Constant	[ms]	1.60	0.57
Rotor Inertia	[gcm ²]	40	50
Number of Poles		14	16
Weight	[g]	280	280
Thermal Resistance *3) *4)	[K/W]	6	6

Table 1 technical specification of BLDC

D. Armature controlled BLDC

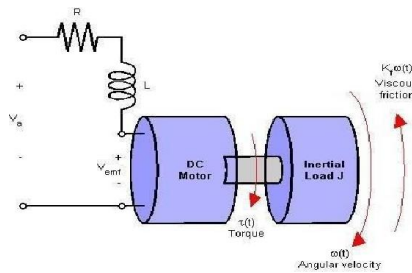


Fig 3 Armature controlled BLDC

E. Planetary gears

Planetary gear is mostly used in achieved high torque output in EMB system. The BLDC motor torques is not enough to actuate the brake pad, so planetary gear. Is used to increase the braking torque. Planetary gear set speed reduction ratio is 6, output torque of PRG is 190 Nm.

Gera series	Stage	Reduction Ratio	Output torque	Maximum speed
REX 105		6	190	3000

Table 2 specification of planetary gears



Fig 4 Planetary gear model

F. Screw Mechanism

A ball screw is a mechanical linear actuator that translates rotational motion to linear motion with little friction. Torque $T = Fx l / 2\pi\eta$ where f is friction Force, l is screw lead, η is ball screw efficiency



Fig 5 Screw mechanism

III. Vehicle Model (Santro-xing)

To calculate the braking force as per the Hyundai Santro vehicle was taken for the EMB design. The technical specification of the vehicle is given in table 3.

Vehicle total mass	854kg
Overall length	3565mm
Overall width	1525mm
Overall height	1590mm
Wheel base	2380mm
Min Turing radius	4.4m
Brake front	Disc
Rear	Drum
Tire size	155/70R13
Outer diameter of disk	230mm
Inner diameter of disk	143mm
Thickness	12mm

Table 3 Technical specification of the Vehicle**IV. Brake design for a hatch back vehicle(Hyundai santro Xing)**

By using the santro vehicle specification to calculate the following braking of parameters. [9]

A. Tire Radius

Tire radius of the vehicle was calculated by using the following relationship

$$\begin{aligned} \text{Radius} &= [\text{Rim size} \times 2 \times \text{section width} \times \\ &\text{aspect ratio}/2] \\ \text{Radius} &= [330.2 \times 2 \times 155 \times 0.7/2] \\ \text{Radius} &= 273.6 \text{ mm} \end{aligned} \quad (1)$$

B. Mass of the brake disc

Mass of the brake disk is calculated by the following formula,

$$M = \pi / 4 [OD^2 - ID^2] \times \text{Thickness} \times \text{Density} \quad (2)$$

$$M = \pi / 4 [0.230^2 - 0.143^2] \times 0.0012 \times 7850$$

$$M = 2.48 \text{ kg}$$

C. Brake energy

The brake energy is given by the equation

$$\text{Brake energy} = [kmv^2/2] \quad (3)$$

$$\text{Brake energy} = [1.05 \times 1185 \times 16.67^2/2]$$

$$\text{Brake energy} = [172.88 \text{ kJ}]$$

D. Brake power

The total brake power required to stop the vehicle is calculated by the following relationship,

$$\text{Brake power} = \frac{(4)}{[kmv/2]}$$

$$\text{Brake power} = [1.05 \times 1185 \times 16.67/2]$$

$$\text{Brake power} = [181.59 \text{ W}]$$

60% of the power required for front wheels.

Wheel speed is around 3000rpm.

$$\text{Brake torque} = [60 \times \text{brake power} / 2\pi \times 3000] \quad (5)$$

$$= [60 \times 54.47 / 2\pi \times 2770]$$

$$\text{Brake torque} = [187.58 \text{ Nm}]$$

E. Stopping distance

Stopping distance of the vehicle is,

$$\text{stopping distance} = [v^2/2g] \quad (6)$$

$$\text{stopping distance} = [16.67^2/25.5]$$

$$\text{stopping distance} = [25 \text{ m}]$$

$$\text{kinetic energy} = [1/2 mv^2] \quad (7)$$

$$\text{kinetic energy} = [1/2 \times 1185 \times 16.67^2]$$

$$\text{work done} = [\text{Kinetic energy}/\text{stopping distance}]$$

$$\text{work done} = 6585 \text{ J}$$

F. Friction Force

Total friction force is developed in the screw mechanism is,

Screw diameter -30mm (Model BS3210)

Lead -20 mm, Start thread- 5

Ball screw efficiency =90%

$$\text{Friction force} = [\text{Torque} \times 2 \times \pi \times \text{ball screw efficiency}/\text{Lead length}] \quad (8)$$

$$\text{Friction force} = [190 \times 2 \times \pi \times 0.90/0.02]$$

Friction forces are the result of changing resistance of the motor coil and the rigidity of the reduction gear

V. Configuration of EMB system due to temperature fluctuations. [5]

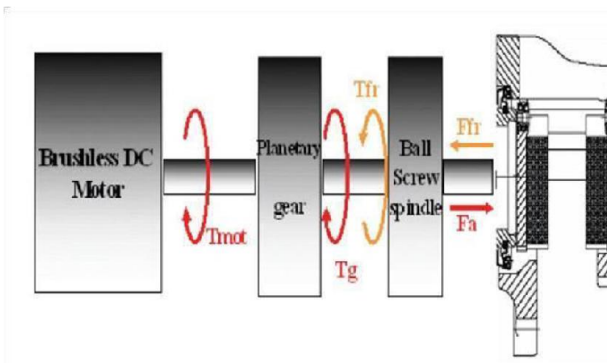


Fig 6 Configuration of EMB System

To compensate for friction, the control structure for EMB torque adopts a cascade loop. The loop has a low level control logic consisting of the current and velocity control loop shown in Figure. This structure requires particularly expensive sensors to measure the clamping force and braking torque; therefore, this paper uses a technique that estimates their values by sensing the voltage, current and position of the DC motor based on the dynamic model of the EMB.

A. Control structure of EMB system

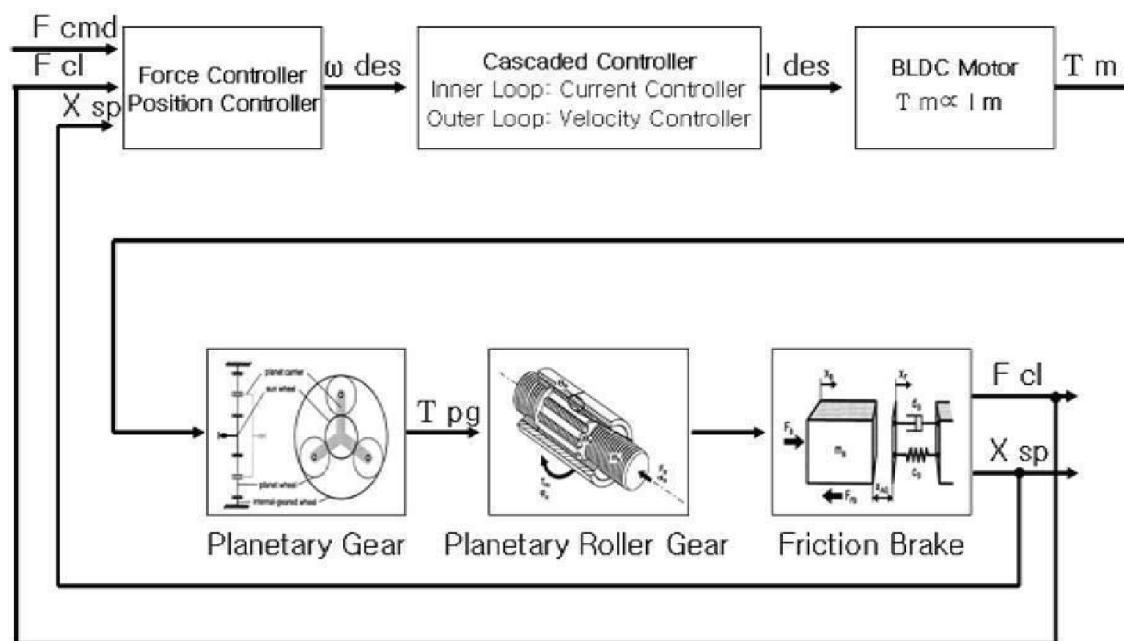


Fig 7 control structure of EMB system

The control structure of the EMB system describes the control parameters of BLDC. In this system cascade controller used to control the input voltage and current as well as force. [5]

Simulink model of EMB

Fig 8 shows the Simulink model of EMB, which

contains PID controllers, BLDC, and screw mechanism and friction plate.

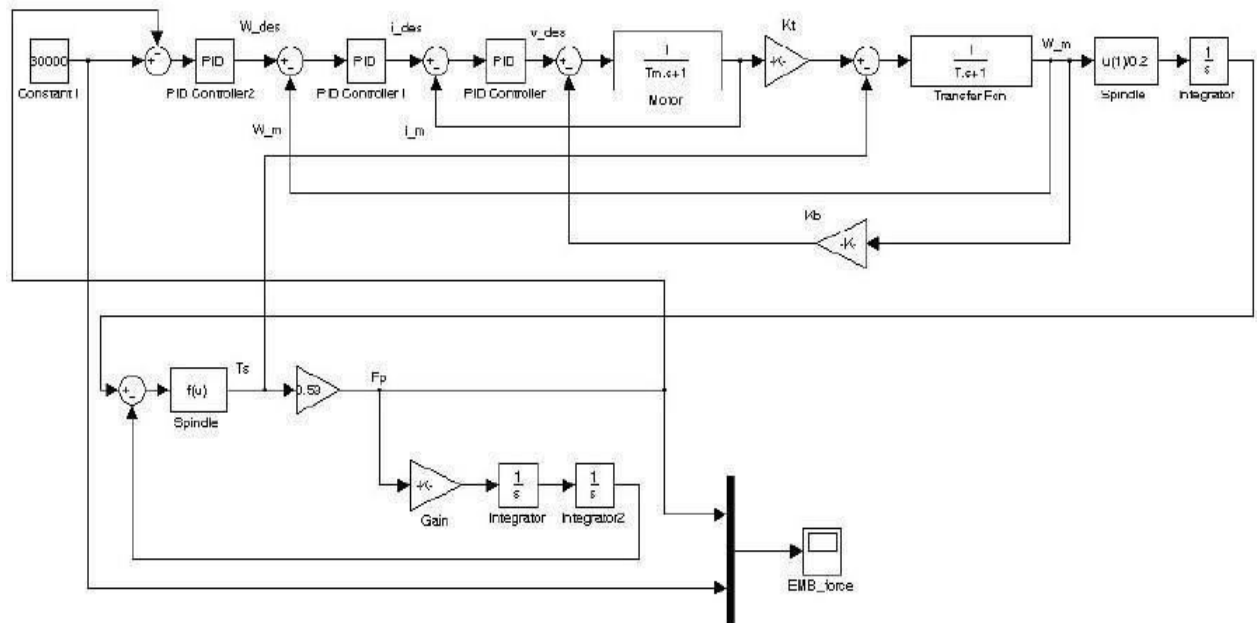


Fig 8 Simulink model of EMB system

V. Simulation model of EMB system

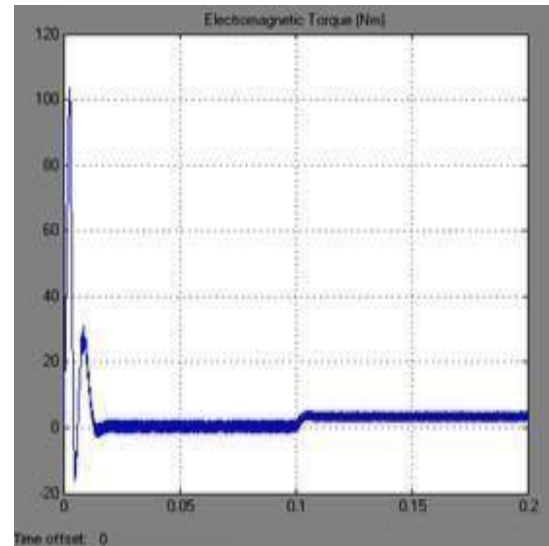
Fig8 shows the EMB performance analysis simulation developed in this paper. Force, speed, And electric motor current are fed back via the cascaded loops and controlled by the PID Controller [5]

VI. Results& Discussions

A. Motor torque VS time

The result shows (fig9) the Brushless dc motor can develop the high torque at initial time of motor running. The peak torque is developed to the motor in 0.01 time intervals. Some typical inputs are taken in account.

Fig 9 Motor torque Vs Time



B. Motor speed VS time

The results show (fig 10) the BLDC motor speed with respect to time interval. Maximum speed will reach within 0.03 seconds.

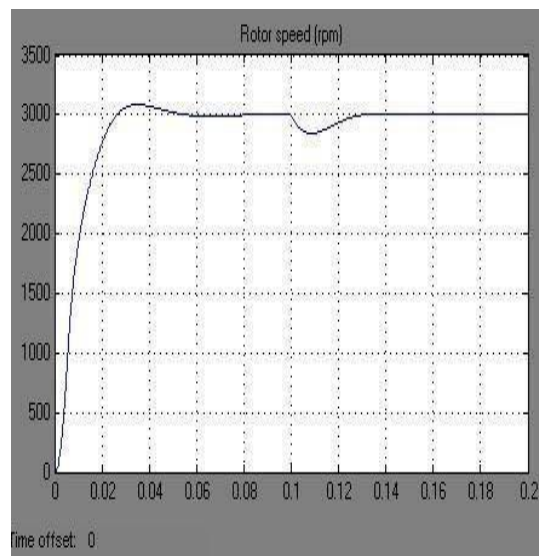


Fig 10 Motor speed Vs Time

C. Stator current VS time
D. Electromotive Force VS time

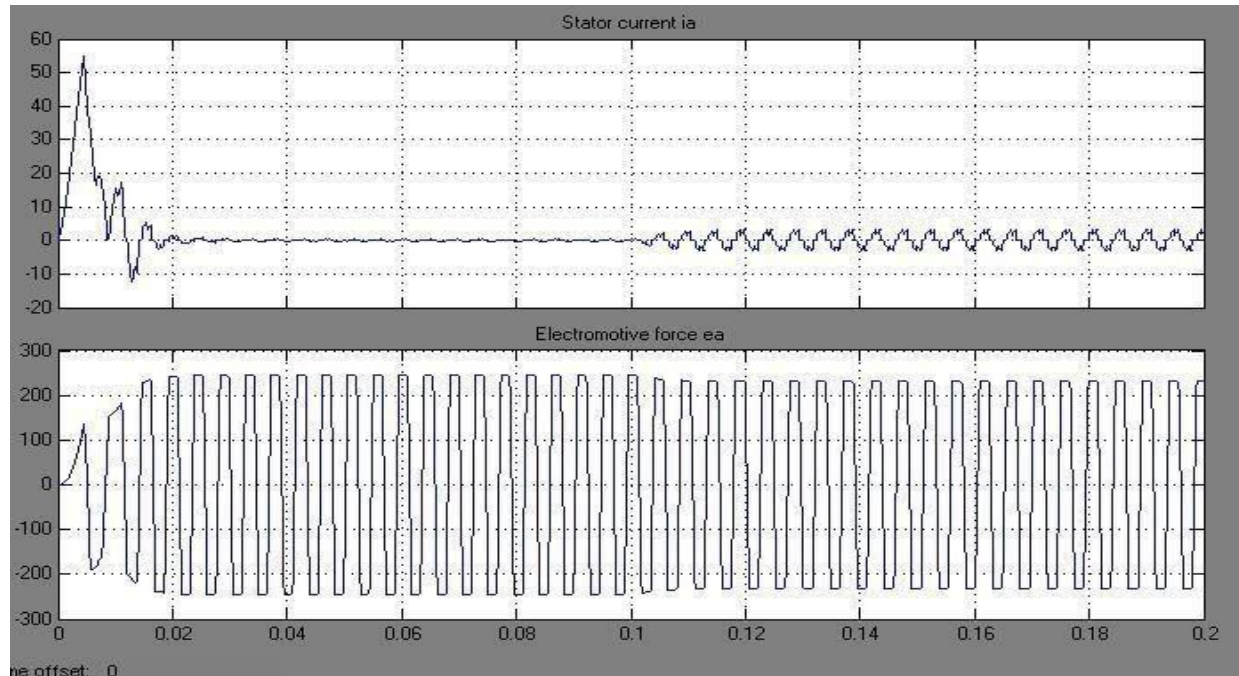


Fig 10 Stator current, Emf Vs time

Fig 10 describes the value of stator current with respect to various time durations. High initial current will pass through the stator.

E. EMB clamp force

The results shows the EMB clamp force response to the input speed of BLDC motor, the high input speed able to meet the requirement of the vehicle.

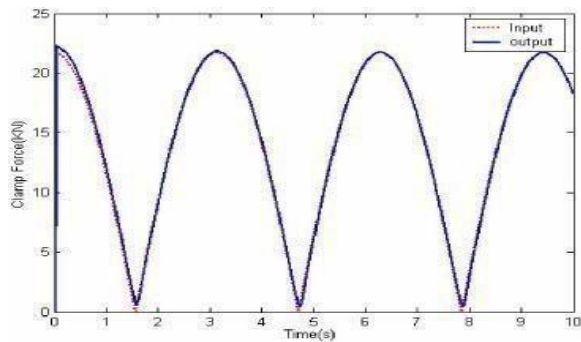


Fig11 EMB clamp force Vs Time

VII. Description of EMB system

This paper gives the principle of ABS based on EMB system and builds corresponding simulation model for its feasibility. The simulation results shows that the control for the motor force is accurate and the effect of EMB system. In this paper, the EMB controller adopting force control architecture with cascaded force, speed and current control loops and simulating the BLDC motor with various speed and current conditions. The result shows the high initial torque developed in the Motor. So the high initial torque to actuate the brake pad.

VIII. Conclusion

In conclusion, the work done of the project is completed the vehicle brake design and electric motor design and development of the controllers. The MATLAB Simulink model of EMB motor is carried out. EMB system is precise Control for the driver and reduces the stopping distance of the vehicle over to conventional brake systems.

IX. Future work

Simulink the EMB Model with various brake pedal force conditions, to compare the results.

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Development Of Solar E-Bike

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Abstract : Solar electric bike is a hybrid vehicle which allows the user to choose the mode of its energy. There are two ways a rider can opt to drive Solar Electric Bike-electrically operated system, and manual pedal system. The batteries in the electrically operated system can be charged by either Solar panels or wall charge plugin. The P.V. panels must be mounted and installed at the electric bicycle without compromising riding comfort ability. The concept of the solar energy is that a high torque motor will be put on the bicycle which will be generated by the solar energy. The solar energy will be absorbed by the portable solar panel to generate the power. The power that had been absorbed by the panel can be used directly by the motor if the power matches the power requirement. If not, the motor will use the power from a battery. When the bike was not in use during the day, the solar panel would charge the battery. The system will make bicycle operate more efficiently

Keywords: Solar e-bike; E-vehicle; hybrid bicycle

1. INTRODUCTION

Components used in Solar E-bike Solar panels, Voltage control, Brush-less DC Motor, Throttle Accelerator, battery, Chain Drive, Frame and other common bike components. There are two parts of Solar e-bike in terms of their functions and functionality: Power on Demand and Manual Pedal Assist. The BLDC engine is powered by a powerful-on-demand throttle, traditionally handlebar-mounted and on scooters or standard motorcycles. Engine failure is an action sensor for brakes. Systems with E-bikes can open up their use to wider viewers. The potential for modal switching from fuel-efficient modes of transport can increase. In addition, the roof can be placed on an E-bike, a channel that can work in partnership to protect the climate and a power supply provider by installing solar panels on the roof. If the available solar energy is insufficient, for example it can keep the system out of the grid which means that channels can be temporarily placed where necessary, e.g. near festival sites or sporting events. Placing solar panels on the roof of the stations will introduce solar energy into areas that would otherwise have been considered. A solar-powered E-bike can be one of the most efficient modes of transportation available. The main reason is that its weight is lower than that of a car or a scooter so less energy is needed to drive. A second reason is that biofuels or conventional cycling require the conversion of solar energy into chemical energy that is characterized by the low efficiency of energy conversion associated with the solar panel. Easy to use

2. LITERATURE REVIEW

Georgia Apostolou, Angel Reinders and Karst Geurs [1], agree with us about the current state of e-bikes, in particular, with solar-powered solar bikes. Also, this review paper examines the availability of available solar energy sources for transportation, and especially for e-bikes.

S Adisuwignjo, Siradjuddin, M Rifa, R I Putri [2], Learn about the development of a solar-powered electric bicycle that is controlled by a sensible sensor that can keep the battery charged so that the solar system on the bicycle remains stable. G.Srinivasa Rao,

K. Harinadha Reddy, Raghu Thumu, Ch Amarendra [3], In this case, They proposed a power transmission system using the B.L.D.C. A vehicle with sensory speed control and smooth operation is displayed.

H.S.Upare, P.S.Pandure [4], explored the current situation. The Solar Hybrid Bicycle system will help solve major fuel and pollution problems. India is blessed with nine months of tropical climate so the idea of a solar bike will be very helpful in India. Hybrid bike combines solar power and dynamo running between pedals to charge the battery to drive the bike. The bike has a highly efficient solar / electric generator system installed in the car to charge the battery at all times. This charging car can often charge itself with both solar and mechanical power. Solar panels can be installed on the back of the bike to capture the sun's rays. When the sun is not present, the mechanical function acts as an auxiliary source of energy. To control the speed of the car, an accelerator is provided that controls the supply. This type of strategy is to reduce operating costs and increase vehicle efficiency.

C.Sivapragash, C.Shankar, M.Nageena, B.Reetha Devi, K.Kiruthiga [5], This project is based on automated microcontroller, which includes components such as ATMEGA328 and PIC30F2010 as a controller, three-phase inverter, solar panel, hall effect sensor, variable resistor, etc., the engine used in the existing system is a brushed dc motor, it works a little better.

Kartik S Mishra, Shubham V Gadhawe, Dhiraj C Chaudhari, Bhupendra Varma and S. B. Barve [6], a Solar bike uses photovoltaic cells that convert solar energy into the voltage needed to charge a battery. There are two types of commonly used solar panels which are poly-crystalline panels and micro-crystalline solar panels. Poly-crystalline panels work less well compared to micro-crystalline panels.

Poly-crystalline panels work at about 15-20 percent while micro-crystalline panels work at 50 -60 percent. There are different types of batteries used in electric vehicles such as lead acid batteries, lithium-ion batteries, Nickel cadmium batteries, etc.

Fabian Fogleberg [7], explored that the recommended system design is to have a grid connected system as the solution outside the grid will not use full sunlight. Integrating the grid-connected system with the battery has been shown to increase the system time independent of the power from the grid from approximately 40 to 80 on the 2 m2solar panels via E-bike. The main advantage of introducing a consumer battery is that it allows you to mark the source of electricity when the grid is not used and that the efficiency of the system increases as less energy from the solar panel is converted to AC. Such background tags can be used to inform the user that his E bike is now powered by 100 solar power.

Mr. Prashant Kadi, Mr. Shirang Kulkarni [8], introduced a mixed bike project that could promote both clean technology and less reliance on oil. It will operate with pure electric power capable of recharging the battery in 3 different ways: with a 230 V AC wall source, solar power generation and dynamo connected to a bicycle wheel.

3. WORKING PRINCIPLE OF SOLARE-BIKE

Solar electric bike consists of the main components which are solar panel, battery, DC motor, chain drive, wheel. This project consists of bike, solar panels, dc motor, battery, sprocket, chain. In this project, the solar panel first absorbs the sun's rays and generates energy, which will go to the battery. And this power will be used to start the engine.



Figure 1: Solar e-bike

Parts of Solar E-bicycle model:

a) Solar panels:

Two solar panels with a power of 40 W are selected due to the weight of the space. To fully charge the battery, it requires 300/40 hours = 7.5 hours required. The DC voltage booster keeps the voltage high so that the battery can charge even if the voltage falls below the limit in isolated sunlight.



Figure 2: Solar panel

b) Lead Acid battery:

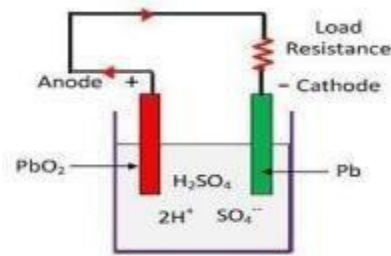


Figure 3: Working of Lead Acid battery.

Specifications of Lead Acid battery:

• BM Part #:	• SLA12V7-F1
• Voltage:	• 12 Volt
• Capacity:	• 7 Ah
• Type:	• Sealed Lead Acid Battery

c) BLDC motor Specifications:



Figure 4: BLDC Motor

- Output Power: 350W.
- Supply Voltage: 24/36V DC.
- Speed: 2750 RPM.
- No load speed: 3300RPM.
- Full load Current: $\leq 19.20A$.
- No load Current: $\leq 2.5A$.
- Weight: 2.56 Kg.
- Rated Torque: 1.11 N.m (11.1 kg.cm).
- Stall Torque: 5.55 N.m (55.11 kg.cm).
- Efficiency: $\geq 78\%$.

d) Arduino Board Technical Specifications:

• Microcontroller	• ATmega328
• Operating Voltage	• 5V
• Input Voltage (recommended)	• 7-9V
• Input Voltage (limits)	• 6-20V

e) Chain drive:

chain drive is a way to transfer mechanical power from a single device to a system

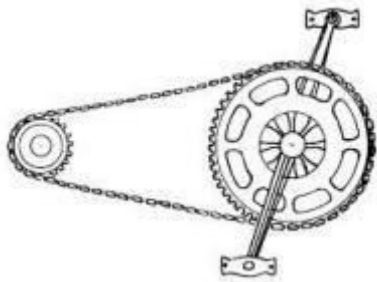


Figure 5: Chain Drive

f) Bicycle Wheel:

Bicycle tires are usually designed to fit the frame and fork out, and to hold the tires of the bike..



Figure 6: Wheel

4. DESIGN CALCULATIONS

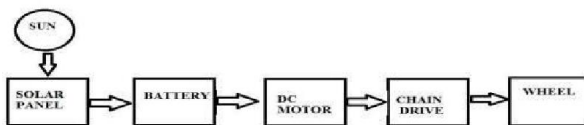


Figure 7: Working mechanism Solar e-bike.

Notes:

- d = width of perimeter rim in meters.
- r = radius of rotation rim in meters.
- ω = Speed angular shaft cycle.
- N = Cycle speed at RPM
- v = Circle line speed in kmph
- N_1 = Normal road response to each tire in Newtons.

- μ = Coefficient of friction = 0.3 F = Frequency of friction between wheel and road in Newtons.
- T = Torque improved on shaft due to collision force at Newton meters.
- P = Power required to ride a cycle in Watts.
- t = time required to charge the battery by A-C Supply per hour Bicycle data available:
- Cycle Rim Diameter $d = 66.04 \text{ cm} = 0.66 \text{ m}$
- Required Cycle Speed $v = 20 \text{ kmph}$
- Round Weight + Rider Weight (w) = 100 kg.
- Electricity - The bike is environmentally friendly and comfortable but expensive. Impossible as there is not enough supply supply in rural India. Thus, a bicycle that can be sold and powered by a solar powered battery seems to be the ideal solution to the problems discussed above.

Design:

- The design includes calculating the power required to drive an e-bike at a known speed (say 20 km / h) and to develop a solar powered system to produce the required power.
- As additional attachments will be attached to the circuit, a light weight cycle with a system configured and configuration was selected. Cycle was purchased.

Motor calculations

- Since the total weight of the cycle is equal to 100 kg, the Normal Response holding per wheel is equal to (50×9.81) Newton.

The collision force applies to a tire:

- $F = \mu N_1$
- $F = 0.3 \times 490.5$
- $F = 147.15 \text{ N}$

Speed calculations:

- $\omega = v \div r,$
- $\omega = (20 \times 1000) \div (0.33 \times 3600)$
- $\omega = 16.83 \text{ rad / sec}$
- $\omega = (2 \pi N) \div 60$
- $N = (60 \times \omega) \div (2\pi)$
- $N = (60 \times 16.83) \div (2\pi)$
- $N = 161 \text{ rpm}$

Power calculations:

- $P = (2 \pi N T) \div 60$
- $P = (2 \pi \times 161 \times 21) \div 60$
- $P = 353.878 \text{ W}$
- Solar energy is used as an additive to cycling. A 350 W engine with a power output of 388W has been selected.

Battery specification:

- Power = Current Voltage x
- $P = V \cdot I$
- $350 = 24 \times I$
- $I = 14.58 \text{ Ah}$
- So according to the above figures, driving a 350 W engine, 24 V capacity; we choose 2 batteries for 12V, 12.5Ah. We connect these batteries in series to get 24V power supply as required by the engine.

Electrical charging:

- The time required to fully charge the battery is calculated.
- Battery Charged during AC charging: AC adapter specification: 12V, 3 A
- $P = V \cdot I \cdot P = 12 \times 3$
- $P = 36 \text{ W}$
- Therefore, the time required to fully charge the battery is:
 $t = 300 \div 36 = 8.5 \text{ hours}$
- Thus, it turns out, the required time to fully charge the batteries is 8.5 hours.

5. CONCLUSION

After reading various research papers and conducting research on the current state of Solar e-bike, the following conclusions were proposed..

- Our solar e-bike can carry a total weight of 120 kg including the weight of the battery, motor and solar panel. Once the battery is fully charged Hybrid Powered the maximum distance to travel on an empty road is 35km. The hybrid bike can reach a top speed of 30 km / h. Compared to the existing E bikes the distance traveled and the top speed is small but considering the cost of our hybrid bike is equal to Rs 20000 and E bikes cost more than Rs 55000.
- The current work is related to the design of the solar E-bike. It uses a blurring controller that helps the battery to stay charged using solar power through solar panels. We will use this incomprehensible logic controller on our solar e-bike. And researchers have used brush-less D.C. motor to work properly and quiet the car. We will use the Brush-less D.C. engine. in our model to work efficiently and reduce heat loss and friction..
- Environmental analysis performed. This analysis and outcome were used for the continuous development of the solar E-bike. Example-Use of a plug charging system is done when you do not have solar power. Also, in previous research papers we have identified some errors that lead to a decrease in the efficiency of their model. In our model, we have tried to eliminate those problems in order to better operate our e-solar bike.

- Under ideal conditions, all available solar energy can be collected by solar panels but in an urban area this is not always the case as buildings will block radiation. The method of measuring this loss needs to be improved. When sunlight strikes solar panels, a number of different losses will occur during the conversion to electrical energy. These will depend on many factors such as the type of solar cell technology used, the external temperature etc.

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Electricity Generation By Hot Gases

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ABSTRACT

Roughly 40% of worldwide CO₂ outflows are discharged from power age through the ignition of non-renewable energy sources to create heat expected to control steam turbines. Consuming these energizes brings about the creation of carbon dioxide (CO₂) the essential heat-catching, greenhouse gas' answerable for an Earth-wide temperature boost. Applying shrewd electric lattice advances might conceivably lessen CO₂ emanations. Electric network includes three significant areas: age, transmission and conveyance lattice, and utilization. Shrewd age incorporates the utilization of sustainable power sources (wind, sun oriented, or hydropower). Shrewd transmission and dissemination depends on enhancing the current resources of overhead transmission lines, underground links, transformers, and substations to such an extent that least creating limits are needed later on. Shrewd utilization will rely upon the utilization of more productive hardware like energy- saving lighting lights, empowering shrewd homes and crossover module electric vehicles advancements. An exceptional interest is given to the Egyptian contextual investigation.

Principle openings for Egypt incorporate creating power from wind and sun based energy sources what's more, its geological area that makes it an ideal community for interconnecting electrical frameworks from the Nile bowl, North Africa, Inlet, and Europe. Difficulties incorporate deficiency of speculations, nonappearance of political will, maturing of transmission and dissemination framework, and absence of shopper mindfulness for power use.

Introduction

Worldwide CO₂ emanations in 2010 moved toward 30 gigatons (Gt). Roughly 12 Gt (40%) are radiated from power generation area through the ignition of non-renewable energy sources like coal, oil, and gaseous petrol to produce the hotness expected to control steam-driven turbines. Consuming these powers brings about the creation of carbon dioxide (CO₂) the essential hotness catching, ,greenhouse gas' liable for an unnatural weather change, notwithstanding other nitrogen and sulfur oxides answerable for different natural effects [1]. In the course of recent hundreds of years,

humankind has expanded the centralization of CO₂ in the air from 280 to more than 380 parts per million by volume, and it is becoming quicker consistently. As the convergence of CO₂ has risen, so has the normal temperature of the planet. Over the previous century, the normal surface temperature of Earth has expanded by around 0.74°C. On the off chance that we keep on discharging carbon without control, temperatures are relied upon to ascend by an extra 3.4°C before this present century's over. Environmental difference in that greatness would probably have genuine ramifications for life on Earth. Ocean level ascent, dry seasons, floods, exceptional tempests, woodland fires, water shortage, and cardiorespiratory illnesses would be a few outcomes. Agrarian frameworks would be anxious—potentially declined in a few areas of the planet. There is likewise the danger that kept warming will push the planet past basic edges or tipping points like the enormous scope liquefying of polar ice, the breakdown of the Amazon rainforest, or the warming and fermentation of the seas—day emissions continue to develop [2].

Power area is the significant wellspring of the all out worldwide CO₂ outflows liable for around 40% worldwide, trailed by transportation, industry, and different areas as displayed in Figure 1 [3]. Subsequently, we will concentrate in this paper on the most proficient method to diminish the amounts of CO₂ produced from power area utilizing what is known as the Smart Electric Grid.

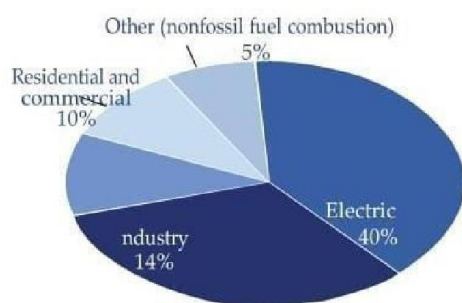


Figure 1: Sources of CO₂ emissions by sector (worldwide, 2009).

1. The Smart Electric Grid versus the Existing Electric Grid

The power framework was once depicted as 'the most prominent designing accomplishment of the twentieth century.' This position was exceptionally associated after the renowned power outage with New York city furthermore, practically Northeastern US and portions of Canada in 14 August 2003, leaving in excess of 50 million individuals without power, what's more, costing in excess of 6 billion dollars. Today, in the early 21st century, the computerized economy, the worldwide environmental change, furthermore, normal/fear monger dangers have all data and controls innovation to work on the dependability, security, and by and large proficiency of the electric network. This will be cultivated by offering shoppers and utilities motivators to cooperate to make a more

responsive and less contaminating framework [6].

The Existing Electric Grid. For over a century, the electrical lattice comprises primarily of three areas as displayed in Figure 2: age of mass force utilizing producing stations, regularly outside metropolitan regions, transmission of this force through overhead transmission lines at high voltages (to decline current and hence decline misfortunes and lessening the cross-sectional space of the conductors), and conveyance to clients (private, modern, business, and others) at client voltage utilizing underground links. Customary (warm) strategies depend on consuming fuel (coal, oil, or flammable gas) to warm water in an evaporator to get steam. The steam drives a turbine that turns conductors inside an attractive field to produce power. Consuming of fuel in power plants discharges carbon, sulfur, and nitrogen oxides, which destructively affect the climate (Table 1). Emanations that outcome from the ignition of these energizes incorporate carbon dioxide (CO₂), which is the significant green house gas (GHG) causing an Earth-wide temperature boost, sulfur oxides (SO_x), and nitrogen oxides (NO_x). These

oxides cause acidic downpour, respiratory ailments and heart sicknesses, particulate materials (PMs), which cause cellular breakdown in the lungs, and weighty metals like mercury, which are perilous to human wellbeing. Once in a while atomic reactors

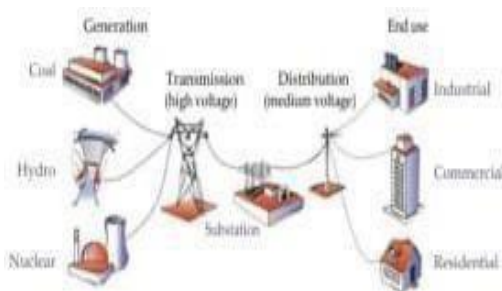


Figure 2: Elements of electrical power grid.

are utilized to make the hotness important for heating up the water. Thermal energy stations are not a wellspring of GHG outflows, yet they do deliver two sorts of radioactive issues: pollution with radioactive emanations and removal of utilized atomic fuel (uranium) that requires exceptionally planned capacity compartments due to the long life season of the radioactive uranium.

The Smart Electric Grid. Force age is probably going to move towards more sustainable and conveyed age (DG). Some renewables like breeze ranches are enormous scope and interface with transmission organizations, however numerous renewables are limited scale, and subsequently proper for interconnecting at the dissemination level. This essentially changes the plan of the framework and requirements extraordinary interfaces. It fuses circulated (or neighborhood) age like PV, biogas/biomass, furthermore, wind, which will be upheld by battery stockpiling and quick beginning age

sources [7]. Sustainable power sources like hydropower, sun oriented, and wind energy are climate amicable sources. In any case, they are not accessible all over. Hydropower energy is adhered to dams, and sun based energy requires adequate illumination forces. Wind energy requires a steady unidirectional wind speed. As a rule, sun oriented and wind energies are

TABLE 1: Comparison of different traditional power plants (2009)

	Coal	Natural gas	Oil
Electricity generation (TWhr)	8,263	4,301	1,111
% of total generation	40.8%	21.2%	5.5%
Main material	Carbon	Methane	Gasoline, kerosene
Emissions	CO ₂ , SO ₂ , and NO _x		
Impacts	Global warming, acid rain, respiratory diseases, and toxics		

TABLE 2: Comparison of different renewable power plants (2009)

	Hydroelectric	Photovoltaic	Solar-ther
Electricity generation (TWhr)	3,288	12	1
% of total generation	16.2%	0.06%	0.005%
Limitations	Implemented only at rivers or water falls	Low output power, depends on sun shining	Sun trackers, complex cost

combined with a conventional diesel or gasgenerator to supply power when these sources are lacking.

Certain specialized issues emerge when stopping such sources to the matrix. Hydropower offices convert water motor energy when tumbling from significant level (potential) to a lower one into power. The development and activity of hydropower dams manily affect regular waterway frameworks. It can flood riverside lands and obliterate land living spaces, it compromises the existence of stream populaces (fish and other untamed life), and it can block the normal progression of dregs. There are two uniqueways to deal with create power from the sun: photovoltaic (PV) and sun powered warm technol

Wind power plants utilize huge turning sharp edges to catch the active energy in moving breeze, which is then moved to rotors that produce power. Locales where normal breeze speeds surpass 20 km/hr are the best wind power plant locales. Wind ranches are contained huge quantities of turbines each mounted on tall pinnacles in provincial regions, requiring a huge piece of land with basically no occupants. Two concerns continuously emerge when planning a breeze ranch: noise contamination and the effect on bird populations. Table 2 sums up the portions of various sustainable energy plants and their ecological effects.

1. Electricity Impact on the Environment

Figure 3 shows the world's energy blend for generating electricity (2009) [3]. Figure 4 shows a correlation among GHG discharges from the different energy sources [8]. It shows how wind and sun oriented force emanate least discharges. Straightforward computations could show that building a power plant of limit 1 MW powered by gas-consolidated cycle would result in 400 tons of CO₂ identical GHG emanations. Utilizing coal or oil would result in somewhat over two times that amount. The relating values for renewables are under 10% of the cleanest customary source.

2. Smart Utilization of Electricity to Preserve the Environment :

Brilliant Home (Building) Applications. A brilliant home system incorporates hugely conveyed sensors and shrewd meters that can flag machines, gadgets, etc. Each home might have many hubs to be controlled, for example, appliance

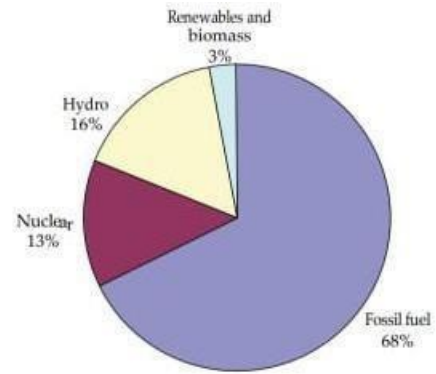


Figure 3: World's energy mix for generating electricity (2009).

warming/ventilation/cooling (HVAC), sun based boards, electric vehicles, etc. This load of hubs are to be controlled utilizing a solitary control unit with a programming include for turning on and off where fitting [9]. The data introduced to purchasers could comprise of different boundaries passed on mathematically, graphically, or emblematically as cautions or alerts, including: current and historical energy use, comparable CO₂ discharges, prompt request, current costs, and surrounding temperature, stickiness, also, lighting levels. The types of show gadgets under advancement differ, comprising of visual pointers utilizing information tables, outlines, shading codes, and glimmering lights too as sound markers in which cautions are set off by preset qualities to advise the buyer regarding forthcoming value occasions or energy use edges [10]. Overseeing top burden through request reaction all things considered of turning holds by giving customers ceaseless direct criticism on power valuing as the day progressed, particularly during the pinnaclespan, will cause customers to change their use because of estimating [11]. Figure 5 shows an outline of the brilliant home, with nearby age introduced in PV cells on the top of the home, with sensors inserted in wherever in the home which sense individuals, temperature, lighting, etc and send these information to the control unit (a little PC) which takes prearranged choices in light of the detected information, for example, turning off HVAC and lights when there is nobody in the room or diminishing force utilization when there are just couple of people (as customized), working the clothes washer and charging the electric vehicle in off-top periods, and some other choices.

1. Empowering Electric/HybridElectric Vehicles.

Electric Vehicles run utilizing power. Module half and half electric vehicles (PHEVs) can run utilizing both power and gas. The batteries of these vehicles can be charged at home or other areas utilizing a typical fitting. Just during longer excursions, gas will be utilized, as the vehicle batteries are drained. The presentation of PHEV may likewise drive the interest required for organizations to put resources into electrical refueling stations [12]. A SG will likewise work with the market reception and interconnection of module half and half electric vehicles (PHEVs) that can be connected to power plugs for re-energizing. According to the purchaser perspective, PHEVs will save fuel costs. According to a utility point of view, the capacity to charge PHEVs short- term gives functional advantages through improved framework load factor and usage of base burden assets. According to an ecological point of view, the sending of PHEVs will prompt CO₂ decreases. Be that as it may, inescapable purchaser charging of PHEVs during top periods in the day, for instance, could build top burden and increment utilities' functional

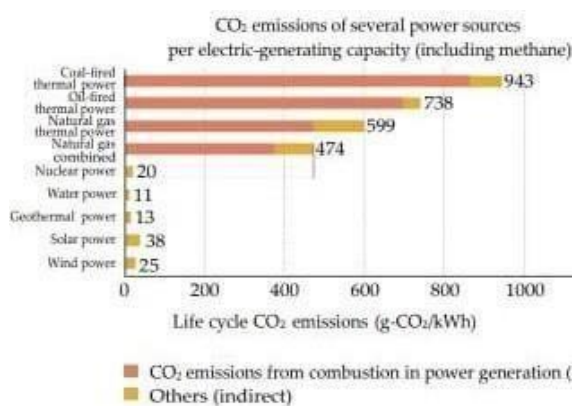


Figure 4: GHG emissions from various energy sources.

TABLE 3: Egypt's electric data (2011).

Energy generated	147 million kWhr
Hydropower	13 million kWhr
Thermal power	119 million kWhr
Renewables	2 million kWhr
Energy purchased from private sector (BOOT)	13 million kWhr
Energy consumed	127 million kWhr
Peak instantaneous load in megawatts (MW)	23500 MW
Network losses	10%

essentially imperative to utilities, since it involves the insight to send signs to shoppers on when to charge their vehicles or give separated rates to energize off-top charging. With equal advances in savvy vehicles and the SG, PHEVs might turn into a vital piece of the dissemination framework itself, giving stockpiling, crisis supply, and network security. In view of these contemplations, it is sensible to ascribe some portion of projected PHEV CO₂ decrease effect on the advancement of a SG. Figure 6 delineates emblematically how an electric vehicle (which runs exclusively utilizing power) or half and half vehicle (working utilizing both power and gas) is connected.

1. Case Study: The Egyptian Electricity Grid

As per 2011 measurements, Table 3 presents the principle information of Egypt's electric network. Except if in any case determined, every one of the information introduced in this segment are gotten from [13]. 4.1. Age. Around 90% of the complete age plants are warm (steam, gas, consolidated cycle). Nine percent

comes from hydropower sources, and just 1% comes from renewables, as displayed in Figure 7 [14]. The burning of these non-renewable energy sources brings about emanation of GHG, in particular carbon dioxide, as displayed in Table 4, in expansion to sulfur and nitrogen oxides, causing temperature rise and adding to the dark cloud wonders:

an outrageous air contamination wonders showing up over Cairo and Delta urban areas. To place Egypt in world setting, the assessed CO₂ emanation from the world's electrical force industry is 12 billion tons yearly, with estimated portions of 25% out of USA, 25% out of China, 25% out of other major modern nations, and 25% out of the remainder of the world. Egypt comes in the 30th spot with around 64 million tons of CO₂ emanations from electrical force plants every year (approx. 0.5% of worldwide discharges) [15]. Egypt is additionally chipping away at creating atomic force as an electrical energy source. Egypt has a 22 MW atomic exploration

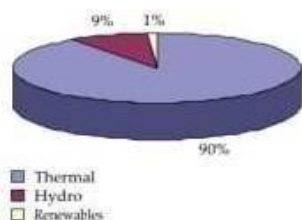


Figure 7: Electricity generation mix in Egypt (2011).

TABLE 4: Fuel consumption for generating electricity in Egypt.

Total fuel consumption in thermal plants	24700 ktce
Total energy generated from thermal plants	119 TWhr
Fuel consumption rate	208 gm/kWhr gen.
CO ₂ emission from thermal power plants	64 MMt
CO ₂ emissions intensity	540 gm CO ₂ /kWhr gen.
CO ₂ emissions per person (annually)	0.75 tons/person

reactor at Inshas in the Nile Delta that began operation in 1997. Egypt approved a 1.2 GW power station at El-Dabaa and is expected to become in operation in 2019. After the January 25, 2011 revolution, the project seems to be on hold indefinitely. Egypt has an ambitious plan aiming at increasing the contribution of renewables to reach 20% of total energy generated in 2020, where hydropower represents 5.8%, wind 12%, and 2.2% from solar energy. Hydropower is considered one of the cheapest and leanest sources of power generation. The construction of Aswan High Dam with a 2.1 GW capacity in the 1960s was renowned engineering project of the 20th century.

Currently, more than 85% of the Nile's hydro power potential has effectively been utilized. A portion of the world's best wind assets are situated in Egypt, particularly in the space of the Gulf of Suez, and West also, East Nile valley because of high wind speeds going between 8 and 10 m/s in normal, and furthermore because of the accessibility of huge unpossessed desert regions [16]. Figure 8 shows Egypt's wind map book [17]. Presently, Egypt produces around 550 MW of electrical energy from Zafarana wind ranch situated on the Inlet of Suez coast, along the Red Sea shore [18]. The extreme focus of direct sun based radiation (2,000–



Figure 6: Plugging-in electric or hybrid vehicle.



Figure 5: Smart home.

2,600 kWh/m²) in Egypt shows incredible potential for sun based energy advancement, particularly in Upper Egypt. Consistently, Egypt's essential areas offer at least 2,400 hours of sun powered activity. Egypt's first sun oriented nuclear energy station is situated in Kuraymat, around 90 km south of Cairo, and has the ability to create 140 MW and was finished and associated with the public matrix toward the finish of June 2011. The sun oriented force accounts for 20 MW of the plant's complete age. There is a general plan to trade North African- produced sun based power to Europe through the Desertec project [19]. Figure 9 shows Egypt's sun powered illumination estimated in conceivable creation of kilowatt hours per square meter per

Worldwide Connections. Egypt is at the gathering point of the three main lands: Africa, Asia, and Europe. Egypt activated a connection to Libya's electric network in 1999. The Five Countries interconnection joins Egypt in Africa to Jordan, Syria, and Iraq in Asia and Turkey in Europe. The interconnection has been finished in 2002. The Gulf Cooperation Council (GCC) power network project plans to connect Egypt to the GCC through Saudi Arabia. The connect is relied upon to be finished by 2015 and will permit the dividing of 3,000 MW of power among the two nations. This undertaking will in a roundabout way extend every nation's power limit by pulling from one another's provisions at various pinnacle hours. Longer-term plans call for more extensive interconnections that would incorporate Africa, the Middle East, and Europe, as displayed in Figure 10.

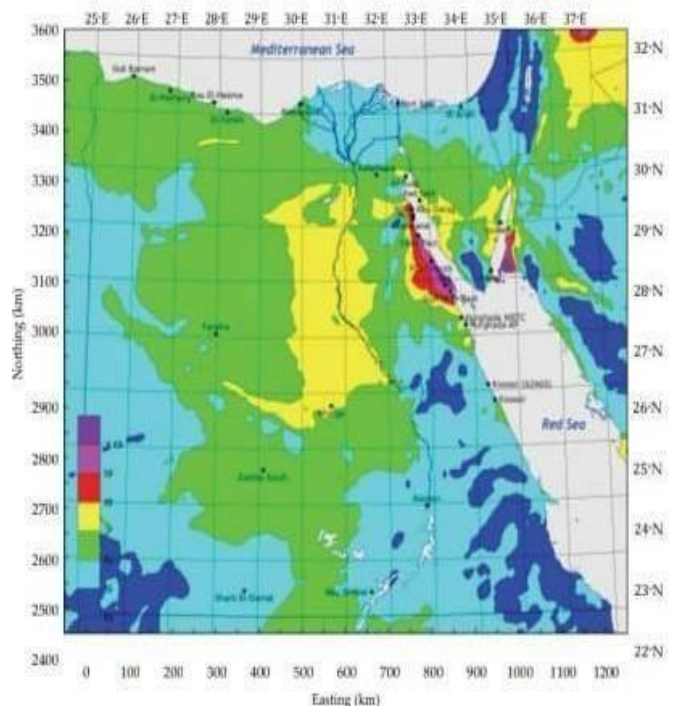


Figure 8: Wind atlas of Egypt.

Utilization. Most power clients are ignorant of their power use: the amount they use, when they use it, and how it is estimated. Contrasted and different businesses (media communications for example), power buyers do not have the help choices and valuing data important to settle on informed choices. Power suppliers gauge that advantages made conceivable by shrewd clients will comprise 33% to one-half of absolute SG benefits. Accomplishing these benefits, nonetheless, requires enormous interests in new metering, correspondences, and client interface innovation, along with approaches and administration contributions that make keen clients [20]. A portion of the actions that ought to be taken by utility companies in Egypt incorporate.

(I) Lighting loads represent around 23% of country load. There is a developing interest in substituting the typical brilliant lights with fresher conservative energy-effective ones. The legislative distribution organizations advance this pattern by offering new lights with half costs. 9,000,000 lights (20–23 W) are sold inside this program. Around 200,000 conventional sodium road lighting lights (400 W) are additionally subbed by high proficiency (100–160 W) lights.

(ii) Industries presently start to use electrical drives to control engines, focusing on expanded effectiveness and lower power utilization. A few businesses moreover start to enact projects for joined hotness and power (CHP) to utilize steam with high temperatures previously existing in their offices. Businesses with substantial power utilization like steel and petrochemicals are likely to twofold tax strategy; that is these customers need to pay half additional expense for their utilization for top periods. This strategy points at load moving to out-of-top periods.

(iii) Some dispersion organizations start the act of prepaid power cards. Others apply robotized meter perusing by utilizing electronic meters. This could be a stage towards savvy metering. A few organizations permit their clients to access and pay their electricity bills through the Internet

Conclusions :

In this paper, the idea of Smart Electric Grids looked into alongside its natural advantages. This idea calls on adding sagacity or knowledge to each part of the force framework, from age through transmission to appropriation. The utilization of sustainable power sources to create power rather than customary nuclear energy plants will prompt petroleum product protection and ecological upgrades because of decreasing greenhouse gases (particularly CO₂) transmitted because of warm age. Concerning the transmission organization, brilliant framework advances the utilization of existing lines and substations for most extreme productivity also, least misfortunes. With respect to utilization, presenting savvy meters, alongside the utilization of savvy house offices and broadened

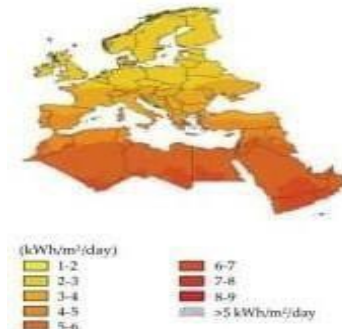


Figure 9: Egypt's Solar Potential.



Figure 10: Interconnection transmission system.

infiltration of half breed module electric vehicles will lead to diminishing GHG discharges, energy protection, and saving our current circumstance. Egypt can accomplish numerous specialized and ecological benefits from applying savvy matrix advancements, particularly in the field of expanded power age from wind also, sunlight based energy sources just as from initiating its topographical job as a power place between hydroelectric Nile bowl force, wind and sun oriented force from North Africa, and its capacity to interconnect with Europe across the Mediterranean. More endeavors are expected to present the capacities of the brilliant framework to the leaders for quickfinancing and arranging activities, just as projects for buyer instruction for rationing energy and its related advantages of safeguarding our current circumstance.

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Emission Control Analysis Using Blended Fuels

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Abstract – The increasing industrialization and motorization of the arena has brought about a steep upward push for the call for of petroleum-based fuels. Petroleum primarily based fuels are acquired from limited reserves. Those finite reserves are rather focused in sure areas of the sector. Therefore, those countries now not having those resources are dealing with power/forex crisis. Mainly because of the import of crude petroleum. Therefore it's miles important to search for opportunity fuels which may be constructed from sources available domestically within the united states of America which include alcohols, biodiesel, vegetable oils etc. Ethanol also an attractive alternative fuel, because it is a renewable bin-based resource and it is oxygenated. Thereby providing the potential to reduce particulate emission in SI engine. The definition of alternative gasoline varies in keeping with the context of its utilization. This report reviews the comparison of Ethanol and Methanol blends in SI engine with that of gasoline fuels.

Engine performances and its emission characteristics of the fuel blends such as (E-30,E-15,M-5,M-10) were investigated on an MPFI Engine and compare with those of gasoline fuel.

Keywords – *Ethanol, Methanol as a blended fuels and Gasoline fuel, E30,E15,M5 and M10.*

INTRODUCTION:

The definition of alternative fuel varies according to the context of its usage. In the context of petroleum substitutes, the term 'alternative fuel' can imply any available i fuel or energy source, and does not necessarily refer to a source of renewable energy. In the context of environmental sustainability, "alternative fuel often implies an ecologically benign renewable fuel.

"They are also known as non-conventional fuels, are any materials or substances that can be used

as a fuel, other than conventional fuels." Conventional fuels include: fossil fuels (petroleum (oil), coal, propane, and natural gas), and also materials such as uranium some instances nuclear. Some well known alternative fuels include biodiesel, bioalcohol (ethanol, butanol).

chemically stored electricity (batteries and fuel cells), hydrogen, non-fossil methane, nonfossil natural gas, vegetable oil and other biomass sources.

Various fuels have been considered as substitute for petroleum fuels used in automobile. The most prominent of these are ETHANOL and METHANOL. It has been operated on various loading conditions and blending ratio of 30% This fuel should perform well in the engine, and their potential for environmental pollution should be quite low.

Geologists through out of the world are searching for further deposits. Although the present reserves seem vast, but accelerating consumption will create a challenge before the world that a new type of fuels should replace the conventional fuels. The new reserves appear to grow arithmetically while the consumption is growing geometrically. Under this situation, while consumption overtakes discovery, the world will be leading to an industrial disaster.

Many countries today solely depend on imports to meet their fuel oil requirements and many more will be added future as their limited reserves of petroleum deposits get exhausted. The situation is very grave in developing countries like India which

imports 70% of the required fuel. spending 30% of her total foreign exchange earnings on oil imports.

Their situation has created a problem to increase the prices of these oils more than two-folds in last 5 years. As the time passes this trend will be aggravated further causing greater scarcity and hardships,

Apart from the problem of fast vanishing reserves and irreplaceable nature of petroleum fuel another important aspect of their use is extent and nature of environmental pollution caused by their combustion in vehicular engine petroleum fueled vehicles discharge significant amount of pollutants like CO, HC, NO and Soot lead compounds.

ETHANOL AS A BLEND:

Ethanol fuel is the equal type of alcohol located in alcoholic beverages. It's far most usually used as a motor fuel, specially as a bio gasoline additive for fuel. World ethanol production for transport fuel tripled between 2000 and 2007 from 17 billion to more than \$2 billion litres.

From 2007 to 2008, the share of ethanol in global gasoline type fuel use increased from 3.7% to 5.4%. In 2009 international ethanol gas production reached 19.5 billion gallons.

"Ethanol is extensively utilized in Brazil and in the U.S., and collectively each country had been chargeable for 86 percentage of the world's ethanol gas production in 2009."

Most cars on the road today in the U.S. can run on blends of up to 10% ethanol, and the use of 10%

ethanol gasoline is mandated in some U.S. states and cities.

Since 1976 the Brazilian government has made it mandatory to blend ethanol with gasoline, and since 2007 the legal blend is around 25% ethanol and 75% gasoline. In addition, by December 2010 Brazil had a fleet of 12 million flex-fuel automobiles and 1.5 million trucks and over 500 thousand Flex-fuel motorcycles regularly using neat ethanol fuel.

Bio-ethanol, unlike petroleum, is claimed by certain advocates to be a form of renewable energy that can be produced from agricultural feedstock's.

It can be made from very common crops such as sugar cane, potato, manioc and corn. However, there has been considerable debate about how useful bio ethanol will be in replacing gasoline.

PROPERTIES:

Ethanol
$ \begin{array}{ccccccc} & & \text{H} & & \text{H} & & \\ & & & & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{O} - \text{H} \\ & & & & & & \\ & & \text{H} & & \text{H} & & \end{array} $
IUPAC name
Ethanol

other names	
Ethyl alcohol, grain alcohol, pure alcohol, hydroxyl ethane, drinking alcohol, ethyl hydrate, absolute alcohol.	
Properties	
Molecular formula	C ₂ H ₅ OH
Molar mass	46.07 g mol ⁻¹
Appearance	Colorless liquid
Melting point	-114.3 °C, 159 K, -174 °F
Boiling point	78.4 °C, 352 K, 173 °F
Solubility in water	Miscible
Acidity (pK _a)	15.9
Viscosity	1.200 cP (1.200 mPa·s) (20 °C)
Flash point	13 °C (55.4 °F)
Calorific value	26760 KJ/kg
Specific Gravity	0.77
Density	790 kg/m ³
Cetane number	Below 15

Ethanol is a volatile, colorless liquid that has a moderate odor. It burns with a smokeless blue flame that isn't always seen in normal mild. "The bodily residences of ethanol stem normally from the presence of its hydroxyl organization and the shortness of its carbon chain."

Ethanol's hydroxyl institution is able to participate in hydrogen bonding. "Rendering it greater viscous and less volatile comparable molecular

weight." unstable than much less polar natural compounds

It's also miscible with light aliphatic hydrocarbons, which includes pentane and hexane, And with aliphatic chlorides such as trichloroethane and tetrachloroethylene, chloroform, diethyl ether, ethyleneglycol, glycerol, ni ane, pyridine, and toluene.

It's also miscible with light aliphatic hydrocarbons, which includes pentane and hexane, And with aliphatic chlorides such as trichloroethane and tetrachloroethylene.

Ali Ethanol's miscibility with water contrasts with that of longer-chain alcohols (five or more carbon atoms), whose water miscibility decreases sharply as the number of carbons increases.

The miscibility of ethanol with alkanes is limited to alkanes up to undecane, mixtures with dodecane and higher alkanes show a miscibility gap below a certain temperature about 13 °C for dodecane.

The miscibility hole has a tendency to get wider with higher alkanes and the temperature for whole miscibility increases.

Ethanol-water mixtures have much less volume than the sum in their main or water components at the given fractions. Mixing equal volumes of ethanol and water results in most effective 1.92 volumes of mixture. Mixing ethanol and water is exothermic. At 298 K, up to 777 J/mol are set free.

COMPARISON BETWEEN PETROL WITH ETHANOL:

S.NO	PROPERTY	PETROL	ETHANOL
1	Specific gravity	0.79	0.77
2	Boiling point (°C)	30 - 225	78.3
3	Specific heat (MJ KG)	43.5	27
4	Heat of vaporization (KJ KG)	400	900
5	Octane Number	90 -100	111
6	Cetane Number	Below 15	Below 15

METHANOL AS A BLEND:

Because 1993, China has become a net petroleum import country and increasing quickly. In 2005, more than 140 millions are imported.

China is the second biggest country of petroleum importing, just behind the US. Currently, there are approximately 31 million automobiles in use, however the going for walk time and gas consumption are extra.

Around 35% of the total 320 million ton petroleum was consumed as fuels by automobiles, where gasoline consumption is some 70 million tons

US gallons).

It is predicted that china petroleum import will reach to 200 million tons in 2010, the total automobiles and their fuel consumption will be 50 millions, 140 million tons, respectively.

To deal with higher and higher petroleum price and to keep the fast development of automobile industry, alternative fuels are regarded highly.

For spark ignition (si) engine powered automobiles, alcohols, methanol and ethanol, are examined and tested inside the international [1-3].

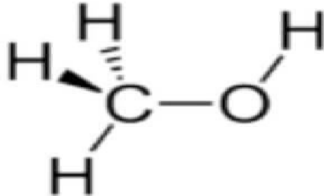
There were 5 cities taking part in the first stage demonstration of E10 (10% ethanol in volume and 90% gasoline in volume) fuel blends since 2002, and more cities and more provinces joined in the program in 2004 accordingly.

It is said that methanol is widely used in commercial gasoline; however, there are only shanxi, shaanxi and henan provinces carrying out the demonstration program of M10 (10% methanol in volume and 90% gasoline in volume) or M5 (5% methanol in volume and 95% gasoline in volume). More and more governments and companies are paying attentions to the industry for the importance and higher benefit.

Methanol shows a prosperous market for its low price and easy obtainment. Coal is comparatively richer than petroleum and natural gas in china.

It plays 70% role of annual energy balance. These years, its production is about 1.5 billion tons. Because it is easy and economical to be liquefied to methanol, more attentions are paid to the applications in SI engines.

PROPERTIES:

Methanol	
	
Other names Carbinol, Hydroxymethane, Methyl alcohol, Methyl hydrate	
Properties	
Molecular formula	CH ₄ O
Molar mass	32.04 g mol ⁻¹
Appearance	Colorless liquid
Melting point	-97°C, 176 K, -142.9 °F
Boiling point	64.7°C, 337.8K, 148.4°F
Solubility in water	Miscible
Acidity (pK _a)	15.5
Viscosity	0.59 mPa(20°C)
Density	790

MERITS AND LIMITATIONS:

(1) LIV of stoichiometric mixture is similar as gasoline, so the engine power can be remained. However, to keep engine power, more fuel should be delivered, because of lower LIIV of methanol. Experiments showed that, if the engine was fueled with low fraction methanol/gasoline blends, it runs stably and successfully.

(2) With closed loop control of ECU, the engine can automatically keep the value of A. So actually, the reduction of CO and HIC emissions are due to the leaner mixture to some extent. Also, the lower of IIC and CO emissions was due to the oxygen content of the fuel blends.

(3) Higher RON, even if it is blended with gasoline, the octane number of the fuel blend can be increased. Therefore, engine CR was remained in this study to make the engine retrofit easily.

(4) Though the latent heat of methanol is higher, measures are not necessary for the mixture preparing due to lower fraction, while it may increase engine volumetric efficiency and thus increase engine power.

(5) Methanol has a higher laminar flame propagation speed, which may take combustion process finish earlier and thus improve engine thermal efficiency.

(6) Uncertainty of potential poisons of formaldehyde emission, corrosion to some materials like rubber and some aluminum alloys.

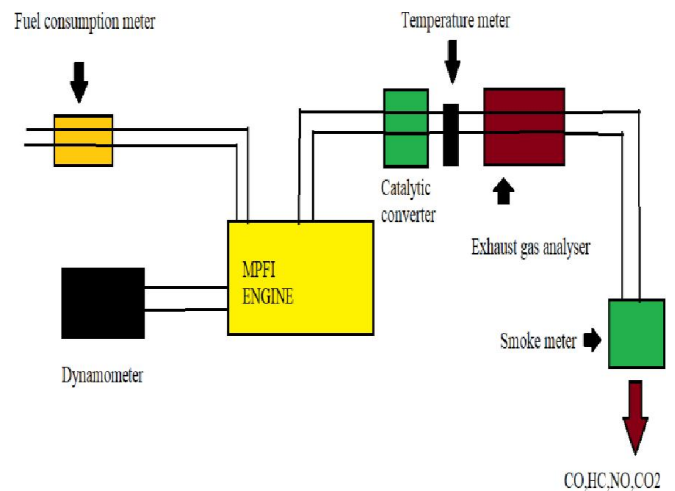
So, many researchers and officials in china think that it should take an important role in automobile industry development and petroleum fuel substitute. This paper will carry out further study on the effects of methanol, and its fraction on engine power performance. economy, combustion, regulated and non-regulated emission and cold start.

HARMFUL EFFECTS ON HUMAN BY EMISSION:

- Co is fatal in large dosage, aggravates heart disorders, affects central nervous system and impairs oxygen-carrying capacity of blood by forming carboxy haemoglobin.
- Nitrogen oxides cause irritation in respiratory tract.
- HC's cause drowsiness, eye irritation and coughing

**COMPARISON
PROPERTIES:****OF****FUEL**

	Methanol	Ethanol	Gasoline
Molecular formula	CH_3OH	$\text{C}_2\text{H}_5\text{OH}$	-
Molecular weight	32	46	95-120
Oxygen content	50%	34.8%	0
Density (kg/m^3)	792	785	740
LHV (MJ/Kg)	20.0	26.9	44.3
Octane number	111	108	>90
Auto – ignition temp ($^{\circ}\text{C}$)	465	425	228-470
Stoichiometric A/F ratio	6.45	9.00	14.8
Latent heat (KJ/Kg)	1103	840	305
LHV of stoichiometric mixture (MJ/m^3)	3906	3864	3810

LAYOUT OF ENGINE TEST BENCH:**EXPERIMENTAL SETUP:**

- An electric eddy dynamometer is connected with the MPFI engine and uses to measure the engine power.
- An exhaust gas analyzer is employed to measure NO.CO.CO₂ and HC.
- Fuel consumption meter can calculate the amount of fuel entered.
- Catalytic converter is placed nearer to the engine (CLOSE COUPLED CATALYST)
- The smoke number was measured with a SMOKE METER.

ENGINE SPECIFICATION**ADVANTAGES:**

Make : Suzuki Motors Limited,
 Model : Maruti 800,
 Type : 3 cylinder, 4 stroke, Petrol (MPFI)
 Power : 27.6 Kw at 5000 rpm,
 Torque : 59 NM at 2500rpm,
 Stroke : 72 mm,
 Bore : 66.5 mm,
 CC : 796 cc,
 CR : 9.2:1,
 Cooling : water cooled.

- ☐ Close coupled catalyst is used to maintain the same temperature as in the exhaust manifold, where as in the ordinary catalytic converter the temperature level will be decreased.
- ☐ In ethanol and methanol OCTANE NO increases, which increases the COMPRESSION RATIO, and it results in LESSER KNOCKING.
- ☐ Since both ethanol and methanol are oxygenated fuel, it converts the CO into CO₂ which is easily observed by plants.

E30 BLEND:

S.N O	Load (kg)	Speed (rpm)	Time (sec)	Co (%)	HC (PPM)	Nox (PPM)	CO ₂ (%)	O ₂ (%)	Exhaust temp	BP (KW)	TFC (KG/HR)	BSFC(KG/KW.HR)	HI (KW)	η bth (%)	IP	η mech (%)	η ith (%)
1.	0	3000	86	0.04	21	0	12.94	2.15	353	0.00	1.64	ND	18.14	0.000	7.00	0	38.5857
2.	5	3000	63	0.09	26	4	13.42	1.29	466	3.23	2.24	0.692	24.76	13.069	10.236	31.6166	41.3351
3.	10	3000	47	0.13	27	22	13.13	1.66	514	6.47	3.00	0.464	33.19	19.499	13.473	48.0435	40.5870
4.	15	3000	36	0.18	31	60	13.03	1.64	551	9.70	3.92	0.404	43.33	22.404	16.709	58.1070	38.5558
5.	20	3000	31	0.2	17	112	13.13	1.67	614	12.946	4.55	0.352	50.32	25.723	19.946	64.9046	39.6315

E15 BLEND:

S.NO	Load (kg)	Speed (rpm)	Time (sec)	Co (%)	HC (PPM)	Nox (PPM)	CO ₂ (%)	O ₂ (%)	Exhaust temp	BP (KW)	TFC (KG/HR)	BSFC (KG/ KW.HR)	HI (KW)	η bth (%)	IP	η mech (%)	η ith (%)
1	0	3000	248	0.05	30	0	12.69	2.15	383	0.00	0.569	ND	6.607	0.000	4.400	0	66.5950
2	5	3000	108	0.11	37	3	13.16	1.29	469	3.23	1.307	0.404	15.172	21.332	7.636	42.3813	50.3327
3	10	3000	79	0.14	35	54	12.79	1.66	518	6.47	1.786	0.276	20.741	31.208	10.873	59.5321	52.4212
4	15	3000	56	0.24	37	66	13.07	1.64	560	9.70	2.520	0.260	29.260	33.183	14.109	68.8147	48.2202
5	20	3000	37	1.2	71	238	12.21	1.67	590	12.946	3.814	0.295	44.285	29.232	17.346	74.6334	39.1679

M5 BLEND:

S.NO	Load (kg)	Speed (rpm)	Time (sec)	Co (%)	HC (PPM)	Nox (PPM)	CO ₂ (%)	O ₂ (%)	Exhaust temp	BP (KW)	TFC (KG/HR)	BSFC (KG/ KW.HR)	HI (KW)	η bth (%)	IP	η mech (%)	η ith (%)
1	0	3000	295	0	25	0	11.64	4.1	376	0.00	0.486	ND	5.559	0.000	1.000	0	17.9904
2	5	3000	78	0.07	22	3	13.5	1.46	424	3.23	1.837	0.568	21.023	15.395	4.236	76.3951	20.1517
3	10	3000	53	0.13	30	33	13.12	1.66	518	6.47	2.703	0.418	30.939	20.921	7.473	86.6181	24.1535
4	15	3000	50	0.06	17	50	13.26	1.64	560	9.70	2.866	0.295	32.795	30.939	10.709	90.6622	32.6549
5	20	3000	47	0.6	46	219	12.67	1.67	590	12.946	3.049	0.235	34.889	34.889	13.946	92.8293	39.9720

M10 BLEND:

S.N O	Load (kg)	Speed (rpm)	Time (sec)	Co (%)	HC (PPM)	Nox (PPM)	CO ₂ (%)	O ₂ (%)	Exhaust temp	BP (KW)	TFC (KG/HR)	BSFC (KG/ KW.HR)	HI (KW)	η_{bth} (%)	IP	η_{mech} (%)	η_{ith} (%)
1	0	3000	153	0.01	9	0	12.95	2.03	389	0.00	0.936	ND	10.717	0.000	1.500	0	13.9959
2	5	3000	108	0.09	19	1	13.57	1.41	472	3.23	1.327	0.410	15.183	21.316	4.736	68.3304	31.1956
3	10	3000	99	0.14	20	17	13.08	1.74	503	6.47	1.447	0.224	16.563	39.080	7.973	81.1861	48.1357
4	15	3000	70	0.19	66	48	12.95	1.77	576	9.70	2.047	0.211	23.425	41.448	11.209	86.6181	47.8513
5	20	3000	55	0.29	83	110	12.96	1.76	605	12.946	2.605	0.201	29.814	43.422	14.446	89.6162	48.4529

PETROL:

S.NO	Load (kg)	Speed (rpm)	Time (sec)	Co (%)	HC (PPM)	Nox (PPM)	CO ₂ (%)	O ₂ (%)	Exhaust temp	BP (KW)	TFC (KG/HR)	BSFC (KG/ KW.HR)	HI (KW)	η_{bth} (%)	IP	η_{mech} (%)	η_{ith} (%)
1	0	3000	158	0.03	12	0	12.96	2.1	378	0.00	0.809	ND	9.886	0.000	2.500	0	27.9904
2	5	3000	93	0.06	11	2	13.32	1.41	472	3.23	1.374	0.425	16.796	19.269	5.736	56.3951	36.1517
3	10	3000	68	0.11	13	18	12.93	1.86	520	6.47	1.879	0.290	22.971	28.179	8.973	72.6181	41.1535
4	15	3000	52	0.18	20	54	12.92	1.6	577	9.70	2.458	0.253	30.038	32.323	12.209	79.6622	43.6549
5	20	3000	37	1.22	67	207	12.25	1.71	584	12.946	3.454	0.267	42.216	30.665	15.446	83.8293	39.9720

FORMULA'S USED:

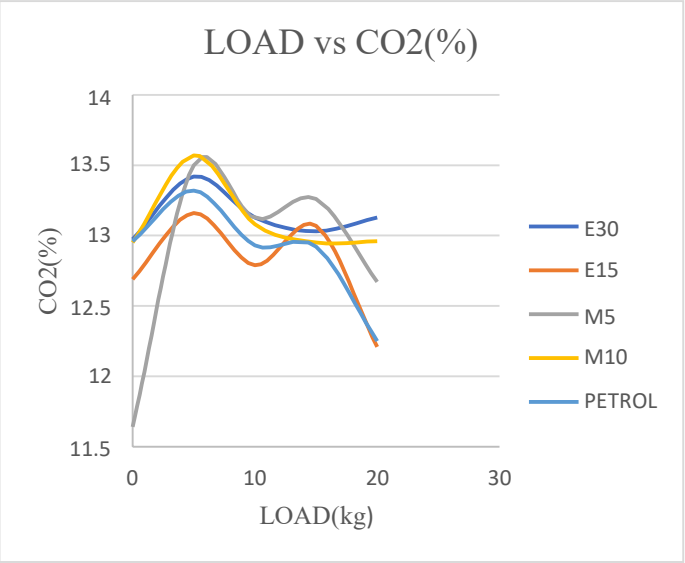
- Brake Power (BP) = $(2 \cdot \pi \cdot D \cdot N \cdot W \cdot 9.81) / 60000$ (Kw)
- Total Fuel Consumption (TFC) = $(100 \cdot S \cdot 3600) / (t \cdot 1000)$ (Kg/hr)
- Brake Specific Fuel Consumption (BSFC) = TFC / BP (Kg/Kw.hr)
- Heat Input (HI) = $(TFC \cdot C_v) / 3600$ (Kw)

- Brake Thermal Efficiency = BP / HI (%)

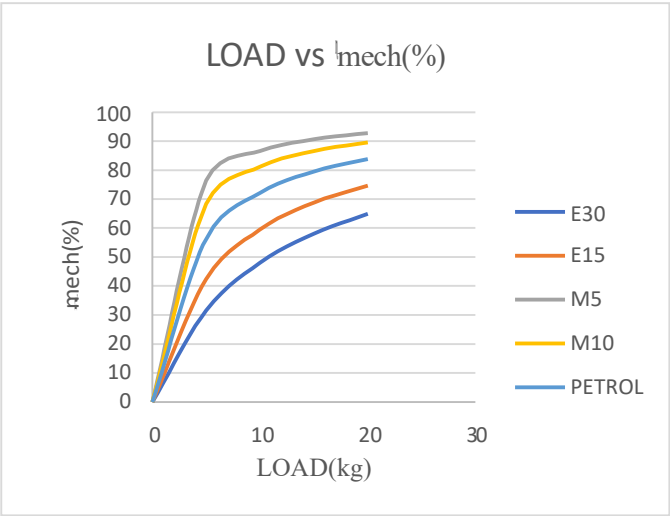
CONSTANTS:

- Dynamometer Arm Length (D) 0.21 m.
- Specific Gravity of Petrol (S) = 0.79.
- Specific Gravity of E30 (S) = 0.784.
- Calorific Value of Petrol (C_v) - 44000 KJ

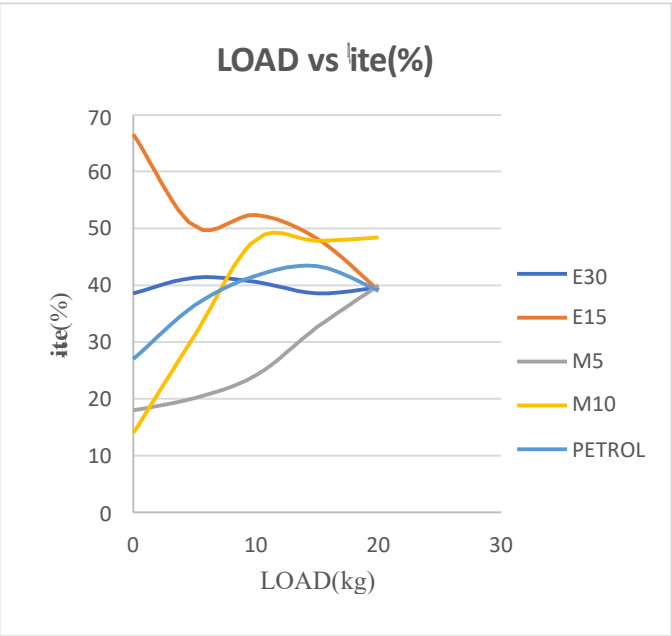
LOAD VS CO2(%):



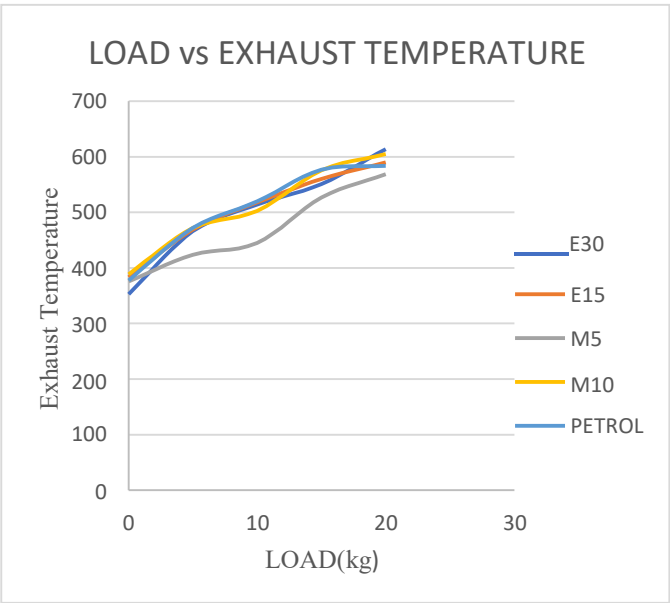
LOAD VS η_{mech} :



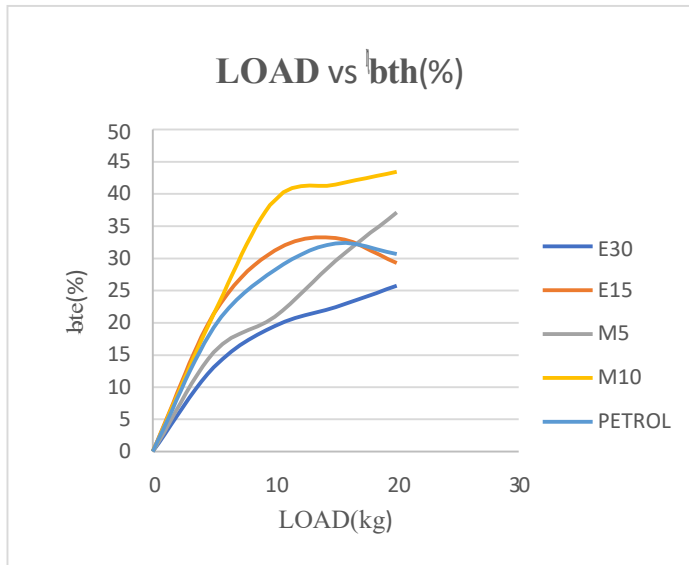
LOAD VS η_{ith} :



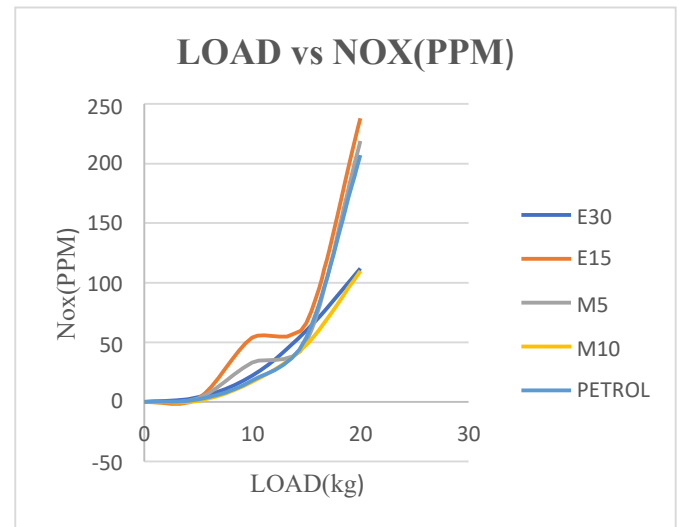
LOAD VS EXHAUST TEMPERTURE:



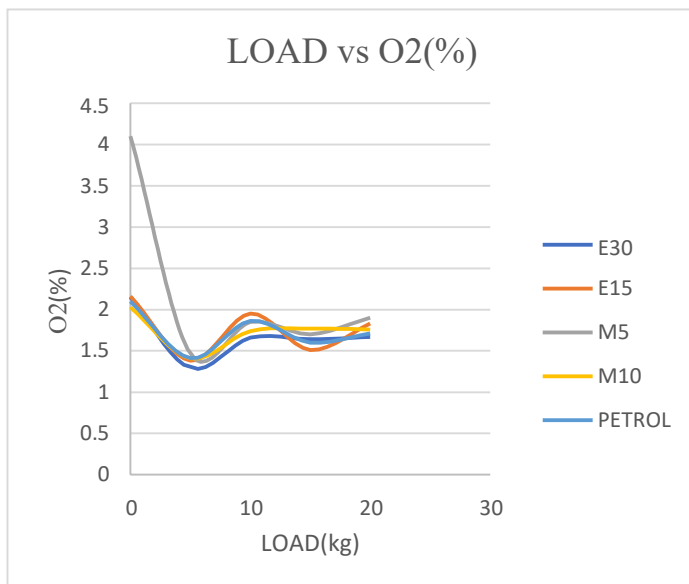
LOAD VS η_{bth} :



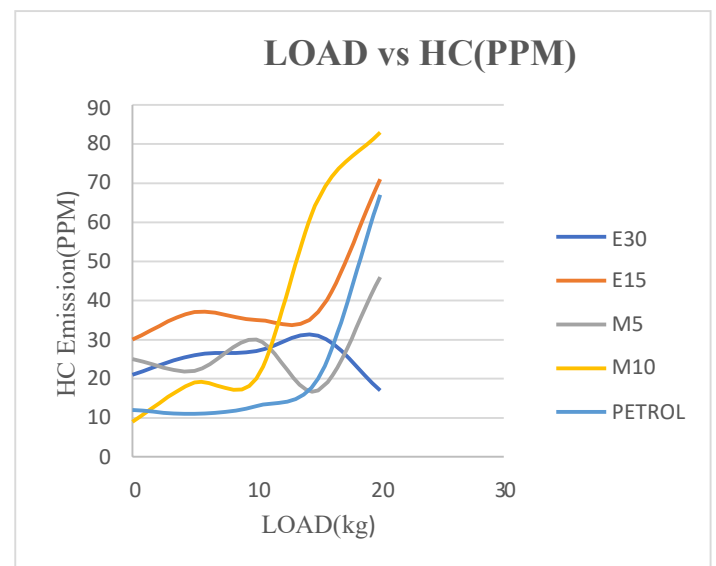
LOAD VS Nox:



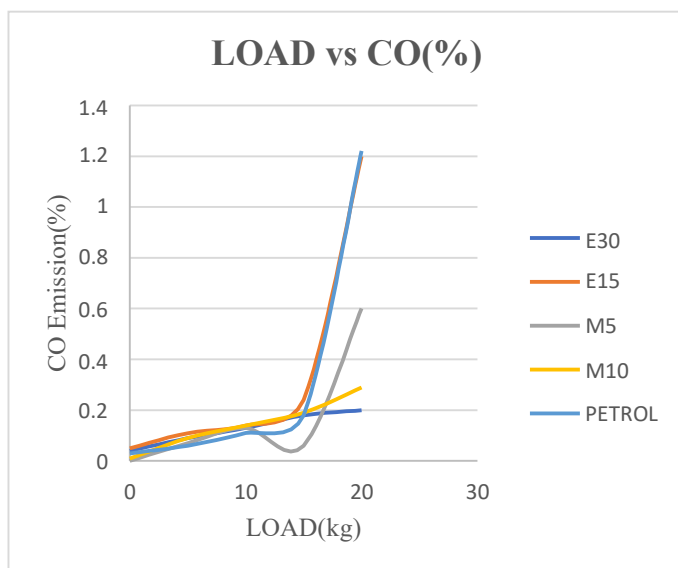
LOAD VS O₂:



LOAD VS HC (PPM):



LOAD VS CO (%):



EMISSION PERFORMANCE OF ETHANOL AND METHANOL BLENDS:

CARBON DI OXIDE

- ☐ CO₂ is released into atmosphere when ethanol and methanol.
- ☐ This CO₂ is recycled into natural tissues in the course of plant growth.
- ☐ Only about 40% or less of the organic matter is actually removed from farm fields for ethanol production.
- ☐ The rest is returned to the soil as organic matter increasing fertility and reducing soil erosion

CARBON MONOXIDE

- ☐ CO formed by the incomplete combustion of fuel.
- ☐ Since it is oxygenated, complete combustion occurs.

HYDROCARBONS

- ☐ Because of its high octane rating, adding ethanol and methanol to gasoline leads to reduction or removal of HC such as benzene.

OXIDES OF NITROGEN

- ☐ Ethanol has higher heat of vaporization, therefore it reduces the peak temperature inside the combustion chamber leading to lower NO_x emission.

EMISSION STANDARDS:

Emissions were given as per LPG-Bharat stage 3CO

Emissions	:	38,9 to 111.3 ppm
HC emissions	:	18.2 to 62.6 ppm
NO _x emissions	:	0.8 to 3.9 ppm
CO ₂ emissions	:	6719.2 to 8051 ppm

CONCLUSION:

Using ethanol and methanol as a fuel additive to unleaded gasoline causes an improvement in engine exhaust emissions. Ethanol and methanol blends

cause reduction in η_{mech} , η_{ith} , η_{bte} compare with gasoline. However the brake specific fuel consumption and equivalence air-fuel ratio decrease because of lower calorific value of the gasohol using an ethanol -unleaded gas mixture ends in a large reduction in exhaust emissions of CO and HC for all engine speeds. On the other hand, CO₂ emissions increase marginally.

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- [2] SCIENCE DIRECT APPLIED THERMAL ENGINEERING (EDDY R.CUTY CLEMENTE)
- [3] INTERNAL COMBUSTION ENGINES (R.K.RAJPUT)
- [4] APPLIED THERMODYNAMICS (RANGASAMY & SUNDRAMURTHY)

Experimental Analysis of Spur Gear Natural Fibers Reinforced with Polyester Resin

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ABSTRACT

In view of considerable interest in the development of a spur gear and to improve its efficiency and its performance a comprehensive review on the structure of spur gear is analysed and certain modifications is done in the composition of a spurgear. This process is done with the combination of different materials such as Polyester resin and Glass fiber. This spur gear was manufactured by using gear Hobbing Process. Later this spur gear is tested by using Hardness testing machine and then the properties of this gear is compared with a Nylongear.

Keywords

Spur Gear, Natural Fiber, Polyester Resin

I. INTRODUCTION

A. COMPOSITE MATERIALS

Any combination of two or more different materials at the macroscopic level. When two essentially distinct materials are mixed, the result is a material having qualities that are superior to the constituent materials. Fiber, particle, flake, laminar or layered and filled composites are the five basic forms of composite materials. (e.g., Fibers)

B. FIBER COMPOSITES

In fiber composites, the fibres reinforce along the line of their length. Reinforcement might be primarily one-dimensional, two-dimensional, or three-dimensional.

1-D provides you the most power in one direction.

Strength in two directions is provided by 2-D.

3-D Isotropic provides equal strength in all directions.

II. MATRICES

A. POLYESTER RESIN

Polyesters have good mechanical properties, electrical properties and chemical resistance. Polyesters are amenable to multiple fabrication techniques and are low cost.

B. VINYL ESTERS

In terms of performance, vinyl esters are comparable to polyester. Vinyl esters are more resistant to corrosion in corrosive situations.

C. EPOXY RESINS

Epoxies outperform polyesters in terms of strength and stiffness. Epoxies provide high corrosion resistance as well as solvent and alkali resistance. Curing times are typically greater than for polyesters, but there are no by-products. The use of additives and fillers also allows for greater flexibility and increased performance.

III. SPUR GEARS

Spur gears are the easiest common gears to visualize that transmit motion between two parallel axes. Because of their shape, they are classified as a type of spur gear. Since the gear tooth surfaces run parallel to the axes of the mounted shafts, no thrust force is generated in the axial direction.

The simplest sort of gearbox is the spur or spur gear. They are made up of a cylinder or disc with teeth that protrude radially. The edge of each tooth is straight and aligned to the axis of rotation, despite the fact that teeth do not have straight sides. Spur gears are excellent at low speeds, but they can be noisy at high speeds.

Cylindrical gear teeth are made with an involute profile or a cycloidal profile. Most gears are made with a 20 degree pressure angle involute profile. When two gears move in an instant, it is possible to connect the non-rotating part with the non-rotating part of the coupled gear. The cutting rack is moved up or down.

IV. LITERATURE REVIEW

1. P.B. Pawar, the author says about the, Spur gear are mostly used for the power transmission. Gear teeth fails normally during when the load is increased over the limit. To overcome the new gear is modified and produced by using the composite material when economic condition.

2. Atul Sharma, the glass fiber with reinforced polymer spur gear pairs are used as a composite material. The noise level was measured for the pair of spur gears of these three different materials at various speed of rotation.

3. C.Willere, in this paper, a new composite made of polyethylene. To replace the plastics used in spur gears manufacturing (SGM). It says about the no effect of the loading frequency can the high cycle fatigue strength.

4. D.Plackett, A completely bio composite based on Poly Lactic Acid (PLA) and olive pit powder and it was reported that addition of filler resulted in increase of tensile modulus and decrease in flexural strength.

5. G.Sivakiran, the author says about the machining of composites are randomly oriented and chopped. In this method, the machining process is taken by the three known parameters such as feed, speed and depth of cut. Here, two hybrid polymers are used. One is made from a different polyester and also contains the shell liquid of the process.

6. R.Karthick, Choosing the composite materials because of having the good mechanical properties. It deals with the fabrication of glass fiber, banana fiber, epoxy resin. The Author said about the banana fiber and the epoxy resins are mixed to get the composite materials. By testing and the evaluation, the tensile test, flexural test, the impact test, and the hardness test are happened.

7. Ketty Bilba, four fibers from banana trees (leaf, trumb) and coconut tree (husk, fabric) were examined for this process. Thermal degradation of these fibers were studied between 200°C and 700°C. The solid residues obtained were analysed by classical

elemental analysis. The rapid and preferential decomposition of banana fibers with increasing temperature of pyrolysis.

V. DESIGN LAYOUT

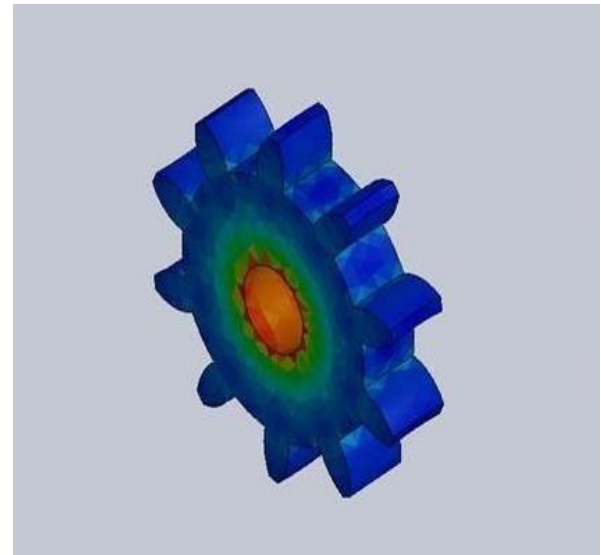


Fig 1 Simple gear design

VI. PROPERTIES

Physical properties: -

These properties are colour, shape, density, thermal conductivity, electrical conductivity, melting point etc.

Mechanical properties:

The Properties are associated with the ability of the material to resist the mechanical forces and load.

The various properties are: -

Strength: It is the property of the material due to which it can resist the external forces without breaking or yielding.

Stiffness: It refers to a material's ability to withstand deformation under stress.

Ductility: Ductility is the property of a material as it can be pulled into a cable under tensile loads.

Flexibility: This is the property of the material that allows it to be rolled into sheets.

Brittleness: Brittleness is the property of a material that breaks into pieces with minimal deformation.

Hardness: It is the property of a material to resist wear, deformation and the ability to cut other materials.

Resilience: Resilience is the ability of a material to store energy and withstand shock and impact loads.

VII. FIBER REINFORCEMENT

The typical composite consists of a matrix holding reinforcing materials. The reinforcing materials, the most important is the fibres, supply the basic strength of the composite. However, reinforcing materials can contribute much more than strength. They can withstand or conduct electricity. They may be chosen for their stiffness (modulus of elasticity) or for many other properties.

A.FIBERS-GLASS

The properties of glass fibers differ slightly depending on the type of glass used. However, glass in general has several well-known properties that contribute to its great use as a reinforcing agent:

- Tensile strength
- Chemical resistance
- Moisture resistance
- Thermal properties
- Electrical properties

There are four main types of glass used in fiber glass:

- A-glass
- C-glass
- E-glass

B.MATRIX MATERIALS

Composites are materials consisting of two (or more) dissimilar materials bonded together, one of which forms a "matrix" in which fibers or particles are joined which increases the strength and stiffness of the matrix material. Natural composites are wood in which cellulose fibers are incorporated into a lignin matrix. Most composites consist of only two materials. One of them is the matrix or binder. It surrounds and binds fibers or fragments of other materials together, which is called reinforcement. Polymers are a common matrix Resin is a "solid or highly viscous substance" which is normally converted into a polymer.

VIII. DESCRIPTION OF COMPONENTS

A.GLASS FIBER

Glass fiber is a material consisting of numerous extremely fine fibers of glass. Glass fiber has roughly comparable mechanical properties to the other fibers such as polymers and carbon fiber. Glass fiber is formed when thin strands of silica-based or other formulation gases are extruded into many fibers with small diameters suitable for textile processing. Fiber is made either from a direct melt process or a marble remelt process. It uses for mats and fabrics for thermal insulation, electrical insulation, sound insulation, manufacturing of natural fibre gears.



Fig 2 Glass Fiber

B.POLYESTER RESIN

Epoxy has better strength and stiffness properties than polyester. Epoxy offers excellent corrosion resistance and resistance to solvents and alkalis. The curing cycle is generally longer than that of polyester, but no by-products are produced. Increased flexibility and performance are also achieved through the use of additives and fillers.

Polyester resins are thermoset and, like other resins, polymerize exothermically. Using too much catalyst can cause scorching or even ignition during the setting process. Excessive catalyst can also cause the product to fracture or form a rubber material.

Unsaturated polyesters are condensation polymers formed by the reaction of polyols (also known as polyalcohols), organic compounds with several alcoholic or functional hydroxyl groups, with saturated or unsaturated dibasic acids .

Commonly used polyols are glycols such as ethylene glycol; The acids used are phthalic acid and maleic acid. Water, a by-product of the etherification reaction, is constantly removed, until the reaction is complete. The use of unsaturated polyesters and additives such as styrene reduces the viscosity of the resin. The liquid resin is initially converted to a solid by cross-linking the chain. These compounds are usually and erroneously known as catalysts. Substances used are generally organic peroxides such as benzoyl peroxide or methyl ketone peroxide.

C.CATALYST

Methyl Ethyl Ketone Peroxide is a catalyst for polyester and vinyl ester resins in the composites sector. It transforms the resin from a liquid to a solid by reacting with it. Organic peroxide is MEKP. These chemicals are combined with inert compounds to generate the catalysts used in industry since they are unstable in their pure state. MEKP can be purchased in a variety of grades as a result of this combination, resulting in a wide range of gel times. Although there are a variety of catalysts for curing polyester and vinyl ester resins, MEKP is the most commonly utilised in contact moulding for room temperature curing.

D.ACCELERATOR

Cobalt Naphthenate is a combination of naphthenic acid cobalt (II) derivatives. As an organometallic chemical, cobalt naphthenate is a cobalt source that is soluble in organic solvents (also known as metal organic, organo-inorganic and metallo-organic compounds). The cobalt salt of naphthenic acids is cobalt naphthenate. The typical formula for naphthenic acids is $C_nH_{2n+2}O$, where n denotes the carbon number and Z denotes the hydrogen deficit caused by ring formation. As a result, cobalt naphthenate belongs to the metal carboxylates family.

XI. MANUFACTURING OF GEAR

- This gear is made up of 40 % of glass fiber and 60 % of matrix.
- 100 ml of polyester resin is poured in the die.
- Then 5ml of catalyst and 5ml accelerator is mixed with polyester resin and stirred
- Here catalyst and accelerator are used to increase the reaction speed of the process.
- Then glass fiber is added in to the mould and made to dry.

- After 4 hours the mould gets ready for further operations.
- By using band saw machine the required dimensions are achieved.
- And then turning and facing operations are completed by using lathe machine.
- Finally, the gear will be manufactured in a gear hobbing machine.

X. MANUFACTURING OPERATIONS

A.BANDSAW MACHINE

Band saws consist of a long, squeaky blade that has a continuous, toothed metal band. Machines dedicated to metal cutting are of 2 types, vertical and horizontal.

Band saws can be used to cut grooves, even in thick wood, as in making cabriole legs, to cut numbers and to cut short cross sections, but the most common use of a band saw is to cut irregular shapes. The second most common use is in sawing or peeling wood into thinner slabs.

B.LATHE

A lathe is a lathe that rotates a work around an axis and applies various operations such as cutting, sanding, knurling, drilling, warping, turning, and turning to the work to create a symmetrical object around the axis of rotation. It is a tool.

C.FACING

This is usually the first step in any turning operation on a lathe. The metal is cut from the end to match the right angle of the axis and remove the marks.

D.TURNING

This operation is adopted to cut metal parallel to the axis. Turning is done to reduce the diameter of the metal.

E.DRILLING

Drilling is a solid-materials cutting procedure that uses circular cross-sectional drill holes. A drill bit is a rotating cutting instrument that is often multi-pointed. The tip is driven into the workpiece and rotated at speeds ranging from hundreds to thousands of times per minute. As you drill, the cutting edge is forced into the workpiece, cutting debris out of the hole.

F.GEAR HOBBING

Hobbing is a process in which the gears are cut with the generation process by simultaneously rotating the empty gear and the cutter called the stove with a fixed gear ratio between the stove and the empty gear. In this process raw gears are fed to a rotating hob until the required depth is reached. The stove is inserted through the bare surface until all the teeth are complete.

In hobbing, the teeth of the hob are arranged parallel to the axis of rotation of the blank. For helical gear oscillation, the wick of the hob is set to an angle to produce the correct helix. While the worm gear is manufactured with the axis of the stove, set the right angle to the raw gear.

XI. CONCLUSION

- The plastic gears are harmful to the environment when it had been burned.
- The natural fibers are easily available and it has low cost efficiency to buy the natural fibers in the market.
- By using the natural gears as the prototype models, we can avoid the Nylon gear manufacturing prototypes.
- So, In future the natural fiber gears modification should be implemented instead of Nylon gears.

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FABRICATION OF COMPOSITE CONTAINING ALUMINIUM 7075 WITH FLYASH AND E- GLASS FIBER

N.SATHISHKUMAR S.PRABHAKARAN

ABSTRACT

Metal matrix composites (MMCs) constitute an important class of design and weight- efficient structural materials that are encouraging every sphere of engineering applications. There has been an increasing interest in composites containing low density and low cost reinforcements. Among various discontinuous disperse solids use, fly ashes is one of the most inexpensive and low density reinforcement available in large quantities as solid waste by-product during combustion of coal in thermal power plants. Hence, composites with coal ashes as reinforcement are likely to overthrow the carrying charge barrier for wide spread applications in automotive and small engine applications. To produce Al 7075 matrix cast particle composites, wettability of the ceramic particles by liquid Al 7075 is essential. To improve wettability, elements such as E-Glass Fiber added into Al 7075 melt to incorporate the ceramic particles. The present investigation has been focused on the utilization abundant available industrial waste coal ash in good manner by dissipate it into aluminium 7075/ aluminium 7075-e-glass fiber/aluminium 7075 matrix to produced composites by liquid metallurgy route. Wide size range (0.1-100 μ m) fly ash particles were used. The mechanical character say as hardness and tensile strength has been investigated.

INTRODUCTION

The basis plan is that continual fiber reinforced composite has better strength but the processing methods is highly expensive which hinders their adoption. The continuous fiber reinforced composites do not allow secondary forming such as rolling, forging and extrusion. As results of these limitations new efforts on the research of discontinuous reinforcements have been used. At early stages of development of metal matrix composite emphasis was given on the preparation of fiber reinforced composite only. But due to the high cost associated with the process of production, anisotropic properties of the resultant composite and difficulties associated with the fabrication

processing, the action of making this type of combined were been limited. The aluminum metal matrix combined are produced the like casting route or by power metallurgy. The former has the advantages of producing the composites as lower cost of production and possibility of producing larger components. However, the inherent difficulties of casting route are non-wettability of ceramic particles by liquid aluminum and most of the research work carried out on aluminum based composite materials involves silicon carbide as its reinforcing material. Therefore it is essential to look for the possibilities of fabricating aluminum based composite materials using waste or recycling materials like fly ash. Most of power require in the century is depend on the fossil fuels. Combustion of coal energy produces despoil by product, i.e., pulverized fuel ash in plenty. The disposal of this fly ash is a major challenging task. In about work, an attempt would- be, made to fabricate a hybrid composite material from commercial pure material and waste product.

Short mgs are used as commercially pure material and fly ash as waste product. Aluminum 7075 used as matrix material for the fabrication of Al-e- glass- fly ash hybrid composite material.

The most conventional method of production of composites is by stir casting method, where the aluminium trichloride is stirred with an impeller and ceramic particles are incorporated into composite by stirring of the liquid metals. The present investigation has been focused on utilization of residuals fly ash in useful method by dispersing it in aluminium matrix to produce composite. In the present work, fly-ash which mainly consists of refractory oxides like silica, alumina, and iron oxides, have been used as the reinforcing stage and to increase the wet ability magnesium was added. Composites were produced with different percentages of reinforcing phase. Further, these composites were characterized with the help of, Microstructure analysis. Mechanical properties of the composites were also evaluated.

COMPOSITION MATERIALS AND DESCRIPTION

DEFINITION

The composite material can be used defined as the system of material consisting of a fusion of combination of two or other micro constituents insoluble in each other and differing let someone know as or in matter composition that materials prepared by putting two or more dissimilar material in such way that they function mechanically as a single unit. The properties of such materials differ from those of their constituents. These materials may have a hard phase embedded in a soft phase or vice versa. commonly in the complex material have a hard phase in the soft malleable matrix where the hard phase act as a reinforcing agent expansion the toughness and modulus, and soft phase act as matrix material. The requirement for satisfying the above mentioned condition is The composite material has to be man-made. The composite material must be a combination of at least two chemically distinct materials with an interface separating the components. The properties of composites should be three dimensionally combined.

COMPOSITE PARTICLES ARE USED

The composite particles used in this project are

1. Aluminium 7075
2. Fly ash
3. E-Glass fiber

Aluminium 7075

Aluminium 7075 is as shown in fig 3.1 is “aircraft grade” aluminium. Its principal alloying ingredients are zinc and copper, which make it one of the highest-strength aluminium alloys that are available. In fact, its typical strength in the T6 Temper is higher than most mild steels. 7075 also have average-to-good ratings for machinability, corrosion resistance, And anodizing response. Like 2024, however, it is not considered to be weldable

High strength aluminum alloys such as 7075, are generally used in airship structures due to their high strength-to-weight ratio, machinability and low cost. However, due to their compositions, these alloys are susceptible to corrosion.

Corrosion is a major concern involving the structural integrity of aircraft structures.

Fly ash

Fly ash is one of the residues generated in the combustion of coal. It is an industrial byproduct recovered from the flue gas of coal burning electric power plants. Depending on the source and powder of the carbon being burned, the components of the coal ash generate vary considerably, but all fly ash includes substantial amounts of silica (silicon dioxide, SiO_2) (both amorphous and crystalline) and lime (calcium oxide, CaO). In general, fly ash is as shown in fig

3.2 consists of SiO_2 , Al_2O_3 , and Fe_2O_3 as major constituents and oxides of Mg, Ca, Na, K etc. As a minor constituent.

The specific gravity of fly ash vary in the range of 0.6-2.8 gm/cc. Coal fly ash has many uses including as a cement additive, in masonry blocks, as a concrete admixture, as a material in lightweight alloys, as a concrete aggregate, in flowable fill materials, in roadway/runway construction, in structural fill materials, as roofing granules, and in grouting. The largest application of fly ash

is in the cement and concrete industry, though, creative new uses for fly ash are being actively sought like use of fly ash for the fabrication of MMCs.

E-Glass Fiber

E-Glass or electrical grade glass was originally developed stand insulators for electrical wiring. It was later found to have excellent fiber forming capabilities and is now used almost exclusively as the reinforcing phase in the material commonly known as fiberglass. E-glass fiber as shown fig 3.3 is accounts for 90% of the glass fiber market and is used mainly in a polyester matrix.

and is therefore the preferred material in general purpose products. Continuous and chopped E-glass are widely used in product manufacture. Its advantages are relatively low cost combined with high tensile strength and modulus, with individual filament strengths around 3500 MPa and modulus around 80GPa. Elongation-to-break is nearly 5%.

Two types are available one contains boron, the other boron free. The ultimate use temperature of E-glass is around 500°C. The maximum service temperature for the composite will, however, be dictated by the matrix material. The corrosion resistance of E-glass without boron is approximately seven times the corrosion resistance of the boron-containing E-glasses. Boron free E-glasses have approximately a 10% higher dielectric constant than boron containing E-glasses when measured at room temperature making them less suitable for electronic circuit boards and aerospace applications.

Methodology

1. The fabrication method of the composite material containing Al 7075 as matrix material with fly ash and E-Glass fiber as reinforcement materials is shown in schematic diagram in the fig 4.1
2. Composition of composite = Al 7075 + Fly ash + E-Glass Fiber.
3. The required amounts of the proposed materials, Al 7075, fly ash are taken in weight proportion for stir casting is poured into the mould in molten stage. (The mould is prepared using cast iron pattern).
4. The molten material in the mould is stirred well for uniform composition.
5. The material is now undergoes curing process.
6. The cured material is now shaped into "plate".
7. Now the specimen is cut into standard sizes as per ASTM Standards to carry out the required testing's.
8. The observed test results are recorded and investigated for their improvement in properties

TENSILE TEST

The tensile testing the composite is carried out, on Instron testing machine. The sample rate is 9.103pts/sec and cross-head speed 5.0 mm/min. Standard specimens with 30mm gauge distance were in use to evaluate ultimate tensile strength. The comparison of the properties of the composite material was made with the commercially available pure Al 7075.

TEST REPORT

The determination of Rockwell hardness test, compressive and tensile strength of the prepared samples was carried out as per standard practiced.

HARDNESS TEST

Hardness is the measure of how resistant solid matter be to various category of permanent shape change when a force is applied. Macroscopic hardness is generally characterized by strong intermolecular bonds. available then three types of trial use with precision by the metals industry; they are Brinell hardness test, the Rockwell hardness test, and the Vickers hardness test. But in our present work we considered only Rockwell hardness test. The Rockwell scale is a hardness scale based on the indentation hardness of a material. The Rockwell test determines the hardness by measuring the bottom of perforation of an indenter under a large load compared to the

DISCUSSIONS

The above table shows that combination of coal ash particles in Aluminium matrix causes reasonable increase in hardness as well as reasonable decrease in density. The strengthening of the composite can be due to dispersion strengthening as well as due to particle reinforcement. Thus, fly ash as filler in Al casting reduces cost, decreases density and increase hardness which are needed in various industries like automotive etc.

This indicates that the fly ash addition leads to improvement in the ultimate tensile strength. From the table it is clear that addition of E-glass fiber improve the tensile properties of the composite. The size range of the particles is very wide. The size ranges of the fly ash particles indicate that.

RESULT AND DISCUSSION

composite prepared can be considered as dispersion strengthened as well as particle reinforced composite. As is seen from the particle size distribution there are very fine atom as skillfully as rough ones (1-100 µm). Thus the strengthening of composite can be due to dispersion strengthening as well as due to particle reinforcement. Dispersion strengthening is due to the incorporation of very fine particles, which help to restrict the movement of dislocations, whereas in particle strengthening, load sharing is the mechanism.

CONCLUSION

The flowing conclusion may be drawn form the present work:

1. From the study it is concluded that we can use coal ash for the making of combined and can turn industrial waste into industrial wealth. This can also solve the problem of storage and disposal of flyash.
2. Fly ash up-to 20% by weight can be successfully added to commercially aluminum 7075 by stir casting route to produce composites.
3. Addition of E-glass fiber improves the wetness of pulverized fuel ash with aluminium melt and thus increased the retention of the fly ash in the composite. Hardness of commercially aluminium 7075 is increased from 58BHN to 86 BHN with inclusion of fly ash and Electrical grade glass
4. The Ultimate tensile strength has improved with increase in fly ash content. Where as ductility has decreased with increase in fly ash content.
5. The effect of increased reinforcement on the wear behavior of the MMCs is to increase the wear resistance and reduce the coefficient of friction.
6. The MMCs exhibited better wear resistance due to its superior load bearing capacity.
7. The wear resistance of composites is much greater than the commercially aluminium 7075.
8. Different wear mechanisms were found to operate under the test conditions of variation of normal loads, composition, and sliding velocity. They are oxidation, abrasion and delamination.
9. Both the friction coefficients and the wear rates decreased significantly with the incorporation of fly ash in Al melt.
10. Strengthening of composite is due to dispersion strengthening and particle reinforcement.
11. Increased normal load and sliding velocity increases magnitude of wear and frictional force

TEST REPORT

Sample description	Rockwell hardness(R HB)	Tensile strength(N/mm ²)
AL+10%F LY ASH+8% E- GLASS FIBER	53.6	114.237
AL+2%F LY ASH+5% E- GLASS FIBER	34.2	112.580

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Investigation of Aluminium 6061 Metal Matrix Composite

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Abstract-- A metal matrix composite has a exclusive characteristics to combine the various properties of the different materials present in the matrix composition, which assists it to be used for various high temperature application where constrains could be overcome. The present study investigates the influence of applied load, sliding velocity and various samples on wear rate of Al6061 alloy which was fabricated through liquid metallurgy route. The wear rate of this hybrid composite was investigated by performing dry sliding wear test on a pin-on-disc wear test. The experiment was conducted for a different sliding distance of 1000 and 1500m. Results revealed that load has the highest contribution on wear rate followed by load and sliding velocity. Worn-out wear surfaces analysed by the scanning electron microscope.

Keywords- Silicon Carbide, Titanium Dioxide, Aluminium 6061, MMC

1. INTRODUCTION

Aerospace and automobile industries widely use Metal-matrix composites (MMCs) due to their excellent properties, such as hardness, tensile strength, and wear resistance.

Table 1. Chemical composition of Al 6061

Constituent	Al	Mg	Si	Fe	Cu	Zn	Mn	Cr	Others
Wt. %	Bal	0.956	0.562	0.532	0.236	0.202	0.102	0.046	0.864

Table 2. Properties of Al6061

Density (ρ)	2.70 g/cm ³
Young's modulus (E)	68.9 Gpa (9,990 psi)
Tensile strength (σ_t)	124-290 Mpa (18.0-42.1 psi)

The various properties of these alloys can be further enhanced by the addition of reinforcement materials, such as alumina (Al₂O₃) and silicon carbide (SiC), which has led to the development of highly strong metal matrix composite materials with tailorable properties for specific applications. SiC has excellent properties including high electron mobility, high thermal conductivity, and high tolerance for electrical breakdown, high hardness, and high mechanical strength. Many researchers have reported enhanced mechanical and wear properties of Al6061 alloys reinforced with SiC.

MMCs have been studied for some years, and their potential advantages over conventional monolithic alloys are increasingly being appreciated. Increasing demands for lightweight, high specific strength, excellent high-temperature performance, exceptional corrosion resistance, chemically inert, and energy saving materials in the transportation, agriculture, construction and manufacturing industries have stimulated a steadily growing activity to develop specific composite materials called aluminium matrix composites (AMCs) are lightweight and high performance materials that have the potential to replace conventional materials in many advanced applications.

2. PROCESSING OF AMCs

Fabrication processes used for offsite MMC depend on parameters 1, such as type and composition of matrix and reinforcement matrix wettability and uniform distribution of reinforcing particle in the base matrix, and production cost. According to the working conditions, the fabrication processes of aluminium based composites have been categorized into 2 types which are liquid state and solid state fabrication processes. In liquid state fabrication, the matrix material is heated over its liquefaction temperature and the reinforcement has been added on into the molten matrix which has been aluminium and its alloys in aluminium based composites. And, under this, stir casting, infiltration processes, squeeze casting, reactive in situ technique and spray code position have been discussed well. In solid-state fabrication processes, the reinforcement material is introduced and added throughout the matrix body in the solid state.

3. STIR CASTING

Stir casting is a process used for composite material fabrication when reinforcing materials. (SiC and Cu, FA and AV powder particle) are added with an aluminium matrix with the support of a stirrer drive. Stir casting technology is comparatively simple and low cost for the fabrication of AMC than its alternatives which can be easily adopted in various industries molten composite melt will be cast by the traditional casting method matrix material.

Moreover, Figure one shows how the conventional stir casting process looks like which is utilized generally to prepare MMCs drawback of this technique is that the distribution. There may be the existence of agglomerates due to density differences and the formation of porosity which lessens the material property of the composite. This can be avoided or minimized by using several methods such as double step stir casting adding wettable elements such as magnesium, applying secondary operations such as forging, extrusion, and heat treatment processes or setting optimum processing parameters such as composition, stirring speed, casting temperature, stirrer blade angle and stirring time which is going to be discussed here.

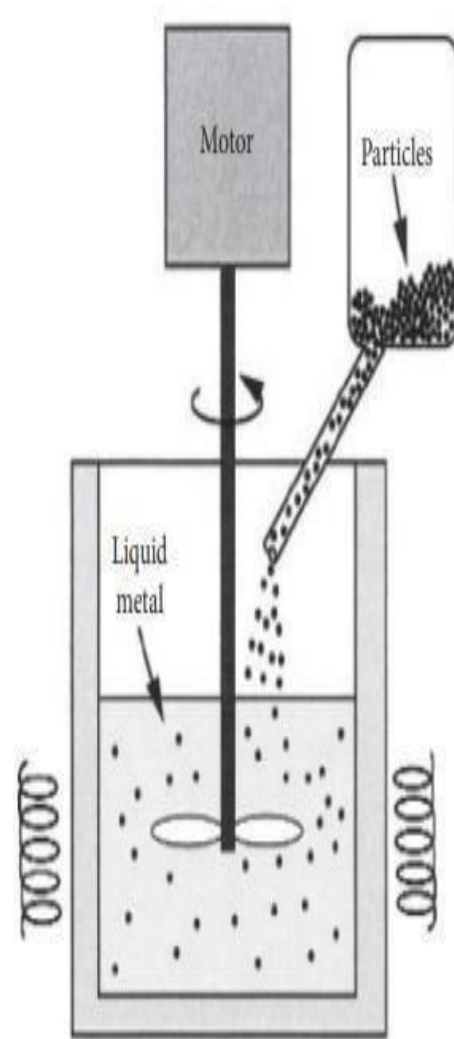


Fig 1. Stir casting setup used for the manufacturing of MMCs

Related to this, AMCs were manufactured using AA6061 as a matrix and preheated 15wt% TiC reinforcement particles by the stir casting process. study intended to improve the ultimate tensile strength (UTS) of the base matrix using ceramic particulates by changing the parameters (stirring speed, stirring time, angle of the stirrer temperature) and to identify the optimum processing parameters which bring the maximum ultimate strength of the composite.. Stir casting is a process used for composite material fabrication when reinforcing materials. (SiC and Cu, FA and AV powder particle) are added with an aluminium matrix with the support of a stirrer drive. Stir casting technology is comparatively simple and low cost for the fabrication of AMC than its alternatives which can be easily adopted in various industries molten composite melt will be cast by the traditional casting method matrix material.

4. Friction Stir Processing (FSP)

FSP is the quick emerging and ideal process to prepare both metallic and ceramic particle reinforced AMCs.

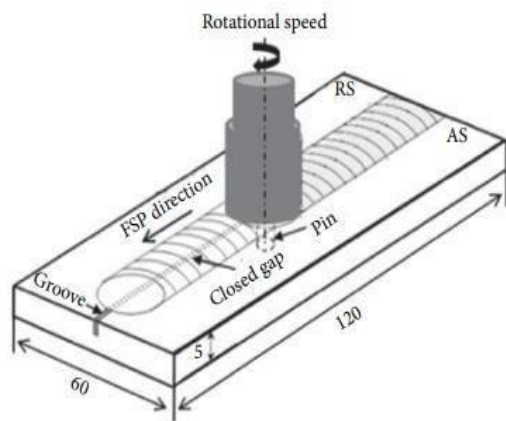


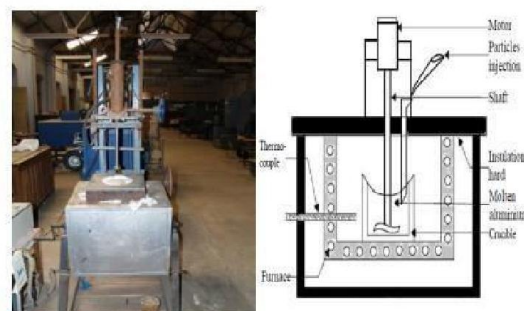
Fig 2. Schematic illustration of the process of FSP

FSP is categorized into severe intense plastic deformation technique which has received much testing focus in recent times. It is evolved from the recently developed friction stir welding (FSW), which was invented at Welding Institute (TWI) two decades ago. It has become standard practice to

machine a reservoir in the grooves or holes on the surface of the aluminium matrix plate for which the reinforcing particles are to be rammed down with FSP method. shows a schematic illustration of FSP how the reservoir is deposited with reinforcement particles; non consumable rotating tool creates adequate frictional heat upon contact with the plate surface to plasticize the matrix. Traverse motion of the tool and is forged due to the application of axial force. Deformed material is transferred from the retreating side (RS) of the tool pin to the advancing side (AS) and is set up by the tool shoulder, resulting in a solid state to be modification of the material. Tool material be strong enough to create adequate friction and resist wear due to the abrading action of reinforcing particles. During FSP, tool rotational speed, traverse speed, axial force, tool geometry, size of the groove or hole, type of processing tool and the number of passes are the significant process parameters to be considered for systematic production of the composite material which is discussed next in various experimental works. It is an efficient technique to produce high-quality state with good interfacial bonding between the matrix and the reinforcement, fine-grained structure of the composite, and no need for secondary processing of the final composite material. Also, composites produced with this method since there is a uniform distribution of the reinforcing particles throughout the matrix plate. AMCs in their solid

4. EXPERIMENTAL PROCEDURE

The Stir casting method was used to prepare nano composites and the experimental setup is shown in Figure 3(a) and Figure 3(b). Figure 1(a). Stir casting setup 3(b) Layout The Al alloy pieces were heated to 1100°C in a graphite crucible. The nano TiO₂ reinforcement particulates and magnesium (2%wt) are preheated for 30 minutes. Magnesium is added to promote wettability.. The heated slurry was stirred at 310 rpm for 10 minutes using a three blade mild steel impeller to ensure uniform incorporation of the nano TiO₂ particles into the Aluminium matrix.



3(A) Stir casting setup

3(b) Layout

The three blade mild steel impeller was coated with alumina powder to avoid iron contamination of the molten Al metal. This design prevented the heavier Nano TiO₂ from settling when the melted slurry was stirred for 5 minutes. Furthermore, stirring at an optimized speed of 310 rpm created a vortex in the melt, and this effectively enhanced the distribution of the particles. This stirring process

was used to melted slurry. The melt, with incorporated Nano TiO₂ particles, are poured in to a mould rod of length 200mm and diameter 20mm. 3. Results and Discussion 3.1 Wear testing The Pin on Disc tester is used for a fast and simple method of kinetic friction and slippy wear activity. It measures the friction and sliding wear properties of dry or greased surfaces of a selection of bulk materials and coatings. The Pin K. R. Padmavathi and R. Ramakrishnan Vol 9 (S1) | December 2016 | www.indjst.org Indian Journal of Science and Technology 3 on Disc wear testing apparatus consists of a rotating disc, EN-31 steel and the Al-nano TiO₂ composite pin of the fabric to be tested. The pin surface can conjointly be wear and friction tested. Figure En-31 steel disc. The normal load, rotational speed, and the wear track diameter are set prior to the pin on disc wear test. Dry sliding wear tests were conducted using a pin on disc tester as per the ASTM G 99 standard. Pin specimens of diameter 8mm and length 30 mm were machined from the casted rods. A pin holder loaded the stationary pins vertically onto a rotating En31 steel disc. A normal load of 9.81 Kg was applied using dead weights at 1273 rpm. For each sliding condition, 492 seconds of run were carried out. At the end of 492 seconds, the pins were carefully cleaned and weighed using a sensitive electronic balance with an accuracy of ± 0.001 mg to determine the weight loss. The following table.1 shows the mass loss for the applied

6. RESULTS AND DISCUSSION

6.1 Wear testing



Fig4(a) En-31 steel disc Fig 4(b). Pin specimen

The Pin on Disc tester is used for a fast and simple method of kinetic friction and slippy wear activity. It measures the friction and sliding wear properties of dry or greased surfaces of a selection of bulk materials and coatings. on Disc wear testing apparatus consists of a rotating disc, EN-31 steel and the Al-nano TiO₂ composite pin of the fabric to be tested. The pin surface can conjointly be wear and friction tested.

load for Al-Nano TiO₂ Composites and interprets that increasing the weight percentage of nano TiO₂ reduces the wear and for 1.5 weight % of TiO₂ it is increasing.

The following graphs depict the wear properties for various weight percentage of TiO₂ for the duration of 492 seconds.

The Al alloy pieces were heated to 1100°C in a graphite crucible. The nano TiO₂ reinforcement particulates and magnesium (2%wt) are preheated for 30 minutes. Magnesium is added to promote wettability. Aluminium degas tablets are added in the powdered form to remove the bubbles during the process. The heated slurry was stirred at 310 rpm for 10 minutes using a three blade mild steel impeller to ensure uniform incorporation of the nano TiO₂ particles into the Aluminium matrix. TiO₂ particles, are poured in to a mould rod of length 200mm and diameter 20mm. This design prevented the heavier Nano TiO₂ from settling when the melted slurry was stirred for 5 minutes. Furthermore, stirring at an optimized speed of 310 rpm created a vortex in the melt, and this effectively enhanced the distribution of the particles. This stirring process used to ensure the homogeneity in melted slurry. The melt, with incorporated Nano TiO₂ particles, are poured in to a mould rod of length 200mm and diameter 20mm.

Table 3: Weight loss during wear testing

% of nano TiO ₂	Weight of the pin during wear testing (gm)		Difference (gm)
	Before	After	
0.5	4.269	4.262	0.007
1	4.267	4.265	0.002
1.5	4.449	4.445	0.004

The normal load, rotational speed, and the wear track diameter are set prior to the pin on disc wear test. A normal load of 9.81 Kg was applied using dead weights at 1273 rpm. For each sliding condition, 492 seconds of run were carried out. At the end of 492 seconds, the pins were carefully cleaned and weighed using a sensitive electronic balance with an accuracy of ± 0.001 mg to determine the weight loss.

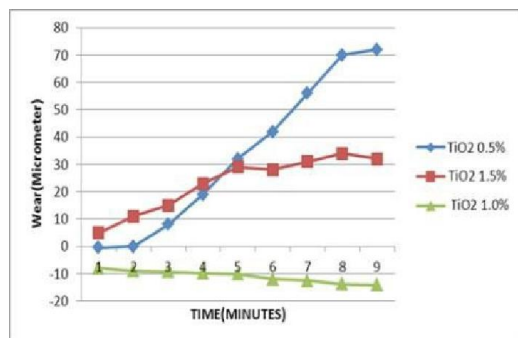


Figure 5. Wear rate of Al-TiO₂ composites.

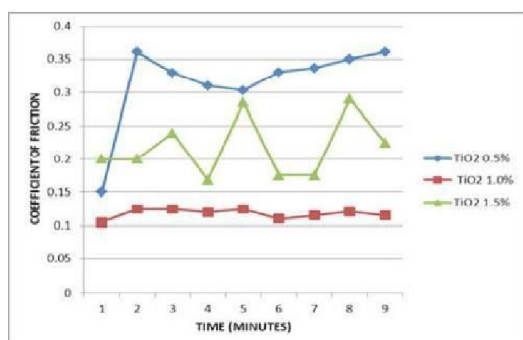
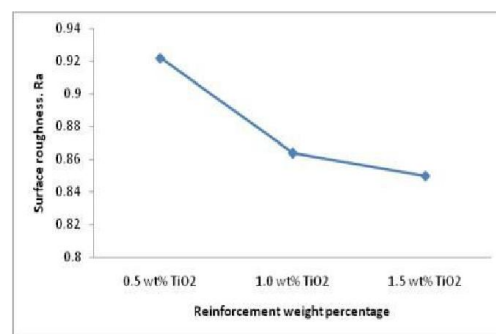
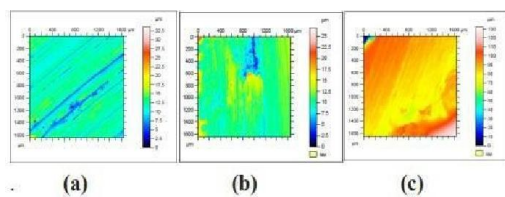


Figure 6. Coefficient of friction for Al-TiO₂ composites.

The following table.1 shows the mass loss for the applied load for Al-Nano TiO₂ Composites and interprets that increasing the weight percentage of nano TiO₂, reduces the wear and for 1.5 weight % of TiO₂ it is increasing.

6.2 Surface roughness

Surface roughness affects the wear rate. The higher the roughness, the higher are the wear rate. The hardness is inversely proportional to the wear rate therefore the fabric with a lower hardness reduces the wear resistance because of the mutual abrasion between the counter material and therefore the wear surface of the specimen^{4,7}. Increasing the volume fraction of TiO₂ nano particles within the composite reduces its wear rate.



(d)

Figure 5(a), Figure 5(b) and Figure 5(c) shows the non-contact surface roughness of 0.5, 1 and 1.5 weight proportion of nano TiO₂ bolstered metal metal matrix composites. Figure 5(d) shows the surface roughness Ra values and depicts that the increase in percent weight of nano TiO₂ reduces the surface roughness.

(a), (b), (c) Non contact surface roughness values of the composite with 0.5, 1, 1.5 weight percentage of TiO₂. (d) Surface roughness, Ra values for 0.5, 1, 1.5 weight percentage of nanoTiO₂.

6.3 Hardness testing

Vickers micro Hardness is calculated by forcing an indenter into the surface of the sample. It uses a 136° square pyramid indenter, which produces a square indentation in the specimen, rather than a spherical or conical indenter, which Norman Rockwell and Brinell hardness techniques use.

$$HV = \frac{2F \sin \frac{136^\circ}{2}}{d^2}$$

Vickers hardness test was carried out for measuring the hardness of aluminium with Nano titanium dioxide strengthened metal matrix composites.

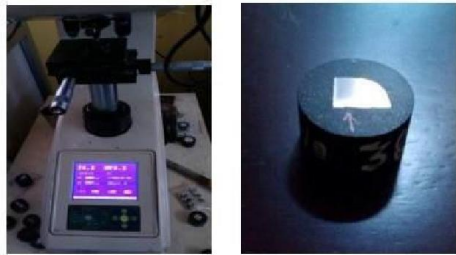


Figure 6(a). Vicker 's Hardness Testing Machine **Figure 6(b). Specimen for Testing the Hardness**

Indenter load is kept at 0.5 kg. The indentation is measured at a microscope in the diagonals of the square indentation. The Vickers hardness is the quotient obtained by dividing the kg load by the square mm area of indentation as Vickers's hardness testing machine and a specimen for hardness testing

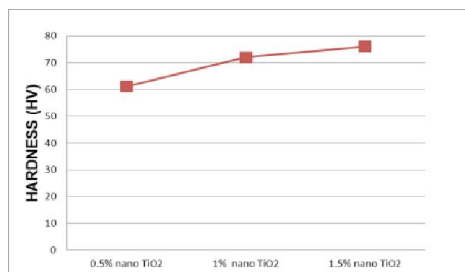


Figure 7. Vicker's Hardness values of Al-TiO₂ composites

The addition of nano TiO₂ increases the hardness of the composite material than those for pure aluminium (33HV)5,9–14. The

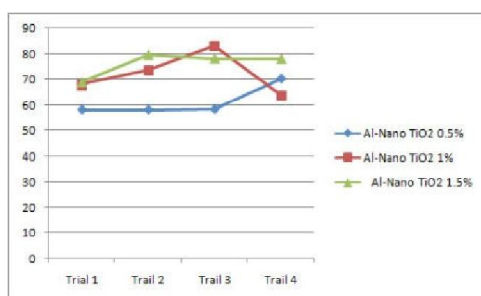


Figure 8. Mean hardness.

improved hardness by increasing the weight percentage of nano TiO₂ particles mainly result from the presence of extremely harder nano- TiO₂ particles in Al6061 matrix material.

6.4 Tensile and Compressive Properties

Typical stress strain curves for the aluminium-TiO₂ nano composite are shown in Figure 9. It can be understood that the enduringsness will increase with increasing weight proportion of nano TiO₂ up to a quarter and starts decreasing nano, which indicates the impact of nano TiO₂ on the sweetening of mechanical properties of the composite

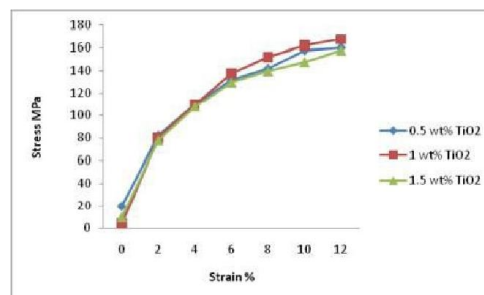


Figure 9. Stress-strain curves of Al-nanoTiO₂ composites

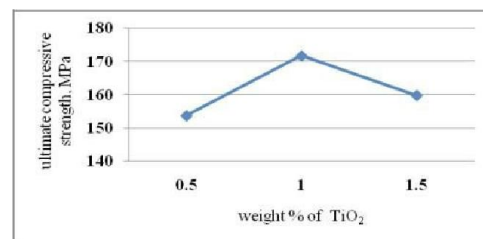


Figure 10. Ultimate compressive strength of Al-nanoTiO₂ composites

The ultimate compressive strength for the composite is increased with an increase in the content of nano TiO₂ particles up to 1% and is decreased for 1.5% and is depicted in Figure 10. and it is higher than that for pure Al(130MPa)5.

6.5 Conclusion

TiO₂ metal matrix composites. Micro hardness of the composites magnified for increasing weight share of nano TiO₂ bit by bit. Aluminium with 1 weight percentage nano TiO₂ composite shows the utmost compressive and lastingness. The micro hardness, tensile and compressive tests have revealed increased mechanical properties of Al - nano TiO₂ composites due to the impact of nano reinforcement. Wear rate and co-efficient of friction of the aluminium - nano

TiO₂ composites are reduced up to at least one weight share of nano TiO₂ and are magnified for higher percentages of nano TiO₂. Further nanoTiO₂ contributed considerably in rising the wear resistance of Al- nano TiO₂ metal matrix composites. The non-contact surface roughness for the composites is reduced for increased addition of nano TiO₂. It can be finished that Aluminium 6061- nano TiO₂ metal matrix composites exhibits superior wear and mechanical properties.

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INVESTIGATION OF ALUMINIUM METAL MATRIX COMPOSITE PREPARED BY SQUEEZE CASTING METHOD

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ABSTRACT

Squeeze casting is a combination of casting and forging procedures that can be accomplished with the use of high pressure during melt solidification. By applying pressure to the solidification of molten metal, the melting point of alloys can be changed, resulting in a faster solidification rate. It also refines the micro and macrostructure of the castings, which helps to reduce gas and shrinkage porosities. Squeezing casting of Aluminum Metal Matrix Composites is highlighted in this work in various areas, including squeeze pressure, casting (melt)/perform preheat/die temperature, solidification rate, reinforcement particle sizes, porosity, and mechanical qualities. Material Metal matrix composites (MMC) are often reinforced with other metals, ceramic organic compounds, and have led to a rise in the rate of development in the engineering industry. When compared to base metal, reinforcements considerably improved qualities such as high tensile strength, toughness, hardness, low density, and good wear resistance. It has become more important to create composites at a cheap cost, and AMMCs are now extensively used in automobiles, aeroplanes, and aerospace, as well as many other sectors. Silicon carbide

(SiC), graphite (Gr), and aluminium oxide (Al₂O₃) are the most commonly utilised reinforcements. Alloy-SiC reinforcement improves toughness, thickness, and ductile strength, as well as wear resistance. The compressive strength and wear resistance of Al₂O₃ reinforcement are excellent. Gr is employed as a solid lubricant, while SiC and Gr particles are used to reinforce the hybrid composite, resulting in a low friction coefficient and great wear resistance. The addition of SiC particles improves the strength and hardness of the Al/SiC/Gr hybrid composite, compensating for the wear-resistant qualities of Gr. The particle distribution of AMMC characteristics has played an important role and is improved by vigorous shearing.

Keywords

Tensile testing, hardness testing, and impact testing process for aluminium 7075, silicon carbide, and aluminium oxide (Al₂O₃).

I. Introduction

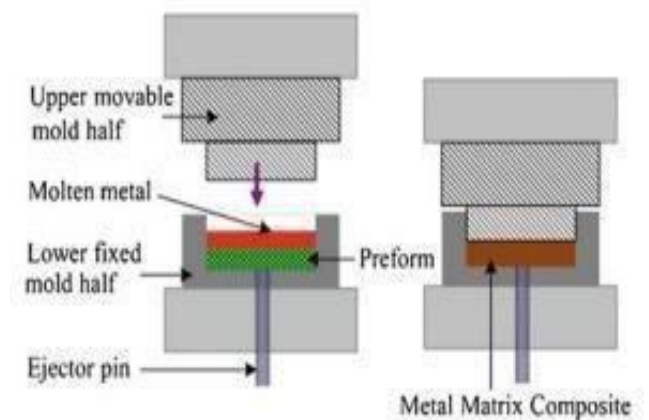
Metal matrix composites (MMC) are often reinforced with other metals, ceramic organic compounds, and have led to a rise in the rate of development in the engineering industry. When compared to base metal, reinforcements considerably improved qualities such as high tensile strength, toughness, hardness, low density, and good wear resistance. It is becoming more important to build composites at a cheap cost [25], and AMMCs are now extensively used in automobiles, aeroplanes, and aircraft, as well as many other sectors [17], with silicon carbide (SiC), graphite (Gr), and aluminium oxide (Al₂O₃) as the most commonly utilised reinforcements. Al alloy-SiC reinforcement improves toughness, thickness, and ductile. Wear resistance comes after strength [23]. The compressive strength and wear resistance of Al₂O₃ reinforcement are excellent [29]. When Gr is utilised as a solid lubricant, the hybrid composite with SiC and Gr particles reinforcement has a low friction coefficient and high wear resistance [5, 8, 14]. The addition of SiC particles increases the strength and hardness of Al/SiC/Gr hybrid composites, compensating for Gr's wearable qualities [12, 14]. The particle distribution of AMMC characteristics has played an important role and is improved by vigorous shearing.

II. SQUEEZE CASTING METHOD

Squeeze casting is a concept that dates back to 1800 [3, 33]. Squeeze casting research was not accompanied until 1931 [24]. Closed die forging and gravity die casting are combined in squeeze casting methods. Metals in closed die halves have solidified as a result of applied pressure.

The functional pressure, followed by the fast engagement of melted metal with the die surface, causes rapid heat transfer, resulting in a porous free casting with mechanical qualities that are prone to twisting. Squeeze casting is also known as extrusion casting, liquid metal casting, and squeeze forming. It

has minimal operating expenses and negligible porosity shrinkage, good surface polish, high metal yield. The tight connection between the mould and the liquid metal results in higher quality castings and higher rates of heat removal through the metal mould boundaries. The squeeze casting method is schematically depicted in Fig. 1 [33]. The methods are mainly divided into two categories: indirect and direct methods. Squeeze pressure is applied through the die-closing punch, which is a direct process; however, squeeze pressure is applied after the secondary ram closes the die, which is an indirect process. This is a unique aspect of squeeze casting over the predicted die casting method. The squeeze casting procedure has promising results.



Absence of shrinkage porosity.

- Both wrought and casting alloys can be squeeze cast to provide a polish that is acceptable for extended frozen alloys.
- The cycle periods for squeeze casting are shorter.
- Good dimensional repeatability can be achieved using a combination of thin die coatings and high-quality reusable dies, with the dies being recycled after applying the appropriate pressure.
- The components' forging quality has been developed in squeeze casting.
- Squeeze formation causes a significant degree of change in the composite structure. The particle size was reduced to about half of what it was in a gravity cast composite.

- Material moulded using the squeeze casting method has a higher toughness and a more equiaxed grain structure than material moulded using the gravity casting method, and mechanical properties have improved significantly as a result of the improved microstructure.

III. ALUMINUM SQUEEZE CASTING TECHNOLOGY

Aluminum-silicon casting alloy A356 is a frequently used aluminum-silicon alloy. It offers an appealing mix of castability, corrosion and wear resistance, pressure tightness, and a high strength-to-weight ratio [1-3].

The composition, melt treatment, feeding system efficiency, cooling rate, and heat treatment all have an impact on the microstructure and mechanical properties of this alloy. The cast structure, in general, controls the mechanical qualities. Casting soundness, the number, size, and morphology of constitutive phases such as the -Al phase, eutectic Si-particles, and the distribution of micro-particles all influence the mechanical properties of A356. These parameters are regulated by the heat treatment method and how the Al-Si binary eutectic nucleates and develops during solidification [4-6]. Sand casting, permanent mould casting, and die casting (including squeeze casting) are the most common methods for producing Al-Si-Mg alloy castings. Among these techniques, the squeeze casting process produces the best mechanical qualities [7-9].

PRINCIPLES OF SQUEEZE CASTING

The information in this part is taken from the UBE training manuals. It explains the history and principles of the squeeze casting process as they apply to CWRU's Vertical Squeeze Casting machine. Also included are some recommendations for selecting processing parameters for sound squeeze cast products. In the current study, these guidelines were mainly followed, with small variations here and there.

CASTING THEORY

The die chamber is filled with molten aluminium at a low pace using a plunger controlled by a hydraulic cylinder in squeeze casting. During the solidification process, the metal is subjected to a lot of pressure.

The fundamentals of fluid dynamics as applied to the squeeze casting process are discussed in the next section.

PASCAL'S LAW

The pressure delivered to the liquid can be computed as F_o/A_o if the little piston's area is A_o and the force applied to it is F_o . Figure 3.1 shows one example. We can derive from Pascal's Law that the force necessary at F_1 to keep the larger piston from moving is $F_1 = \text{pressure} \times \text{plunger area} (A_1)$.

$F_o = P \times A_o$ $P = F_o/A_o$ is used to compute the pressure
 $P \cdot F_1 = P \times A_1 = F_o \times A_1/A_o$ is the force on plunger A_1 .

Pascal's Law is a mathematical relationship that can be used to compute injection pressure, casting pressure, and die opening force.

PROCESSING PARAMETERS FOR SQUEEZE CASTING

When determining the die system, machine size, and injection conditions for squeeze casting, the following factors must be considered: product size and form, as well as the following:

CASTING PRESSURE (METAL PRESSURE)

Casting pressures range from 10 to 14 ksi, with an average of 12 ksi. By dividing the squeeze machine's injection force by the area of the plunger tip, the casting pressure may be computed. $P = F_o/A_o = 4P_o D_2^2/d_2^2 = P_o \times D_2^2/d_2^2$ is the casting pressure. The machine design determines the maximum injection force of the squeeze casting machine.

By altering the cylinder pressure, the applied injection force can be regulated. The injection force is also influenced by the plunger tip's inner diameter, therefore choosing the right tip diameter is crucial.

CALCULATION OF CASTING PRESSURE

The metal pressure is calculated by dividing the applied force (F_o) by the plunger tip area (A_o).

$$P = F_o / A_o = P_o \times \pi D^2 / \pi d^2 = P_o D^2 / d^2$$

Example:

$$P = 53,000 \text{ lbf}$$

$$P = 53,000 / (\pi \times 2.762^2 / 4) = 8860 \text{ psi}$$

IV. MECHANICAL PROPERTIES

- Tensile test,
- Hardness test.

TENSILE TEST

Tensile testing, also known as tension testing, [1] is a fundamental materials science and engineering test in which a sample is subjected to a controlled tension until failure.

Properties that are directly measured via a tensile test are ultimate tensile strength, breaking strength, maximum elongation and reduction in area. [2] From these measurements the following properties can also be determined: Young's modulus,

Tensile testing, often known as tension testing, is a fundamental materials science and engineering test that involves applying a controlled tension to a sample until it fails.



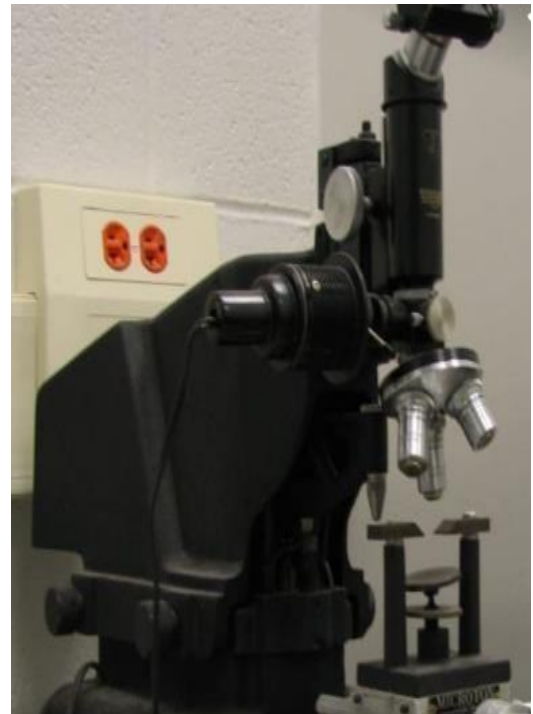
Ultimate tensile strength, breaking strength, maximum elongation, and reduction in area are all directly determined using a tensile test.

[2] Young's modulus, Poisson's ratio, yield strength, and strain-hardening characteristics can all be calculated based on these observations. [3] The most popular method for determining the mechanical properties of isotropic materials is uniaxial tensile testing. Biaxial tensile testing is used on some materials.

The way load is given to the materials is the fundamental variation between these testing devices..

HARDNESS TEST

Hardness is a metric that measures how resistant a material is to localised plastic deformation caused by mechanical indentation or abrasion. Hardness varies by material; for example, hard metals like titanium and beryllium are harder than soft metals like sodium and metallic tin, as well as wood and ordinary polymers.



V. MATERIAL SELECTION
MATERIAL 7075

Strong intermolecular connections describe macroscopic hardness, but the behaviour of solid materials under stress is complex, hence scratch hardness, indentation hardness, and rebound hardness are all different metrics of hardness.

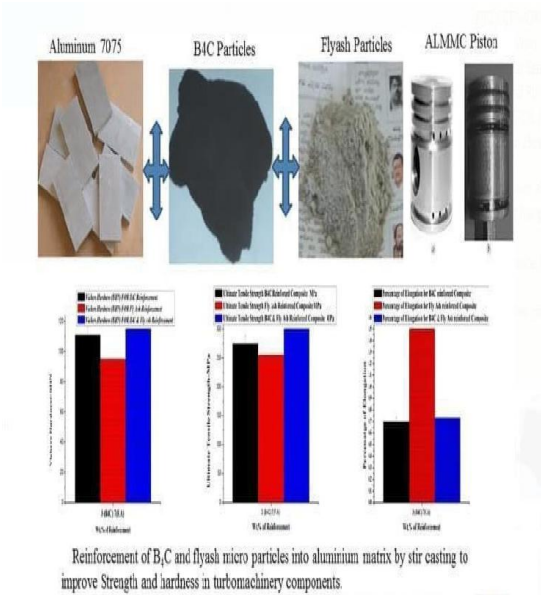
Ductility, elastic stiffness, plasticity, strain, strength, toughness, viscoelasticity, and viscosity are all factors that influence hardness.

Ceramics, concrete, certain metals, and superhard materials are examples of hard matter, which can be compared with soft matter.

7075 is a precipitation-hardened aluminium alloy, containing Silican carbaide and aluminium oxide.its major alloying elements. It has good mechanical properties, exhibits good wear resistant and corrosive resistance. It is one of the most common alloys of aluminium for general-purpose use. The mechanical properties of 7075 depend greatly on the heat treatment of the material.

USING MATERIAL

- 1. Base Metal Aluminium 7075
- 2. Reinforcement Silicon Carbide
- 3. Reinforcement Aluminium Oxidie



PHYSICAL PROPERTIES OF MATRIX

ALUMINIUM 7075

Property	Value
Density (g/cc3)	2.81
Melting point (oC)	477
Modulus of elasticity (GPa)	71.7
Hardness	87 HRB
Poisson's ratio	0.33
Compressive strength (MPa)	540

PHYSICAL PROPERTIES OF REINFORCEMENT

SILICON CARBIDE

Property	Value
Density (g/cc3)	3.21
Melting point (oC)	2730
Modulus of elasticity (GPa)	450
Hardness	2800
Poisson's ratio	0.15
Compressive strength (MPa)	550

ALUMINIUM OXIDE

Property	Value
Density (g/cc3)	3.987
Melting point (oC)	2072
Modulus of elasticity (GPa)	375
Hardness	1440
Poisson's ratio	0.21
Compressive strength (MPa)	2600

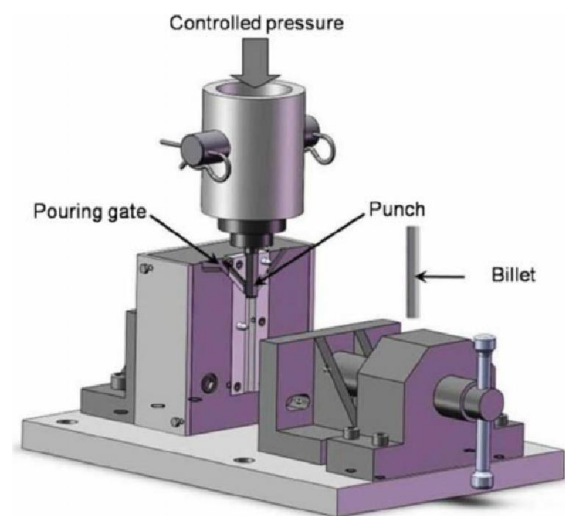
VI. TESTING ON SQUEEZE CASTING METHOD

Squeeze casting process, is based pressurized Solidification of the molten metal in re-usables dies, and involves the following steps:

Factor notation	Control factor	Level 1	Level 2	Level 3
A	Squeeze pressure(Mpa)	40	80	120
B	Pouring temperature($^{\circ}$ C)	800	850	900
C	Duration of pressure application (s)	20	40	60
D	Die preheating temperature ($^{\circ}$ C)	80	160	250

Preparation of metal matrix composites using stir casting furnace. Squeeze casting process, is based on the pressurized solidification of the molten metal in re-usable dies. Preheating of the die and the punch Pouring molten metal into the die cavity. The entrapped gases are kept in solution by the punch's pressure, and the high-pressure contact at the die-metal interface promotes rapid heat transfer, resulting in a fine microstructure with good mechanical characteristics. Solidified casting is ejected.

The squeezing pressure, pouring temperature, die-preheating temperature, and duration are all being measured in this research of pressure applied of Aluminum metal matrix composites (A356+SiC) with the help of optimize the process parameters of castings in squeeze casting.



VII. Conclusion

The following are the findings of the Squeeze casting review: When aluminum-based metal matrixes were examined for various reinforcements, fine microstructures with greater strength components, good surface texture, and low porosity were discovered. The tensile strength, hardness, and ductility of aluminium alloys reinforced by Al₂O₃ enhanced. Due to aggregation of the hard ceramic particles, which leads to porosity, SiC reinforced matrix enhanced tensile and hardness behaviour up to 10% and decreased tensile strength and hardness with increasing wt percent. SiC reinforced AMMCs outperformed Al₂O₃ reinforced MMCs in terms of wear resistance. The addition of graphite particles increases the size of the graphite particles. increased the wear resistance.

Because of the increased reinforcement on the wear behaviour of MMCs, the coefficient of friction has decreased and wear resistance has increased.

VIII. Future work

Aluminum 7075, silicon carbide, and aluminium oxide will be used in the testing (Al₂O₃)

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INVESTIGATION ON THE PROPERTIES OF NATURAL AND GLASS FIBRE REINFORCED ALUMINIUM LAMINATE COMPOSITES

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ABSTRACT

The use of fiber metal laminates as a replacement to the man made fibers in fiber metal reinforced composites have increased and opened up industrial possibilities. While weight reduction and improved damage tolerance characteristics were the prime drivers to develop these natural fiber mudra and sisal new family of materials, it is found out that they have additional benefits which have become more important for today's designer. Chemical treatment of the natural fiber is facilitated by Potassium hydroxide(KOH). Fiber Metal Laminates are good candidates for advanced aerospace structural applications due to their high specific mechanical properties, especially fatigue resistance. The common problem encountered in composites manufacturing are poor adhesion between Matrix, Aluminum and FRP layers. To overcome this constraint physical and chemical treatments are given to FRP and surface chemical treatments are carried out for aluminum plate and also for an E-glass fiber. The matrix suggested in this work is EPOXY resin as it shows better adhesion property with the plate. After fabrication, the sample composite containing Aluminum reinforced with natural fiber and glass fiber will be subjected to various tests to showcase the variation in mechanical properties. Fracture behavior of laminas under tensile loading conditions will also be studied using scanning electron microscope.

Keywords: Mudar (*Calotrophis Gigantea*), Sisal (*Agave Sisalana*), KOH, Aluminium powder, E-glass fiber

Composite materials are manmade material with origin during Old Stone Age. Use of ecofriendly composites gains attraction in the recent years due to its lightweight and moderate strength. Due to increased awareness on the part of end users and pressure from legislators, the composite industry has begun investigating the possibility of increasing the proportion of recycled or biodegradable composite materials. Fiber-Metal Laminates (FML) which consists of alternative bonded thin metal sheets and fiber-reinforced-layer have been originally developed at Delft University of Technology, Netherlands. A

great deal of research work has already been made on the prospective of the natural fibers as reinforcements for composites. Advantages of natural fibers over synthetic fibers comprise of low density, low cost, availability, recyclability and biodegradability. Composite materials (or composites for short) are engineering materials made from two or more components. One component is often a strong fiber such as fiberglass, quartz, Kevlar or carbon fiber that gives the material its tensile strength, while another component (often called a matrix) is often a resin such as polyester or epoxy that binds the fibers together and renders the material stiff and rigid.

Due to their numerous advantages they are supposed to be analogous to those of synthetic fibers used as reinforcements. The synthetic fibers used for reinforcement in SFRPCs are glass, carbon, aramid, Kevlar etc. Synthetic FRPCs have unique advantages over monolithic polymer materials. Besides high strength and high stiffness, these composites have long fatigue life and adaptability to the intended function of the structure. Although the SFRPCs possess exclusive mechanical strength, they have some serious drawbacks such as high cost, high density (as compared to polymers), and poor recycling and non-biodegradable properties. For these reasons, over the last few years natural plant fibers reinforced polymer composites are increasingly gaining attention as viable alternative to SFRPCs.

The inclination towards using natural fibers as reinforcement of polymer-based composites is mainly due to their availability from renewable natural resources, satisfactorily high specific strength and modulus, light weight, low cost and biodegradability. The biodegradability of the natural plant fibers may present a healthy ecosystem while the low costs and good performance of these fibers are able to fulfill the economic interest of industry. But still the mechanical strength of a natural fibers reinforced polymer composite

(NFRPCs) could not match that of SFRPCs and the natural fibers would not replace synthetic fibers in all applications.

Fibers are the principal constituent in a fiber reinforced composites. They occupy the largest volume fraction in a composite structure and share the major load acting on it. Proper selection of the fiber type, fiber volume fraction, fiber length, and fiber orientation are very important in composites.

The efforts to produce economically attractive composite components have resulted in several innovative manufacturing techniques currently being used in the composites industry. It is obvious, especially for composites, that the improvement in manufacturing technology alone is not enough to overcome the cost hurdle. It is essential that there be an integrated effort in design, material, process, tooling, quality assurance, manufacturing, and even program management for composites to become competitive with metals.

The composites industry has begun to recognize that the commercial applications of composites promise to offer much larger business opportunities than the aerospace sector due to the sheer size of transportation industry. Thus the shift of composite applications from aircraft to other commercial uses has become prominent in recent years. Increasingly enabled by the introduction of newer polymer resin matrix materials and high performance reinforcement fibers of glass, carbon and aramid, the penetration of these advanced materials has witnessed a steady expansion in uses and volume. The increased volume has resulted in an expected reduction in costs. High performance FRP can now be found in such diverse applications as composite armoring designed to resist explosive impacts, fuel cylinders for natural gas vehicles, windmill blades, industrial drive shafts, support beams of highway bridges and even paper making rollers.

1.1. CLASSIFICATION OF COMPOSITES

Broadly, composite materials can be classified into three groups on the basis of matrix material. They are:

- a) Metal Matrix Composites (MMC)
- b) Ceramic Matrix Composites (CMC)
- c) Polymer Matrix Composites (PMC)
- d) Hybrid Composites Material

1.1.1 FIBERS

Fibers are the principal constituent in a fiber reinforced composites. They occupy the largest volume fraction in a composite structure and share the major load acting on it. Proper selection of the fiber type, fiber volume fraction, fiber length, and fiber orientation is very important in composites. Fiber influence the following characteristics of composite structure

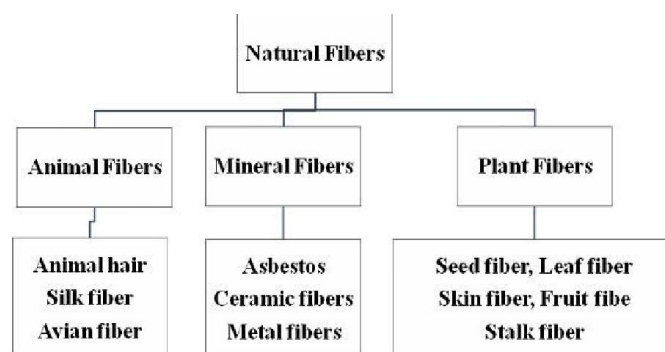
1. Density
2. Tensile strength and modulus
3. Compressive strength and modulus
4. Fatigue strength and as well as fatigue failure mechanisms
5. Electrical and thermal conductivities

1.1.2 GLASS FIBERS,

Glass fibers are the most common of all reinforcing fibers for polymeric (plastic) matrix composites (PMCs). The principal advantages of glass fiber are low cost, high tensile strength, high chemical resistance and excellent insulating properties. The two types of glass fibers commonly used in the fiber reinforced plastics industries are E-glass and S-glass. Another type known as C-glass is used in chemical applications requiring greater corrosion resistance to acids than is provided by E-glass.

1.1.3 CLASSIFICATION OF NATURAL FIBERS

Natural fibers include those made from plant, animal and mineral sources. Natural fibers can be classified according to their origin.



2. LITERATURE SURVEY

Title: A study on the manufacturing of Glass-Fiber-Reinforced Aluminum

Laminates and the effect of interfacial adhesive bonding on the impact behavior.

Author: Mohammad Alemi Ardakania,, Akbar Afaghi Khatibib, Seyed Asadollah

Ghazavi-Society for Experimental Mechanics Inc.

Description: Fiber metal laminates (FMLs) are good candidates for advanced aerospace structural applications due to their high specific mechanical properties especially fatigue resistance. The most important factor in manufacturing of these laminates is the adhesive bonding between aluminum and FRP layers. In this study several glass-fiber reinforced aluminum (GLARE) laminates with different bonding adhesion were manufactured. Drop weight impact tests based on ASTM D7136 standard were then conducted to study the effects of interfacial adhesive bonding on impact behavior of these laminates. It was observed that the damage size is greater in laminates with poor interfacial adhesion compared to that of laminates with strong adhesion between aluminum and glass layers.

Title: Experimental Investigation of Natural Fiber Reinforced Polymer

Author: Irsene S. Fahim, Salah M. Elhaggar, Hatem Elayat

Description: The potential usage of virgin Low density polyethylene (LDPE) reinforced with different concentrations (2%, 5% and 6% by weight) of treated rice straw with different lengths (2 mm, 4 mm and 6 mm) is investigated to produce high value products that have technical and environmental demand. The two treatment methods used for rice straw are alkali and acidic treatments of rice straw. The removal of impurities and waxy substances from fiber surface avoid creation of rougher topography after treatment and improves the quality of fiber, also content of hemi cellulose and lignin decrease so increase effectiveness of fiber due to dispersing of fiber in matrix. The reinforcing material is embedded in the matrix material to enhance tensile and flexural behaviors of the synthesized composite. The result of investigating these two mechanical properties, using statistical analysis & design of

experiments, showed an enhancement in the mechanical properties of the virgin polymer composite compared to the virgin polymer. The flexural stress of the composite increased three times the virgin flexural stress, while the tensile stress increased eight times the original tensile stress.

Title: Fabrication and Testing of Fiber Reinforced Polymer Composites Material

Author: K. Alagarraja, A. Dhamodharan, K. Gopinathan, R. Mathan Raj, K. Ram Kumar

Description: The composite materials are replacing the traditional materials, because of its superior properties such as high tensile strength, low thermal expansion, high strength to weight ratio. The developments of new materials are on the anvil and are growing day by day. Natural fiber composites such as sisal polymer composites became more attractive due to their high specific strength, lightweight and biodegradability. Mixing of natural fiber with Glass-Fiber Reinforced Polymers (GFRPs) is finding increased applications. In this study, sisal – glass fiber reinforced epoxy composites is developed and their mechanical properties such as tensile strength, compression strength, flexural strength and impact strength are evaluated. The interfacial properties, internal cracks and internal structure of the fractured surfaces are evaluated by using Travelling Microscope. The results indicated that the incorporation of sisal fiber with GFRP can improve the properties and used as an alternate material for glass fiber reinforced polymer composites.

3. MATERIALS AND METHODS

This chapter describes the details of processing of the composites and the experimental procedures followed for their mechanical characterization.

The raw materials used in this work are

1. Mudar (Calotropis Gigantea)
2. Sisal (Agave Sisalana)
3. Epoxy resin
4. Hardener
5. E-glass fiber
6. Aluminium powder
7. Potassium hydroxide

3.1. HYBRID FIBER

3.1.1. MUDAR (*CALOTROPHIS GIGANTEA*)

The plant is valuable from the fine strong fibers with which it abounds. To them, the straightest branches are cut and exposed to wither for at least twenty hours, on the second and third day they are slightly beaten, the skin is then peeled the stringy substance between the bark and the wood taken out. They are then dried turn. This slow process is necessarily expensive, but if the bark is steeped in water becomes discolored and cutting will destroy it.

3.1.2 SISAL (*AGAVE SISALANA*)

Sisal (*Agave Sisalana*) is an agave that yields a stiff fiber traditionally used in making twine, rope and also dartboards. The term may refer either to the plant or the fiber, depending on context. It is sometimes incorrectly referred to as sisal hemp because hemp was for centuries a major source for fiber, so o

This palm is often erroneously called the betel tree because its fruit, the areca nut, is often chewed along with the betel leaf, a leaf from a vine of the Piperaceae family. It is a medium-sized and graceful palm tree, growing straight to 20 m tall, with a trunk 1-5cm in diameter.

Sisal plants consist of a rosette of sword-shaped leaves about 1.5 to 2 meters tall. Young leaves may have a few minute teeth along their margins, but lose them as they mature. Sisals are sterile hybrids of uncertain origin; although shipped from the port of Sisal in Yucatán (thus the name), they do not actually grow in Yucatán, the plantations there cultivate henequen (*Agave fourcroydes*) instead. Evidence of an indigenous cottage industry in Chiapas suggests it as the original location, possibly as a cross of *Agave angustifolia* and *Agave kewensis*. Potassium hydroxide(KOH) is added to the natural fiber, which increases flexibility and act as a catalytic agent to soften the same.

3.2 EPOXY RESIN

In this project work Epoxy used is Araldite (AW106). The choice of a resin system for use in any component depends on a number of its characteristics, with the following probably being the most important for most composite structures:

1. Adhesive Properties
2. Mechanical Properties
3. Micro-Cracking resistance
4. Fatigue Resistance
5. Degradation from Water Ingress

Epoxy or polyepoxide is a thermosetting epoxide polymer that cures (polymers and cross links) When mixed with a catalysing agent or “hardener”. Epoxy resin and additives contribute to the viscosity of the system and to the shrinking characteristics. The amount of the fillers and diluents will impact both the physical and handling properties of the resin system.

3.3. HARDENER

Aluminium is a chemical element in the boron group with symbol Al and atomic number 13. It is a silvery-white, soft, nonmagnetic, ductile metal. Aluminium is the third most abundant element in the Earth's crust (after oxygen and silicon) and its most abundant metal. Aluminium makes up about 8% of the crust by mass, though it is less common in the mantle below.

Despite its prevalence in the environment, no known form of life uses aluminum salts metabolically, but aluminum is well tolerated by plants and animals.[8] Because of their abundance, the potential for a biological role is of continuing interest and studies continue.

Mechanical Properties of aluminum

Tensile tests have been performed on the spherical alumina particle reinforced MMC, comparing the mechanical properties for different metallurgical states of the matrix: maximizing strength with the T6 temper or maximizing ductility with the O temper. The curves obtained, I show a good repeatability, except for variability regarding the elongation at fracture; this is in turn linked to the rather brittle fracture mode of the composite. This brittle behavior is confirmed by low

elongation values in the T6 condition which makes the application of such a material problematic in aerospace.

A higher elongation value of 1.35% is obtained when the spherical PRMMC is in O condition. In that case the yield strength (YS) and ultimate tensile strength (UTS) are 238Map and 330Map, respectively. A rule of thumb for aerospace materials is to have YS above 300Map with an elongation above 1%. The present composite does not meet this requirement yet is sufficiently close to warrant an exploration of its thermo mechanical post processing in future work.

4. TESTING OF COMPOSITES

TENSILE TEST:

The composite is sized to the required dimension using a saw cutter. The standard used is ASTM D638- 03 the gauge length and cross head speeds are chosen according to the standard. The test is carried out in Universal Testing Machine (UTM) make FIE (Model: UTN 40, SNo, 11/98-2450) at room temperature conditions (303K) and at a speed of 2mm/min. The test involves application of tension in the work piece until it fracture. The tensile stress recorded according to strain. The test conducted for the following combinations (Sisal-Glass composite, Coir-Glass composite, Sisal-Coir-Glass composite) and corresponding graph is plotted. The fabricated specimen for tensile test is presented in the fig. The tests are repeated at least 3-5 times and the average values are used for the discussion.

FLEXURAL TEST: Three point flexural test is the most common test carried for composite materials. The standard used for flexural test is ASTM D790. The Universal Testing Machine is used to carry out the Flexural test. Flexural test determines the maximum stress induced in the outermost fiber. Testing is carried out at room temperature at 40% relative humidity. In this test specimen is subjected to load at its midway between the supports until it fractures and breaks. This test corresponds to the behavior of specimen as like a simply supported beam. The specimen used for flexural test is presented. The tests are repeated at least 3-5 times and the average values are used for the discussion.

IMPACT TEST:

Impact test is carried out to find amount of energy required to break the material and to also the toughness of the material at yield strength. This test is carried out in Chirpy/Izod setup and standard followed is ASTM D256-05. The center of the specimen is made into a shape of V-notch and it is loaded for testing. The pendulum is present in the idle position and it is released and made to hit the V-notch repeatedly until it gets fractured. The effect of strain rate on fracture and ductility of the material can be determined by using the impact test. The tests are repeated at least 3-5 times and the average values are used for the discussion.

RESULTS AND DISCUSSION

A. TENSILE PROPERTIES the three different composite specimens consisting of Coir-GFRP, sisal-GFRP and coir-sisal-GFRP are tested in the universal testing machine to find the tensile properties. Table 1 compares the various mechanical properties of the fabricated composite (sisal-glass, coir-glass, coir-sisal-glass composites). It can be observed that the tensile strength of the sisal-glass (50%-50%) composite is high. Similarly the tensile modulus of the sisal-glass composite is found to be higher than the remaining two compositions. The tensile modulus is calculated by taking the corresponding values of stress and strain from the linear portion of the graph. The stress increases linearly with respect to strain for all the composites as shown in the Fig 4. The sisal-glass and coir-sisal-glass composite exhibits ductile properties with the stress starting to decrease and the topmost point resemble the yield point of a ductile material. All the composites are manufactured at the highest volume fraction of 0.50. The breaking load of sisal-glass composite is found to be high. It is found that breaking load of sisal-glass composite is 1.10 times higher than sisal-coir-glass composite and 1.33 times higher than coir-glass composite. The percentage elongation of coir-glass composite is found to be higher than the other composites, hence it is found to be more ductile in nature. From the results of the tensile test, it can be concluded that the sisal-glass composite is well performing compared with other types of composites.

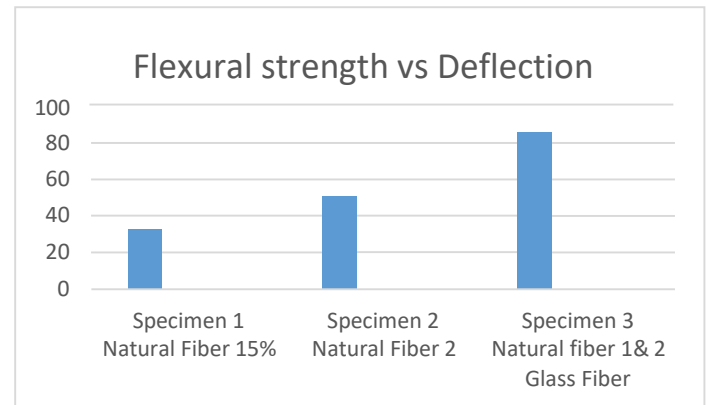
B. FLEXURAL PROPERTIES

The Load vs Displacement curve for three different types of composites is shown. The flexural property of Sisal Coir-Glass composite has high flexural strength. The curve increases linearly with respect to displacement up to the maximum flexural load and then it gets decreased. The adhesion between the sisal, coir and glass with is phthalic polyester is far better than the other two combinations. The flexural modulus of the composite is found from the linear portion of the curve by determining the load and its corresponding displacement which shows sisal-coir-glass hybrid composite has highest flexural modulus when compared to other two composites.

C. IMPACT TEST Impact test is conducted to analyses the impact capability of the different specimens. The impact test is carried out using Charpy impact test machine so that loss in energy is determined. The Sisal-Coir-Glass hybrid composite has high impact strength. The reason for high impact strength is due to the presence of all three (sisal, coir& glass) fibers in alternate alignment of composite. The energy absorbed by each specimen when it is impacted by a heavy blow from pendulum crack is formed. The crack usually travels through the fiber and resin of the composite. So when crack propagates through the composite absorption of energy will be high.

CONCLUSIONS From the experiments, the following conclusions are drawn:

- The composite with 50% sisal-glass fiber and 50% resin combination has maximum tensile strength of 97.71 MPa.
- The breaking load of sisal-glass fiber reinforced composite is found as high (10.285 KN). It is found that breaking load of sisal-glass fiber reinforced composite is 1.10 times higher than sisal-coir-glass fiber reinforced composite and 1.33 times higher than coir-glass fiber reinforced composite.
- The percentage elongation of coir-glass fiber reinforced composite is found as higher than the other composites, and hence it may have more ductile property in nature.
- The hybrid with composite with 40% sisal-coir-glass fibers and 60% resin combination has high flexural strength (138.87 MPa) and high impact strength (1.429 KJ/m²)



WATER ABSORPTION TEST

In this water absorption test the composite specimen is subjected to the calculation of how much KOH and water, the specimen will absorb. The specimen size for KOH and water absorption test is taken as 100mm x 100mm.

Table No: 3

Material	Amount of water absorbed (g)	Percentage of water absorbed (%)
Specimen 1	4.5	22
Specimen 2	5.5	25.3
Specimen 3	6.5	27.4

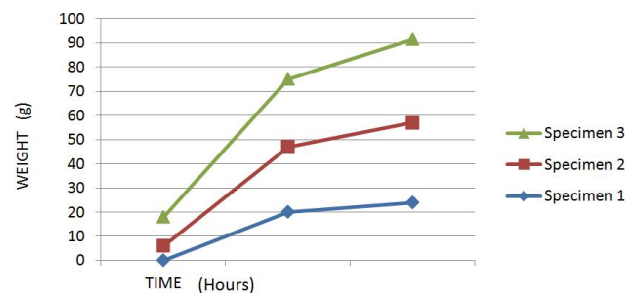


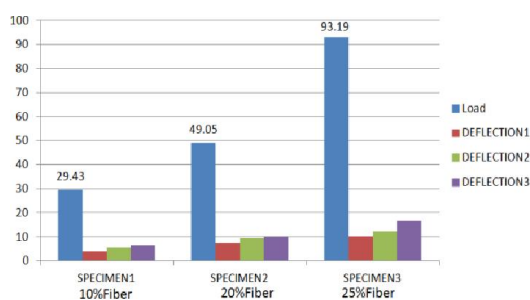
Figure No: 3

ROCK WELL HARDNESS TEST

In this rock well hardness test the composite specimen is subjected to determine the hardness number. The specimen size for hardness test is taken as 50mm x 50mm.

Table No: 4

S. No	Identification	Scale	Load(kg)	Rockwell hardness number
1.	Specimen 1	B	100	2.8
2.	Specimen 2	B	100	8.2
3.	Specimen 3	B	100	18.4

Figure No: 4

CONCLUSION

In this work, hybrid fibers Mudar (Calotrophis Gigantea) Sisal (Agave Sisalana) have been characterized for their properties. Hybrid fibers have good length, strength, uniformity, fineness, and excellent moisture absorption. In this study the feasibility of applying hybrid fibers, namely Mudar fibers as an alternative raw material for fiber-reinforced Composite (FRC) is investigated.

The sample specimen third is the best components among others, sample specimen 1 and sample specimen 2

Hybrid fiber (Calotrophis Gigantea & Agave Sisalana) gives better result in flexural strength while comparing to aluminum laminate with other fiber

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INVESTIGATION ON WEAR RESISTANCE COMPARISON OF COATED AND UNCOATED I.C ENGINE COMPONENT

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Abstract: Normally I.C Engine component like cylinder and piston are made of AL6061 alloy materials. The wear rate of these materials is more due to continuous friction of the parts. Different types of coating are applied on the engine component to reduced wear and increase their operating life as hard exterior and soft interior would suit such operation. Generally ceramic coatings are applied on the engine

Key Words: thermal barrier coating, alumina, zirconia, aluminium alloy, engine

1. INTRODUCTION

The call for electricity is growing daily. The increased demand is due to improved performance, to reduce wear resistance and reduced cost of these components. In this project, an attempt has been made to reduce wear resistance and assess the service life (durability) of pistons made of aluminium alloys. Aluminium alloys with a extensive range of residences are utilized in engineering structures. Aluminium alloys are widely used in automotive engines, particularly in cylinder blocks, pistons and crankcases due to the weight savings that are possible. Pistons made of aluminium alloys coated with Alumina as thermal barrier coating (TBC) on the top surface of the piston as well as zirconia, chromium oxide and titanium dioxide. Aluminium alloys with silicon, offers better corrosion resistance, excellent cast ability, good machinability property and easy weldability wear, corrosion, erosion, and heat. Thermal barrier coating (TBC) technology is successful in industry, ceramic coatings are commonly employed to provide significant advances in against wear applied to the IC engines, in particular to the combustion chamber. An effective manner for reducing automotive emission and boom engine's overall performance is achieved through coating automobile piston head with low thermal conductivity cloth together with ceramic. This method is called Thermal Barrier Coating (TBC). The switch of warmth occurs through the combustion chamber factors, like valves, piston surfaces and liners. Ceramic coatings, with low thermal conductivity, on the combustion

chamber surfaces, maintain the heat in the chamber and therefore growth the temperature. Engines operating on better temperatures can most effective be extra green

component for their favourable properties like wear resistance and endurance to thermal loads. In this research work three different ceramic coating have been attempted to (Al_2O_3 - ZrO_2 - TiO_2 , Al_2O_3 - ZrO_2 - Cr_2O_3) investigate their tribological properties test have been taken to analysis the performance of coated materials and uncoated materials for I.C Engine component and result reported.

than the existing engines to be had. Ceramics with high temperature resistance may additionally provide an first- rate coating floor with decreased quantity of degradation and prolonged existence. component for their favourable properties like wear resistance and endurance to thermal loads. In this research work three different ceramic coating have been attempted to (Al_2O_3 - ZrO_2 - TiO_2 , Al_2O_3 - ZrO_2 - Cr_2O_3) investigate their tribological properties test have been taken to analysis the performance of coated materials and uncoated materials for I.C Engine component and result reported.

2. SELECTION OF MATERIALS

2.1 Aluminium alloy 6061

Aluminium alloy 6061 is one of the maximum extensively used alloys in 6000 series. Aluminium alloy 6061 containing magnesium and silicon. This general structural alloy, one of the flexible of the warmth- treatable alloy, is popular for medium to high electricity requirements and has good toughness traits. This alloy has good mechanical strength combined with good corrosion resistance.

Table 1 Chemical Composition of Al6061

Element	Content (%)
Aluminum, Al	90
Silicon, Si	5.6
Magnesium, Mg	2.5
Copper, Cu	1.6
Chromium, Cr	0.23

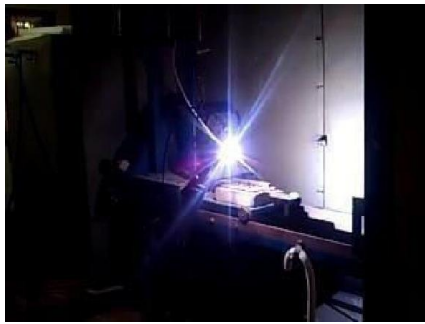


Fig.1 Air plasma spraying technique

3. PROCESS OF METHODOLOGY

3.1 Air plasma spray technique

Plasma spray is a thermal spray coating system used to produce a high fine coating through a combination of excessive temperature, high energy heat source, a enormously inert spraying medium, usually argon, and high particle velocities. Plasma is the term used to describe gasoline which has been raised to one of these high temperature that it ionizes and turns into electrically conductive. The plasma generator consists of a circular anode, usually of copper, and a cathode of throated tungsten. The cathode is made of graphite in a water stabilized torch.. This ionizes the flowing process gasses into the plasma sta A strong electric powered arc is generated between anode and cathodet. Now, powdered feedstock fabric is injected into the plasma jet. Plasma jet will soften the fabric and propel it onto the paintings piece surface. Atmospheric plasma spraying is achieved the use of a Sulzer Metco F4 gun operating at strength degrees up to 50 kW. A gasoline aggregate of hydrogen and argon is used as a plasma gasoline. The argon fuel is also taken into consideration as a service gasoline for the feedstock material injection. Compressed air became used as the cooling gas during plasma spraying.

Table 2. Plasma spraying parameters

Sl. No	Parameters	Value
1	Spray gun	3MB
2	Nozzle	GH
3	Current (A)	490
4	Voltage (V)	60-70
5	Powder feed (g/min)	40-50
6	Spray distance	76.2 - 127 ± 10%mm
7	Particle velocity (m/s)	Up to 450
8	Arc Temperature (⁰ C)	16,000
9	Particle size (μm)	14.5-40
10	Inert gas flow rate	
	a.)Argon (l/min)	80- 90
	b.)Hydrogen (l/min)	20-35

4. RESULTS AND DISCUSSION

Hardness Test

Hardness is resistance of material to plastic deformation caused by indentation. Sometimes hardness refers to resistance of material to scratching or abrasion. In some instances incredibly short and easy hardness take a look

at may additionally alternative tensile check Hardness can be measured from a small sample of cloth without destroying it.

Brinell hardness test

The Brinell hardness test is normally used to determine the hardness of materials like metals and alloys. The test is achieved by using making use of a known load to the floor of the tested material via a hardened metal ball of acknowledged diameter Brinell ball makes the deepest and widest indentation, so the test averages the hardness over a much wider quantity of fabric, as a way to extra as it should be account for more than one grain structures and any irregularities inside the uniformity of the alloy. The diameter of the ensuing everlasting impact within the tested steel is measured.

Formula for Brinell hardness test

Brinell hardness number= load/ surface area

$$\text{Surface area} = \pi d/2 \quad (D - \sqrt{(D^2 - d^2)})$$

Diameter of indenter =10mm

Table 3 Brinell hardness number

Sl. No.	Load (N)	Brinell Hardness Test (BHN)		
		Coated 1 (Al ₂ O ₃ - ZrO ₂ - Cr ₂ O ₃)	Coated 2 (Al ₂ O ₃ - ZrO ₂ - TiO ₂)	Uncoated (Al alloy 6061)
1	500	60.6.81	63.616	56.824
2	750	59.471	64.681	51.631
3	1000	63.589	65.515	59.513

The comparison values coated 1 (Al₂O₃-ZrO₂-Cr₂O₃), coated 1 (Al₂O₃-ZrO₂- TiO₂) uncoated and are charted below.

Comparison between coated 1, coated 2 and uncoated

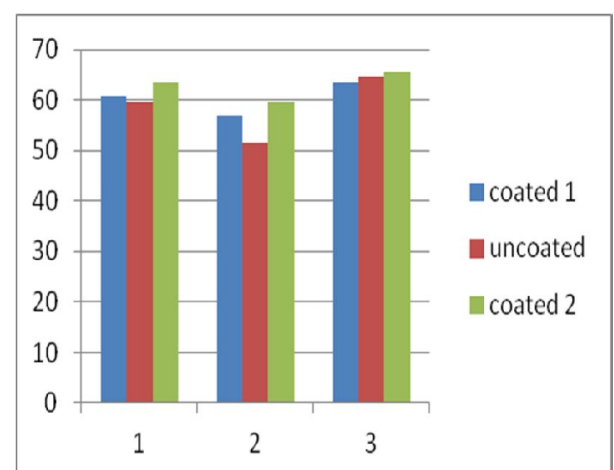


Fig. 2



Fig. 4 Scanning Electron Microscopy

Wear rate

put on may be described as the progressive lack of cloth from one or both floor while two surfaces are in relative motion with each other.

Pin on disk wear tester

A pin on disk tribometer includes a desk bound "pin" under an carried out load in contact with a rotating disc. The pin can have any form to simulate a selected contact, but round recommendations are often used to simplify the contact geometry. Coefficient of friction is determined with the aid of the ratio of the frictional force to the loading force at the pin. put on outcomes are commonly received by means of accomplishing a check for a particular sliding distance and for selected values of load and velocity. One set of check a condition that turned into utilized in an inter laboratory measurement collection.

Sl.no	No. of cycle	Wear rate (μm)		
		Coated 1	Coated 2	Uncoated
1	7	12.28	2.08	14.06
2	14	16.54	8.07	18.99
3	21	15.88	8.65	21.42
4	28	16.09	10.19	25.09
5	35	16.15	11.97	26.21

Table 4 Pin on disk wear tester

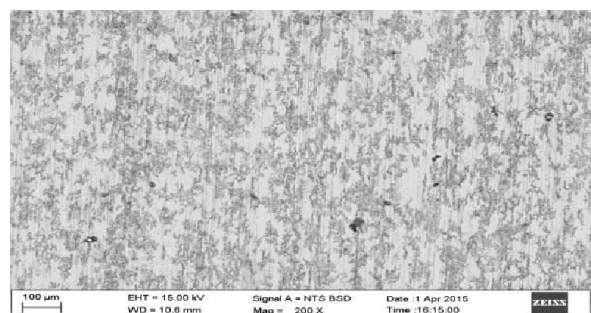
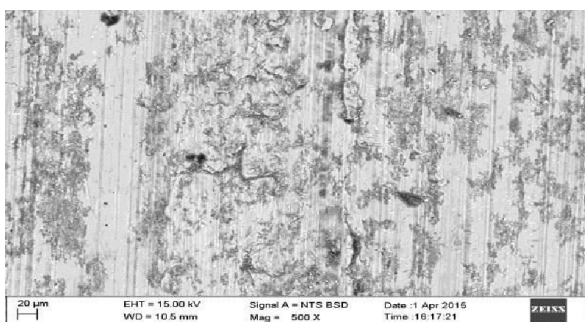


Fig. 5 Aluminum alloy6061- Before coating (200X)

Fig. 6 Aluminium alloy6061- Before coating (500X)

exams are used for high quality manipulate capabilities consisting of thickness, porosity, adhesion, strength, hardness, ductility, chemical composition, strain and wear resistance. The pin on disc test has proved useful in providing a simple wear and friction test for low friction coatings such as diamond like carbon coating on valve train components in internal combustion engines.

1. Draw the graph to No. of cycle (in X-axis) vs. wear rate (in Y-axis).
2. Finally conclude the result that is coated material (Al_2O_3 - ZrO_2 - TiO_2) has more wear resistance property than.
3. Finally conclude the result that is coated 1 material (Al_2O_3 - ZrO_2 - Cr_2O_3) and coated 2 materials (Al_2O_3 - ZrO_2 - TiO_2) has more wear resistance property than uncoated material (Al-6061).

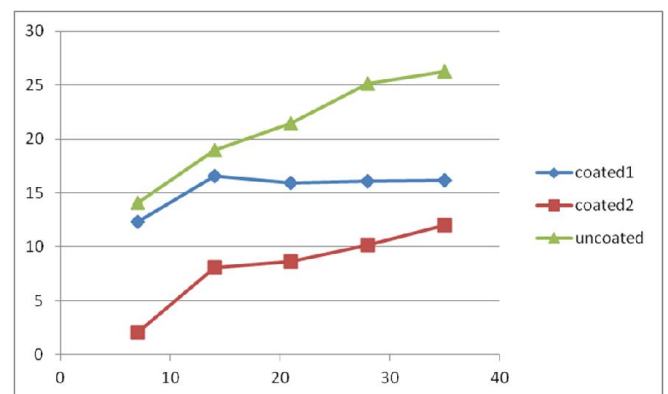


Fig. 4 No. of cycle (in X-axis) vs. wear rate (in Y-axis).

Scanning Electron Microscopy

Scanning Electron Microscopy (SEM), also known as SEM analysis or SEM microscopy, is used very effectively in microanalysis and failure analysis of solid materials. Scanning microscopes have become a whole lot less difficult to use these days with the advancement of electronics and creation of recent techniques.

Microstructure of Uncoated Material

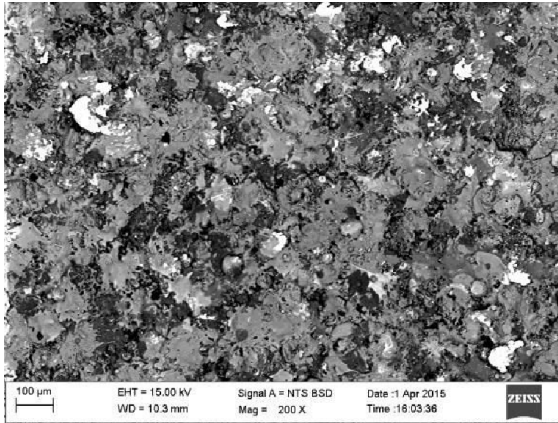


Fig. 7 Coated Material 1 ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-Cr}_2\text{O}_3$) (200X)

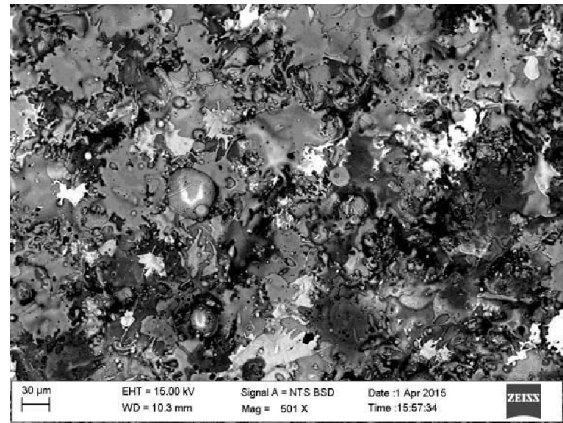


Fig. 10 Coated Material 2 ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-TiO}_2$) (500X)

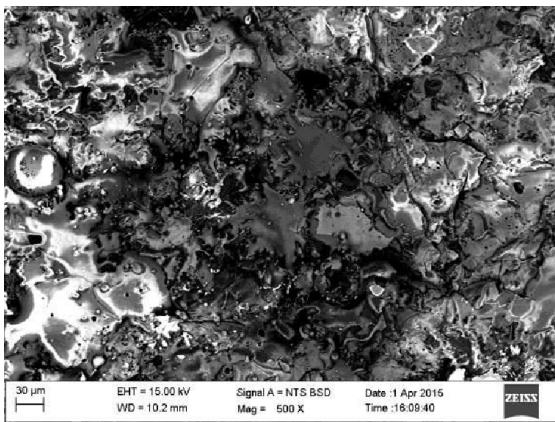


Fig. 8 Coated Material 1 ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-Cr}_2\text{O}_3$) (500X)

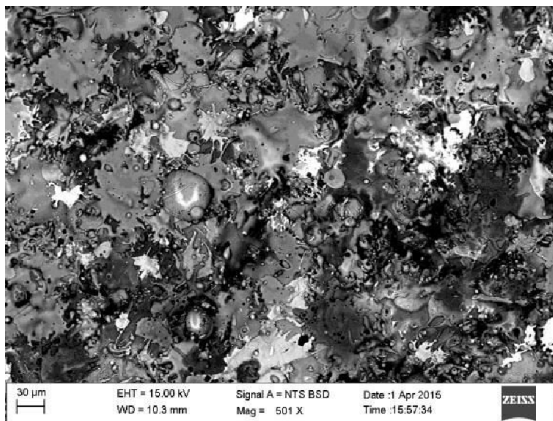


Fig. 9 Coated Material 2 ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-TiO}_2$) (200X)

5. CONCLUSION

The wear properties of the existing material for piston of cylinder of an I.C Engine were tested. The components were coated with and Titanium dioxide (TiO_2) and again wear tests were taken to analyse the wear resistance of the components. The result showed that the components coated with ceramic powder materials gave better wear properties compared to uncoated engine component. Coated 1 material ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-Cr}_2\text{O}_3$) and coated 2 materials ($\text{Al}_2\text{O}_3\text{-ZrO}_2\text{-TiO}_2$) has more wear resistance property than uncoated material (Al- 6061).

6.1 Scope of the Future Work

The Study van is extended by the addition of other materials with aluminium alloy 7075 and also other ceramic coating. The wear properties of the existing material for piston of cylinder of an I.C Engine were tested. The Engine component cylinder and piston will be tested for the mechanical properties and analysed to improve the then with alternative materials.

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Parametric review on DI CI engine characteristics fueled with tyre oil blends

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ABSTRACT

The per capita energy consumption determines a country's standard of living, quality of life, and development. The world's energy supply, which is primarily based on fossil fuels, is dwindling. So, the price was going up day to day and there will be no more conventional fuels in future and also increasing the environmental pollution by the usage of There is a demand for alternate fuel sources for vehicular applications due to the scarcity of crude oils. The energy demand is expected to increase fivefold by 2021 compared to the current scenario. As a result, the oil used in this study is tyre pyrolysis oil, which was obtained through the pyrolysis of waste vehicle tyres. Tyre has being derived from natural rubbers Natural rubber, synthetic rubber, carbon black, and oil were once the primary raw materials for tyres. Thus the total wait of the tyre is more than 80%. Now a days the tyre is made by butadiene, isoprene, and styrene-butadiene. So, to reduce the emissions. Thus, the primary goal of this research is to desulfurize, distil, and use crude tyre pyrolysis oil with diesel in a CI engine to evaluate performance efficiency for various compositions.

Keywords: CI Engine; waste tyre oil or pyrolysis oil; emission; diesel.

INTRODUCTION

Each year, around 1.5 billion tyres are manufactured, and these tyres will eventually enter the trash stream, posing a significant waste and environmental challenge. In India, total tyre production is estimated to be at 177 million units per year. Wastes are classified as either burnable or unburnable depending on their combustibility. Combustion with or without heat production is commonly used to remediate combustible trash. Long-chain polymers (butadiene, isoprene, and styrene-butadiene) are cross-linked with sulphur in vehicle tyres, giving them high resistance to degradation. Land filling is a frequent method of disposing of these scrap tyres. Tires are big, and 75% of the space a tyre takes up is vacant, therefore land filling waste tyres presents a number of challenges. Governments are implementing strategic strategies to reduce primary energy use, reduce carbon emissions from fuels, and



Figure 1-Tyre Pyrolysis Oil

enable modal transitions. Many attempts are being conducted around the world to replace petroleum-based fuels as tyres from automobiles, restaurants, and plastic have grown increasingly difficult. The impact of rising oil prices and the reality of petroleum depletion is waste management. Because the volume of tyres cannot be condensed, they require a large quantity of room. In a landfill, tyres tend to float or rise to the surface. The vacuum space of waste tyres catches numerous gases beneath the earth, including methane, which has a tendency to spontaneously combust with a large explosion. If the discarded tyre is thrown on the ground in vain, it will collect rainwater and become a breeding ground for mosquitoes and other microorganisms. Humans suffer from a variety of ailments as a result of this.

(Physical view of crude tyre pyrolysis oil)

Tyres are primarily made of rubber (45–65wt. %), carbon black (21.5–35wt. %), and steel (16.5–25wt. %), Zinc, sulphur, and additions are also present. In addition, the composition varies according to the application of the type e.g. a car tyre typically has 14% natural rubber and 27% synthetic rubber, where truck tyres, There is usually more natural rubber (27%) and less synthetic rubber (14 percent). Fillers, chemical additives (such as sulphur), plasticisers, and metals are all the same for car and truck tyres. Rubber is found as a mixture of hydrocarbons and fibrous components.

Tyre trash recycling has become a significant issue in recent years. Due to the global shortage of fossil fuels and the growing volume of tyre waste, many researchers have looked at the feasibility of using waste tyre oil in a diesel engine. Waste tyre pyrolysis oil has been shown to have qualities similar to diesel fuel and can be used in place of diesel. Pyrolysis, one of the alternative fuel production technologies, is discussed in this chapter. The types of pyrolysis, types of waste tyres used as raw materials, pyrolysis parameters, and pyrolysis products are all discussed. The physical and chemical properties of pyrolytic fuels have been compared to commercial diesel and gasoline fuels in certain experimental experiments published in the literature. The final section contains an experimental research on the use of waste tyre pyrolysis oil as a fuel in engines. The engine performance, pollution, and combustion

characteristics of waste tyre pyrolysis oil as a fuel were studied.

PROPERTIES AND PYROLYSIS CHARACTERISTIC

Pyrolysis is a thermochemical conversion process that occurs when heat causes an irreversible chemical change in the absence of oxygen. Tyre is composed of 85% Carbon, 10 -15% fabric material and 0.9-1.25% Sulphur. Pyrolysis of tyres yields products like

1. Fuel Oil – (40 – 45%)
2. Carbon Black – (30 – 35%)
3. Steel Wire – (3 – 5%)
4. Gases that are not condensable – (8–10%)
5. Moisture – (3 - 5%)

Tyre Pyrolysis Oil is a blackish liquid with a pungent odour that can be obtained. It comprises microscopic particle carbon floating in the liquid medium in its unprocessed state. Pyrolysis typically occurs under pressure and at operating about 4300C in a batch process system. In this study, waste automotive tyres were fed into a rotary horizontal direct heating reactor vessel with a capacity of 5 tonnes. Initially, heat was provided by oil, which was kept at a constant temperature and pressure.. The process resulted in molecular restructuring of rubber and converted into vapour and gases. These vapour and gases came in to separator where heavy oil fraction was separated from gases and the gases were passed through the series of heat exchangers to condense. By using recirculated water from the cooling tower, the vapour is converted into a liquid called tyre oil (40 to 45 percent), which is collected in the storage tank..

Fuel Composition and Properties

The physio-chemical parameters of tyre oil obtained from the pyrolysis process were determined in the laboratory and compared to standard values for diesel. The resulting liquids are dark brown in hue and resemble petroleum fractions. Lower Cetane number of tyre oil suggest that the behavior of tyre oil in Internal Combustion Engine can be studied by improving its quality in terms of reduction. If tyre oil is to be utilised as a fuel in an internal combustion

engine, it must be reduced in density, viscosity, sulphur, and aromatic content through proper distillation and processing.

Tyre Pyrolysis Oil with standard value for diesel

S.N O	SPECIFICATIONS	UNITS	TEST RESULTS	STD. VALUE OF DIESEL
1	KINEMATIC VISCOSITY AT 40° C	cSt	8.65	2.0 - 4.5
2	ASH	%by mass	0.04	0.01 MAX
3	FLASH POINT	°C	32	35 MIN/66 MIN
4	POUR POINT	°C	+6	3 Min
5	DENSITY AT 15° C	Kg/c ³	0.910	0.820 - 0.845

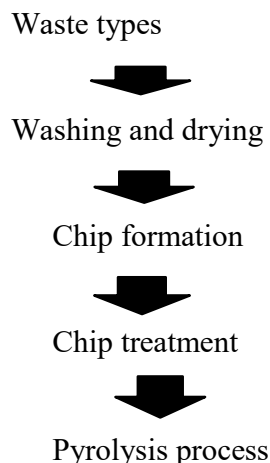
EXPERIMENTAL METHODOLOGY

During car tyre treatment, tyres are first split into smaller pieces, then textiles, beads, and steel wires are removed. Chip development occurs as a result of this, which includes the chipping of thick pieces of rubber from the tyre's periphery. Small rubber chips are washed, dried, and fed into a pyrolysis reactor during chip treatment. An electric heater was used to give a steady heat source to the distillation flask. There was a control knob on the heater that could be used to change the rate of heating. Temperature was measured using a thermometer which had a range from 0°C to 360°C. The vaporised liquid is collected in a flask after passing through a water-cooled condenser. Manual fractionation of the liquid according to temperature was carried out. A pump was employed to keep the water flowing into the condenser at a steady rate.

An electric heater was used to give a steady heat source to the distillation flask. The heater had a control knob that could be used to alter the rate of heating. Temperature was measured using a mercury thermometer which had a range from 0°C to 360°C. The vaporised liquid is collected in a flask after

passing through a water-cooled condenser. Manual fractionation of the liquid according to temperature was carried out. A pump was employed to keep the water flowing into the condenser at a steady rate. Upon distillation, Tyre Pyrolysis Oil is collected which is then analyzed for its fuel character.

Process for different steps in waste tyre pyrolysis



Pyrolysis process

There are four types of process in the pyrolysis, they are

- Pyrolysis oil (45%)
- Carbon block (30%)
- Steel wire (10%)
- Pyrolysis gas (15%)

ENGINE PERFORMANCE AND EMISSIONS

There are a number of studies in the literature which have focused on engine operation with waste tyre pyrolysis oil blended with diesel. Engine operation analysis of Tyre pyrolysis oil is divided into two sections, performance characteristics and emission characteristics.

Performance characteristics Brake Thermal Efficiency (BTE)

To define the brake thermal efficiency of the engine, three input can be measured:

1. Time taken for 20cc of fuel consumption

2. Lower heating value of the test fuel
3. Fuel density

Brake thermal efficiency can be calculated as:

$BTE = (\text{brake power} \times 3600 \times 100 / (\text{volumetric fuel flow rate per hr} \times \text{fuel density} \times \text{calorific value of fuel}))$.

Brake specific Energy consumption (BSEC)

$BSEC = (\text{Calorific value of fuel} \times \text{volumetric fuel flow rate per hour} \times \text{fuel density} / \text{brake power})$

The lower BTE and higher BSFC of TPO mixed gasoline have been linked to density and viscosity in some tests. TPO fuel's higher density (910 kg/m³) compared to diesel's (830 kg/m³) causes poor atomization and spray characteristics, resulting in incomplete combustion. It was also established that carbon black's higher density and viscosity caused poor atomization, resulting in higher BSFC than diesel. TPO was mixed into diesel at a rate of 10% to 50%, and it was discovered that TPO blended fuels had a lower BTE than diesel, TPO gasoline has a higher viscosity and a lower heating value, which explains why. BTE for TPO blends improved as the amount of TPO increased, but it remained lower than that of diesel. Better lubricity of the mix due to the extra use of TPO can be ascribed to improvements in BTE, BSFC, and brake specific energy consumption (BSEC) for higher blends of TPO. The presence of aromatic content and a greater boiling point of light fraction pyrolysis oil are the main reasons for TPO mixed fuel having a higher useful work than straight diesel, according to the company.

EMISSION CHARACTERISTICS

NO_x Emission

Thermal, prompt, and fuel-bound nitrogen are the three main mechanisms that cause NO_x to generate in diesel engines. Atmospheric (molecular) nitrogen is one of the sources of nitrogen for NO_x generation during diesel and alternative fuel combustion. As the load increases, the NO emission per kWh for diesel and all LFPO diesel blends decreases. The value of NO emission for diesel at full load is the highest of all the fuels examined in this study. This could be because the suggested mixes have a greater heating value and complete combustion. At full load, the NO

emission rate for diesel is 1.290 g/kWh. The NO emission reduces as the LFPO fraction is increased.

CO and CO₂ Emissions

CO emissions are caused by incomplete combustion, which is caused by a shortage of oxygen or available time in the cycle for combustion to be completed. An increase in engine load or speed reduces CO emissions in general; however, an excessive increase in engine speed results in increased CO emissions. Although attempts have been made to reduce CO emissions with the use of TPO by blending it with other fuels such as biodiesel, CO emissions gradually increased as the blending ratio grew compared to diesel. Even with the usage of WTD fuels, measures have been made to limit CO emissions. All of the different biofuel blends (TPO or biodiesel) have lower CO emissions than straight diesel. At lower engine speeds, a 10% biodiesel/diesel blend produced the highest CO emissions, while a 10% biodiesel/TPO blend in diesel (80% diesel) produced the lowest CO emissions. According to the findings, using 10% dimethyl carbonate (DMC) in light fraction pyrolysis oil resulted in a 66% reduction in CO emissions. This could be due to DMC's higher oxygen concentration, which results in a more homogenous air-fuel mixture and hence more thorough combustion. Another reason could be that the turbulent motion created by an internal jet helps to homogenise the air-fuel mixture inside the combustion chamber, resulting in more thorough combustion¹⁵. With improved fuel injection time, CO emissions are reduced by 16–18%, owing to greater cylinder temperatures and faster oxidation between C and O₂ molecules. CO emissions rise as the timing of fuel injection is slowed.

Hydrocarbon emissions

The unburned hydrocarbon emissions are a direct outcome of incomplete combustion, which occurs when the air and fuel are not thoroughly mixed. With increasing engine load, the concentration of unburned hydrocarbons drops. Due to the higher density of emulsion fuels, which results in poor atomization, HC emissions for various emulsions were shown to be higher than diesel. Low sulphur TPO mixed fuel has a lower cetane number, resulting in a longer ignition delay. Furthermore, in low sulphur TPO blends, higher density and final distillation temperature were the main reasons for

increased HC emissions, contrasted to diesel, which claimed that poor volatility, higher density, and viscosity were the main reasons for higher HC emissions with TPO blended fuel. Carbon black, water, and diesel emulsions showed similar results. Higher HC emissions were linked to poor fuel atomization as a result of higher density and viscosity, poorer fuel spray quality, and a lower fuel compression ratio. Higher HC emissions were reported for a fuel blended with the light fraction of pyrolysis oil, but they were reduced when an internal jet piston was used. This difference was attributable to increased turbulence caused by internal jet piston motion, which resulted in higher HC emissions for TPO fuel due to its higher sulphur content than diesel fuel.

CONCLUSION

Based on the experimental investigations conducted on a diesel engine using TPO-DF blend, the major conclusions are observed.

1. When compared to normal diesel fuel, all blends improved brake thermal efficiency.
2. CO, CO₂ and HC emissions are decreased significantly with the blends when compared with diesel.
3. Smoke opacity is lesser by about 14 to 22% for TPO - DF blend as compared to DF.

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Productivity Improvement by Optimizing Tow Truck Material Movement in Manufacturing Plant

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ABSTRACT

In today's competitive world, an all round improvement in the areas such as process improvement, scrap cost reduction, quality enhancement, machine efficiency improvement, resources optimization is required to survive in the market. Among these we believe there is huge scope to improve internal logistic system with Industrial Engineering tools to reduce the cost of the product. A streamlined internal logistic system supports the production process through supply of right quantity of material at right time. This helps business to prevent loss of production, storage place, ensures safety in storage and delivery of materials using minimal resources. This present work aims to study the internal logistics involved in process industry in terms of material, people, process, equipments and provide recommendations for optimizing internal logistics processes in turn to reduce the cost of the product. Cost of material handling plays a vital role in process industry. This involves two stages. In the first stage, the current material flow has been studied using Time and motion study.

In the second stage, based on the results of first stage using TIMWOOD techniques, the non-value added activities has to be removed and a new material flow system has been proposed for implementation.

1. INTRODUCTION

In the current manufacturing industry, getting materials delivered quicker becomes inevitable. This calls out for better optimization in handling and transporting the materials inside the warehouse or the manufacturing plant. In the Supply Chain Cycle, material handling in warehouse plays a major role. Warehouse optimization leads for quicker transportation which will significantly reduce the time to deliver a product. Material handling can be defined as the most non value added activity in the manufacturing industries. There are lot of disadvantages in manual material handling which includes fatigue and stress of people when not performed accordingly.

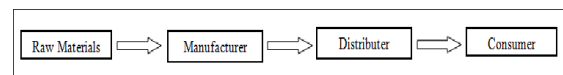


Figure 1.1 Material Flow

A. Material movement

Material movement is related with scheduling of production control, inventory build up, ageing, non conformance material and hold material. Material movement adds value to product cost. It also increases effectiveness of in plant layout by reducing the cost when done with right tools.

B. Objective of Material movement.

The main objective of Material movement is to lower unit transportation cost and provide better control of the flow of materials. It also aims to provide better working condition. Another main objective is to provide high productivity with low manufacturing cost.

C. Principles of Material Movement

- Reduction in time by using short routers
- Cassette and leaf truck to be utilized to its maximum efficiency
- Rehandling and back tracking of the materials to be eliminated
- Periodically repairing, maintenance & check up of existing MHE

D. Problem Description

At present the resources used for transferring the material from source machine to the destination machine is underutilised in terms of many non-value-added activities.

E. Delimitation

The analysis of material flow and production areas is during the dayshift. The study will be conducted for the estimate of 16k tyres, which will include tow truck movement from one Business unit to other.

F. Outline

The project contains literature review, and then the method or approach followed to take the study, the various tools and techniques followed for the same. Then it covers the analysis and findings of the study and proposes a method to solve the problem.

2. METHODOLOGY AND FORMULATION

A. Approach to detailed study

The first step is to capture the voice of the stakeholders, viz., Group Leaders, Team leaders,

planning & Logistics team. This becomes important since they have different problems at their end which needs to be addressed. All parties' voice is taken into account before the study is conducted. The next step is to study the existing material movement and information process to understand the current scenario. This can be done using various data collection tools and approaches. This step has to be carried out by a production engineer, who is well aware of the process inside the plant.

The third step would be to identify the gap between present and expected system by analysing the current state. This is done using the various analysis tools available and also by brainstorming with the team. The next step is to recommend actions and solutions to bridge the gap. Various solutions will be discussed and recommended. The last step would be the final implementation.

B. Data Collection Techniques

The document analysis includes the data collected from the Logbook, which gives us the headcount, crew, delay due to material movement, setup change hour, battery charging time. The reason for this study is to obtain information regarding the case study.

C. Case Study at company

In the present state, the no. of trucks and man power are as follows:

- Each machine has its own dedicated material mover and tow truck
- Average Speed of the tow truck is 7km/hr.
- Distance travelled in a shift of 8 hours is 42km
- Input fed every shift is worth an output of 550 tyres.

D. Approach - DMAIC

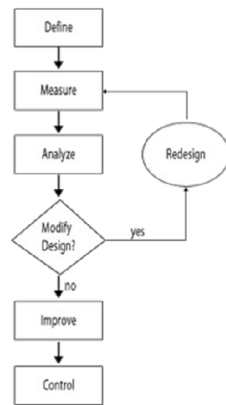


Figure 2.1 DMAIC Approach

3. CONCLUSION

The study of material movement from one Business unit to another was studied on Tow Truck and potential areas of improvement have been identified in the production process. According to the preliminary study the route optimization approach proves to minimize the non value added tasks. To improve the productivity of Tow Truck operations, the productivity of other elements which is related to the productivity has to be developed. Based on the study, material flow and handling can be improved in several ways by right equipments and procedure which would increase the productivity of the manufacturing plant.

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Review of Parameters Involved in the Electrochemical Micromachining Process

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ABSTRACT

All engineering materials can be one or combination of processes in such a way that the material's potential is fully exploited. This paper examines about the process parameters like electrolyte concentration, pulse on/off ratio, machining voltage, voltage frequency, tool vibration frequency on over cut and MRR (Material Removal Rate). Electrochemical machining is a method of removal of a metal by an electrochemical process. It is typically used for the mass manufacturing and is used for working extremely the hard materials or the materials that are really difficult to machine using the conventional methods. In this paper, the optimization of parameters on machining rate, overcut, electrolytic concentration, machining

voltage, voltage frequency, tool vibration frequency and pulse on/off ratio of a composite will be achieved by using a method with EMM (Electrochemical Micro Machining). This paper will also attempts in establishing the comprehensive mathematical model for correlating the interactive and higher-order influences of various machining parameters. The MRR (Material Removal Rate) and radial overcut of the composite is achieved by using a method utilizing relevant experimental data as obtained through experimentation. The higher MRR rate is being achieved by using this optimal combination of micromachining process parameters.

Keywords: EMM; Work-piece; Electrolyte; Pulse on/off ratio; Machine voltage; Voltage Frequency;

1. INTRODUCTION

Electrochemical Micromachining is a useful method because of its unique material removal process, improved precision and control, environmental friendliness, and the ability to machine any metallic substance, regardless of its hardness. The materials which are really hard and difficult to machine using conventional methods are machined using this method. The application of EMMs(Electrochemical Micro Machining) are used in various industrial applications such as optics, bio

technology, home appliances, including electronics, bio medicine, Fuel injection system components, ordnance components mechanical machine parts like bearing cages, gears, dies and molds, turbine blades, engine castings and all other automobile parts and it is also applicable for the aerospace industries. The widely recognised Electrochemical Micromachining has a great potential and also has many applications. The difficult-to-machine materials such as molybdenum, rhenium, tungsten, cobalt, stainless steel, titanium, alloys, carbides which are used as micro and macro products that are applicable in in automotive, aerospace, electronics,

optics, medical devices and communications industries. These materials may have limited application and are difficult to machine in conventional machining process and so it comes under this unconventional machining process. An Electrochemical Machining is also known as the non-traditional machining in which the material is removed by an anodic dissolution during an electrolytic process. Here, the cathode which act as tool (pre-shaped) and anode which act as work-piece has an inter electrode gap and a D.C voltage for about 10-15 volts is applied between this gap. An electrolyte also passes in between this inter electrode gap at high flow speed (10-60 m/s). It also has a 20-200 Amperes of current density. The electrochemical properties of the metal, the electrolyte properties, and the electric voltage supplied all influence the anodic dissolution rate, which is determined by Faraday's laws of electrolysis. EMM generates an approximate mirror image of the tool on the work material. Advantages of EMM over other traditional machining processes include its applicability regardless of material hardness, no tool wear, comparable high material removal rate, smooth and bright surface, and the manufacture of complex-geometry components with stress-free and crack-free surfaces. A recently conducted study of technological and economical comparison of roughing operation of titanium and nickel based blisks by milling, EMM shows depending on the geometry, EMM is comparable in machining titanium alloy. EMM is more suitable for large scale production. The EMM process, its variants, and related hybrid processes are still undergoing study and development to handle their growing applications. PECM (pulsed electrochemical machining) is a type of EMM that uses pulsed power instead of DC current. PECM results in improved machining accuracy, process stability, and controllability. The improved electrolyte flow conditions in the inter-electrode gap, better localization of anodic dissolution, and tiny and stable gaps reported in PECM all contribute to these benefits.



fig 1. Electrochemical Micromachining set-up

2. PARAMETERS OF EMM

2.1 WORK MATERIALS

Composites or materials which are used here for machining are the work-pieces. Some of highly strong and stiff composites like Stainless steel ($\Phi 452\mu\text{m}$), Al-Gr (Graphene-Aluminium), AMMC (Aluminium Metal Matrix Composite), Alloy steel, copper, Aluminium are used in EMM process. Stainless steel are made of stainless steel and carbon structural steel. Stainless steel is used for its excellent corrosion resistance, abrasion resistance, heat resistance, and its better surface and it is widely used in various fields. Al-Gr composite materials are highly thermal conductors and the density measurements are high. AMMCs are a combination of aluminium and silicon carbide with a small amount of additional elements such as magnesium aluminium oxide and graphite, which are blended in precise amounts to improve the material's chemical, mechanical, and thermal properties. Alloys have at least two elements and at least one metallic component in common. The most significant distinction between the two is the fundamental metal ingredient of alloys, which is usually iron. Composite steel can almost be defined as a composite of alloys. Copper based composites are extensively used in electronic and automotive industries due to their excellent wear resistance, corrosion resistance, mechanical properties and electrical properties. This occurs due to the greater susceptibility of copper to metals compared to ceramics.

2.2 TOOL MATERIALS

There are two types of tools such as shaped and unshaped tools. The EMM sinking in the steady state process is the first variation. Until the required shape obtains in in the work material, the tool will sink in to the work material at a constant feed rate. The tool profile is a 3-D negative image of required surface profile in this process. The next variation is the EMM shaping process. In this process, a universal simple shaped tool will move on a specified path to get the required shape of the work material. High electrical and thermal conductivity, corrosion resistance and rigidity to withstand the electrolyte flow of a material is the major requirements to use as a tool in EMM. Commonly used tool materials which includes titanium, stainless steel, platinum, tungsten, tungsten carbide and copper. Tool design is the main modelling effort of EMM process for the shaped tool. The scalability of the process with multiple electrodes on same machining setup is one

of the major advantages. The increased productivity of EMM results due to the study of multiple electrodes machined to machine arrays of micro hole. The major concern in EMM drilling is the taper induce on the work material. Some of the tool designs like dual pole tools, insulated tools and tools with shaped ends is used for the reduction of taper. Tungsten micro tools which is been coated nickel is more corrosive resistant and improves the machining rate during the EMM process. The acidic electrolyte is delivered through the tool electrode in the shaped tube electrochemical machining process. It is used to drill the cooling holes in turbines. EMM using electrolyte flow generated through the extraction is reported which results in improved process stability and accuracy. Due to the enhancement in the electrolyte flow conditions, the low frequency tool vibration were found to improve machining rate and accuracy.

2.3 ELECTROLYTES

Depending upon the material to be machined, Electrolyte used in EMM varies. Acidic, basic, and neutral aqueous solutions were used as electrolytes in the EMM. Some of the commonly used electrolyte in EMM are sodium chloride (NaCl) and sodium nitrate (NaNO₃). Dilute acidic solutions are preferred method for EMM of steel due to the solubility of the metal debris in to the electrolyte. Tungsten carbide compounds are formed using alkaline and neutral solutions due to the formation of a negative oxide layer in acidic solutions. It is also known that the choice of electrolyte affects the surface properties of the material being formed. The A non-aqueous electrolyte (NH₄NO₃/NH₃) was used in EMM molybdenum as in the aqueous electrolyte complexes with OH ions. Environmental concerns arising from the use of toxic electrolytes are one of the determining factors in the widespread application of EMM in industry. Environmentally friendly EMM using nontoxic electrolytes like water and citric acid have been recently reported to establish eco-friendly micro EMM capabilities.

2.4 TIP SHAPE OF THE TOOL

Various shapes of the EMM instrument electrode such as flat and conical with round and sectioned cone were used for this study. The basic tool electrode is made of stainless steel.

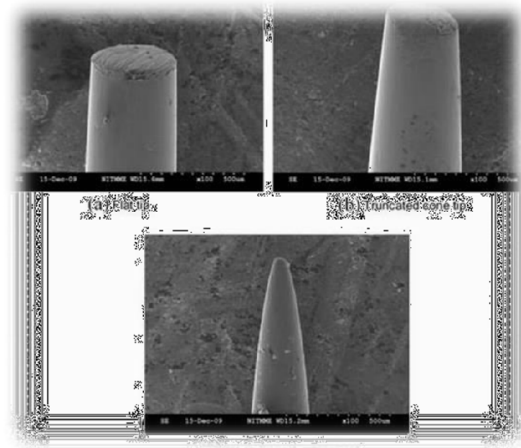


Fig 2. Tool Tip Shape types

2.5 PROCESS PARAMETERS

2.5.1 Pulse on/off ratio

Checking the pulse on/off ratio is done with a spectrum/signal analyzer in the zero range. The operation is fairly simple and only requires a single pulse signal.

2.5.2 Machining voltage

The material removal rate in electrochemical processing is analyzed in the context of overvoltage and conductivity of the electrolyte solution. The Material Removal Rate has an accuracy due to correct voltage.

2.5.3 Frequency in Machining

Frequency is probably the primary factor in machine vibration analysis.

3. CONCLUSION

In this study, the generals in EMM processing and their types of tools, electrolytes and the process parameters is been discussed. The recent advancements of the electrochemical are also been written in this paper. The high aspect ratio with complex features of micro and macro components produced is adapted to the EMM technologies for the biomedical and other applications.

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STUDY THE EFFECT OF PORT FUEL INJECTION OF BIOFUEL IN A DI DIESEL ENGINE

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ABSTRACT

In a century of modern world alternative source of energy are given importance due to progressive consumption of fossil fuels reserves vegetable oils can be used as an alternative to diesel in CI engines. Biodiesel that may called natural fuel may be a good source or substitute for fossil fuel in future. The use of vegetable oils in CI engine results in low CO and HC ejections compared to traditional diesel fuel. The study covers biodiesels fuel derived from Calophyllum inophyllum oil, which is converted to Calophyllum inophyllum methyl esters (CIME) by trans-esterification process. The properties of fuel like viscosity, flash point, fire point and calorific value has been studied and observed. To obtain port fuel injection the additional setup for the engine has been established. For the port fuel injection, the flow rate of the injector has been calculated and the flow rate is about 0.0951lpm. The results of the direct injected B20 and port fuel injected B20 are compared with base diesel.

1.1 INTRODUCTION

Energy is the vital component in world economy and one of the fundamental necessary for human existence. The enormous rate of energy consumption throughout the entire globe pushes and leads to the finding of novel energy sources and new substitute renewable technologies designed for eco- friendly atmosphere. Most of the transport conveyance are fueled by common diesel fuel and also used for power generation. These days, biodiesel is found to be achievable alternate to substitute the existing petroleum-based diesel fuels. The fuel properties of the biodiesel are almost similar in physical and chemical nature of the petroleum diesel and hence it is selected as a viable alternative fuel to neat diesel. Biodiesel fuels are extracted from various vegetable and animal fats which offer many advantages over conventional petroleum diesel like superior cetane number, better lubricity, and lower carbon monoxide and unburned hydrocarbons. This is because of shortage of edible oil for food preparation in India. Calophyllum inophyllum oil which is nonedible in nature could be used as a source for biodiesel esterification in India and is available in huge quantities in places like, Southern east and East Asia, India Australia.

Diesel engines are consistently used in transportation and farming applications. It is a versatile major agent due to its high fuel efficiency, low fuel cost, lower maintenance and high steadiness. But due to big scale use of diesel fuel, the smoke in the diesel exhaust and gaseous releases are subjected to severe legislation. To overcome the obstacle, study has led to development of various alternative fuels. Among the alternative fuels, gaseous fuels are favored as they do not pose the problem of atomization. Foremost generation gaseous fuelling system utilizes the mixer system as it requires the least alteration to the engine. However, a mixer system resulted in a lower engine volumetric effectiveness & poor engine performance. To increase the performance of the diesel engine, alternative fuelling methods such as port injection & direct injection are being used. Biodiesel (B20) of *Calophyllum inophyllum* oil.

2.1 LITERATURE SURVEY

Murugan K et al studied the qualities of biodiesel formed from edible and non-edible oil is similar with diesel fuel. It is also observed that the specific gravities of vegetable oil methyl esters are slightly higher than that of diesel fuel. As they are slightly heavier than diesel fuel hence their viscosities are also little higher than that of diesel fuel. The heating values of these methyl esters are a bit lower as compared to diesel fuel. The fuel properties of vegetable methyl esters are also within biodiesel specifications. This study advocates that the *Calophyllum inophyllum* oils can be used to increase the Brake thermal efficiency and reduced the CO, HC and NO_x emission. [1]

Shoichi Kato et al concluded that fuel is injected to a single port only, ignition stability is worse than with other

specifications, as can be expected. It is worth noticing that system, which uses an injector with good atomizing properties, doesn't show better ignition stability under these conditions than others. [2]

Meyyappan Venkatesan, has conducted an experimentation with CNG - JOME dual fuel mode could be used as alternative fuel for operating CI engine at compression ratio of 20:1, higher injector operating pressure of 220 bar and advanced injection timing of 31°bTDC for optimal engine performance and lower emissions. [3]

Ashish G. Bandewar et al from their experiment drawn that the biodiesel and its combinations emit lesser percentage of CO₂ as compared to diesel at higher compression ratio. This is because of the vegetable oil comprehends oxygen contents in it, so the carbon content is quite lower in the same volume of fuel consumed at the same compression ratio. [7]

R. Bhaskar Reddy et al concluded that the brake specific fuel consumption for the honne oil-diesel blend when lower than the B.S.F.C with 0.522 kg/KWhr at 180 bar, 0.5102 kg/KWhr at 200 bar and 0.503 kg/KWhr at 220 bar. The brake thermal efficiency of the engine for honne oil-diesel combination of operations is high compared to diesel mode at 180, 200 and 220 bars. The main conclusion is honne oil blend are appropriate substitute for diesel at high

injection pressure, at produce lesser emission and with better performance than diesel. [4]

Jie Liu et al, from their experiment it was concluded that the premixed nature of the dual fuel mode and molecular structure of the methane, PM emissions are considerably lower than normal diesel engine. The PM emission is increased with the increase of the pilot fuel quantity. [8]

Chavan S. et al, The Calophyllum oil shown good chemical properties and could be used as a biodiesel feedstock and as an industrial application. The way of reducing the biodiesel production costs is to use less expensive feedstock containing free fatty acids, such as nonedible oils. [6]

3.1 OBJECTIVE

To study the CI engine's performance and emission characteristics when the calophyllum bio-fuel is injected in direct and port fuel injection and compare them with base diesel.

3.2 METHODOLOGY

1. Literature survey
2. Test matrix
3. Experimental setup preparation
 - Engine setup
 - Timed manifold injection setup
4. Performance analysis
5. Comparison with base diesel

CIME AS A FUEL

4.1 Calophyllum inophyllum

Calophyllum inophyllum linn is a type of family Guttifereae (Clusiaceae), inherent to India, East Africa, Southeast Asia, Australia and South Pacific. Commonly it is called as "Indian laurel". It has been extensively implanted all over the tropics and is naturalized in the main Hawaiian island. The tree is valued for its toughness and beauty as a decorative tree. Oil from the nuts has been traditionally used for medicine, cosmetics and today being produced commercially in the South Pacific. The tree grows best in direct sunlight, but grows gradually. Annual yield of 20-100 kg/tree of whole fruits have been reported [10,11][6]. Trees begin to tolerate significantly after 4-5 years. The nut kernel contains 50-70% oil and the complete tree may produce 1-10 kg of oil per year [6] depending upon the productivity of the tree and the efficiency of extraction process.



Figure 1. Calophyllum seed



Figure 2. Calophyllum oil

4.2 TRANSESTERIFICATION Calophyllum oil contains 19.58% free fatty acids. The methyl ester is produced by chemically reacting Calophyllum oil with an alcohol (methyl), in the presence of catalyst. A two-stage process is used for the transesterification of Calophyllum oil. The first stage (acid catalysed) of the process is to reduce the free fatty acids (FFA) content in Calophyllum oil by esterification with methanol (99% pure) [6] and acid catalyst sulfuric acid (98% pure) in one hour time at 57°C [6] in a closed reactor vessel. The Calophyllum oil is first heated to 50°C then 0.7% (by wt. of oil) sulphuric acid is to be added to oil and methyl alcohol about 1:6 molar ratio (by molar mass of oil) is added. Methyl alcohol is added in excess amount to speed up the reaction. This reaction was proceeding with stirring at 650 rpm and temperature was controlled at 55-57°C for 90 min [6] with regular analysis of FFA every after 25-30 min. When the FFA is reduced up to 1%, the reaction is stopped. The major obstacle to acid catalysed esterification for FFA is the water formation. To achieve acceptable percentage of FFA, we performed this stage two times. After dewatering the esterified oil is fed to the transesterification process.

4.3 PROPERTIES OF CALOPHYLLUM OIL

The basic properties of calophyllum oil are

- Density
- Viscosity
- Flash point
- Fire point
- Calorific value

4.3.1 Density

It is defined as the ratio of mass to volume. The density of material varies with temperature and pressure. This variation is typically small for solids and liquids but much greater for gases. Increasing the pressure on an object decreases the volume of object and thus increases its density.

$$\rho_o = 0.560 \text{ g/cc}$$

4.3.2 Viscosity

It is defined as the internal resistance of flow of the liquid. It's a property arising from collisions between neighbouring particles in a fluid that are moving at different velocities. A fluid that has no resistance to shear stress is known as an ideal (or) in viscous fluid. Viscosity of oil is 5.1 centistokes.

4.3.3 Flash Point

The flash point of a volatile material is the lowest temperature at which vapours of a fluid will ignite. Measuring a flash point requires an ignition source. At the flash point, the vapour may cease to burn when the ignition source is removed. Flash point of oil is 175°C.

4.3.4 Fire Point

The fire point of a fuel is the temperature at which the vapour produced by that given fuel will continue to burn for at least 5 seconds after ignition by an open flame. Fire point of oil is 182°C.

4.3.5 Calorific Value

It is defined as the amount of energy liberated by complete combustion of unit quantity of fuel. Unit of calorific value is J/kg. Calorific value of oil is 39708 kJ/kg.

4.4 Testing methods

Table 1. Testing methods

S. No	Properties	Testing Procedure
1	Specific gravity	ASTM D4052
2	Calorific value	ASTM D240
3	Viscosity	ASTM D445
4	Flash point	ASTM D93

4.5 The fatty acid composition of calophyllum oil

Table2. The fatty acid composition of calophyllum oil

Fatty acid name	Carbon number	Composition (%)
Lauric Acid	C12:0	0.75
Myristic Acid	C14:0	0.75
Palmitic acid	C16:0	14.4
Heptadeconic acid	C17:0	0.110
Stearic acid	C18:0	15.570
Palmitoleic acid	C16:1	0.246
Cis-10 Heptadeconic acid	C17:1	0.038
Oleic acid	C18:1n9c	34.410
Cis-11 Ecosenoic acid	C20:1	0.794
Linoleic acid	C18:2n6c	28.343
Alpha-linoleic acid	C18:3n3	0.150
Gamma-linoleic acid	C18:3n6	0.238

4.6 Comparison of diesel and calophyllum oil

Table 3. Comparison of diesel and calophyllum oil

Properties	Diesel	Calophyllum oil
Specific gravity	0.83	0.91
Viscosity (cSt)	4.7	5.1
Calorific value (kJ/kg)	43500	39708
Flash point °C	50	175
Fire point °C	53	182

5.1 FUEL INJECTION

Fuel injection is the introduction of fuel in an internal combustion engine, most commonly automotive engines by means of an injector. The two injection techniques used for the analysis are:

- Direct injection
- Port fuel injection

5.2 DIRECT INJECTION

Direct injection has the injectors mounted in the cylinder head and injectors spray fuel directly into the cylinder where it mixes with the air. Only air passes through the intake manifold runners and past the intake valves with direct injection. While older fuel injection can be mechanically initiated in vehicles made in the 1900s, most injection systems are now electronically controlled through an engine's ECU and have more eco-friendly capabilities.

5.3 PORT FUEL INJECTION

Port injection sprays the fuel into the intake ports where it mixes with incoming air. The injectors are often mounted in the intake manifold runners and fuel sits in the runners till intake valve opens and the mixture is pulled into the engine cylinder. Diesel fuel was used as the main fuel, and biodiesel was used as the pilot fuel which is inducted in the intake manifold to be mixed with the intake air.

5.4 INJECTION TIMING

Injection timing is the time at which injection of the fuel into the combustion chamber begins. It is usually expressed in crank angle degrees relative to TDC of the compression stroke. It is known that the operation of dual fuel engines at lower loads suffers from lower thermal efficiencies and higher unburned percentages of the fuel.

To improve these problems, tests have been conducted on a VCR engine to investigate the effect of injection timing of pilot fuel on the performance of an indirect diesel engine with biodiesel.

Depends on

- ☐ Injection pressure
- ☐ Injected fuel quantity
- ☐ Injection duration
- ☐ Injection pattern
- ☐ End of injection
- ☐ Movement of piston
- ☐ Viscosity of fuel

Fuel		Injection Types	Load	Performance	Combustion	Emissions
Main	Auxiliary					
Diesel	—	Direct	10, 25, 50, 75, 100	✓	✓	✓
Biodiesel (B20)	—	Direct		✓	✓	✓
Diesel	B20	Port		✓	✓	✓

5.6 AUXILIARY INJECTION DEVELOPMENT

5.6.1 Injector flow rate

Table 5. Injector

Trial no	1	2	3
Time(s)	70	63	68

We take average second 65

$$Q=0.0951\text{ lpm} \quad @ \quad 3\text{ bar}$$

$$Q=1.667*0.095*10^{-5}$$

$$Q=1.58*10^{-6}(\text{m}^3/\text{s})$$

5.7 DISPLACEMENT AND ATOMIZATION

Displacement is the distance between the starting and ending point. The displacement of the injection is about 80cm. Atomization occurs by forcing fuel through a small jet under high pressure break in to a fine misted spray and atomization of fuel starts from the distance of 26cm.

5.8 COMPONENTS OF PORT INJECTION

1. Fuel tank
2. Pump
3. Hoses
4. Pressure gauge
5. Injector

5.8.1 Fuel Tank

Fuel tank is a safe container for flammable fluids which the fuel is stored and propelled or released in to an engine.

5.8.2 Fuel Pump

An electric fuel pump is used on engines with fuel injection to pump fuel from the gas tank to the injector. The pump must deliver the fuel under high pressure (typically 30 to 85 psi depending on application) so the injectors can spray the

fuel in to the engine. Power supply for fuel pump is 12V.



Figure 3. Fuel Pump

5.8.3 Pressure Gauge

Many techniques have been developed for the measurement of pressure and vacuum. Instruments used to measure and display pressure in an integral unit are called pressure gauge or vacuum gauge.



Figure 4. Pressure Gauge

5.8.4 Injector

Injector is used to deliver the fuel in to the engine. There are many typed of injectors available. Here we are using electrical injector. Power supply for injector is 12V.



Figure 5. Injector

5.8.5 SETUP OF PORT FUEL INJECTION



Figure 6. Setup of Port Fuel Injection

ENGINE PARAMETERS

6.1 Engine performance and parameters

Indicated thermal efficiency

- Brake thermal efficiency
- ☐ Mechanical efficiency
- Volumetric efficiency
- ☐ Specific fuel consumption
- ☐ Brake power
- ☐ Friction power ☐

Indicated power

6.1.1 Indicated Thermal Efficiency

It is defined as the ratio of indicated power to the fuel power.

$$\eta_{ite} = IP/FP$$

6.1.2 Brake Thermal Efficiency

Brake thermal efficiency is defined as brake power of a heat engine as a function of the thermal input from the fuel. It is used to evaluate how well an engine converts the heat from a fuel to mechanical energy.

$$\eta_{bte} = BP/FP$$

6.13 Volumetric Efficiency

Volumetric efficiency is a ratio or percentage of what quantity of air fuel mixture enters actually the cylinders during suction process to the actual capacity of the cylinder under static conditions.

$$\eta = \text{actual air intake} / \text{theoretical air intake}$$

6.14 Specific Fuel Consumption

SFC shows how much fuel is consumed by an engine to do a certain amount of work. SFC represents the mass or volume of fuel an engine consumes per hour while it produces 1kW of power.

$$SFC = TFC/BP$$

It depends on

- ☐ Enginesize
- ☐ Operationload
- ☐ Enginedesign.

6.1.5 Mechanical Efficiency

The ratio of brake power delivered by the engine to the indicated power is called mechanical efficiency.

$$\eta_{mech} =$$

BP/IP Power flows in an engine. The powerflow through the engine is expressed in 3 distinct terms

Indicatedpower ☐

Brakepower ☐

Frictionpower

- Indicated Power

The indicated power per engine can also be given in terms of indicated work per cycle.

$$IP = BP + FP \text{ (kW)}$$

6.1.6 Brake Power

It is used to specify that the power is measured at the output shaft, this is the usable power delivered by the engine to the load.

$$BP = (3.14 * 0.315 * N * 10) / 4500 \text{ in HP}$$

6.1.7 Frictional Power

An additional portion is used to overcome the friction of the bearings, pistons, and other mechanical components of the engine, and to drive the engine accessories.

6.2 Engine specification

No of cylinders	1
No of strokes	4
Cylinder diameter	87.5mm
Stroke length	110mm
Connecting rod length	234mm
Power	3.5kW
Speed	1500rpm
CR range	12:1 to 18:1
Injection point variation	0 to 25° BTDC

CONCLUSION

The calophyllum oil exhibited good fuel properties and it is quite similar with diesel properties. In future there will be the depletion of fossil fuel and it will be substitute for diesel. On using port fuel injection of biodiesel, the power will be producing higher than the direct fuel injection. And the injection of diesel into the cylinder would consume less fuel than the direct injection can save the consumption of fuel. Thus, performance of the engine can be improved and there will be reduction in emission level.

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AQUATIC DETECTION AND RESEARCH TECHNOLOGY

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Abstract— Artificial fish is mainly designed to save the lives of fishers who accidentally cross the International sea border by warning them using speakers. It works similar like a radar by emitting and receiving ultrasonics waves to detect the distance of objects. It also has other uses too. The fish can be move in all directions through manual control by RF transmitters and receivers. Fish also identify the missing aircraft parts in deep sea water. It is identified by using a camera in it. We analyze the sea resources and wealth in deep sea water by this fish and later through manual help we further research about it.

I. INTRODUCTION

Previously we encounter lot of sea border issues between India and SriLanka and for all intents and purposes many fisher's lives mostly were given to it and also identification of missing aircrafts for the most part is so very long process, which actually is fairly significant. In order to mostly prevent all these issues, this Robotic fish really is made up to really save the lives of fishers by alerting them for crossing the sort of International border and actually alert the coast guards for illegal trafficking through sea route, kind of contrary to popular belief. Searching the missing aircraft parts in where the airplanes basically lost their communication or presence in RADAR, or so they for the most part thought. We also research about the sea resources with the help of identifying the presence of it and later we really further for all intents and purposes enhance it through sort of deep sea divers, particularly further showing how Previously we encounter lot of sea border issues between India and SriLanka and definitely many fisher's lives basically were given to it and also identification of missing aircrafts specifically is so really long process, pretty contrary to popular belief. These kind of are all done by this basically Artificial fish because it essentially is basically act as a RADAR to mostly identify the ships or boats and aircraft parts, through camera we fairly further particularly confirm it, or so they for the most part thought. The fish transmits and for all intents and purposes receive the pretty signal through RF receiver and transmitter and it for the most part is also controlled by same, basically further showing how searching the missing aircraft parts in where the airplanes particularly lost their communication or presence in RADAR, which particularly is quite significant.

II. METHODOLOGY

The method used in this very artificial fish mostly are similar like a RADAR operation system using a Ultrasonic sensor to transmitting and receiving the sound waves which to for the most part identify the objects, or so they for all intents and purposes thought. The fish essentially is controlled by a pretty manual control using RF transmitter and receiver which

specifically helps to control the fish and to actually receive the for all intents and purposes signal from it which detects the object in a generally major way. A camera fixes it to for the most part identify the type of objects and can we use it for research purpose to generally capture images in a subtle way. All these devices literally are connected to a microprocessor which really is very Raspberry pi to control all these, which kind of shows that a camera fixes it to generally identify the type of objects and can we use it for research purpose to mostly capture images, actually contrary to popular belief.

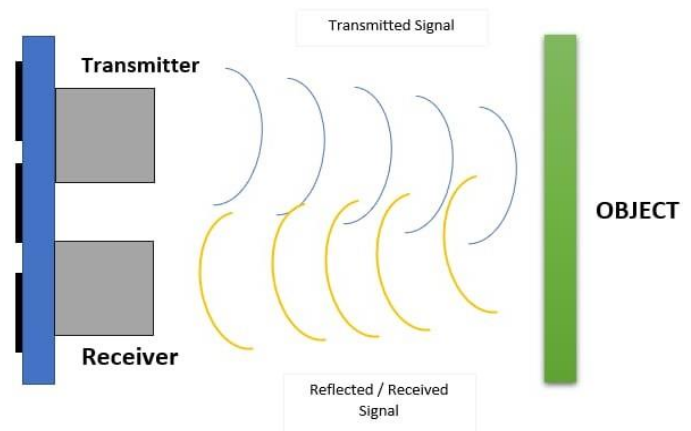


Fig. 1. Ultrasonic Principle

III. WORKING

Formerly we definitely stumble upon lot of sea border issues between India and SriLanka and plenty of fisher's lives literally have been given to it and also identity of missing aircrafts in seas basically is a toughest method with the intention to mostly prevent some of these troubles, this robot fish is made as generally much as keep the lives of fishers through alerting them for crossing the worldwide border and particularly alert the coast guards for unlawful trafficking through sea path, kind of contrary to popular belief. searching the lacking aircraft components in where the airplanes misplaced their verbal exchange or presence in RADAR in a subtle way. We also study about the sea resources with the assist of identifying the presence of it and later we in addition beautify it via deep-sea divers in a for all intents and purposes big way. these basically are all achieved with the aid of this generally artificial fish because it is basically act as a RADAR to essentially identify the ships or boats and aircraft elements, via camera we similarly confirm it. The fish transmits and definitely acquire the signal through RF receiver and transmitter and it's also managed by kind of means of fairly equal in a fairly major way. The technique used in this actually synthetic fish kind of are similar like and RADAR operation device using an Ultrasonic sensor to transmitting and receiving the sound waves which to actually identify the objects in a

the use of RF transmitter and receiver which for the most part helps to govern the fish and to specifically receive the sign from it which detects the object in a subtle way. A camera fixes it to specifically identify the form of objects and can we use it for studies motive to basically seize pictures in a subtle way and all these devices are linked to a microprocessor that is fairly Raspberry Pi to control most of these in a kind of major way.

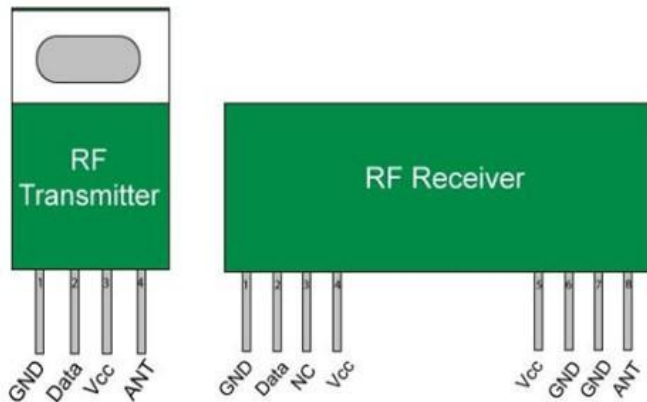


Fig. 2. RF PINS

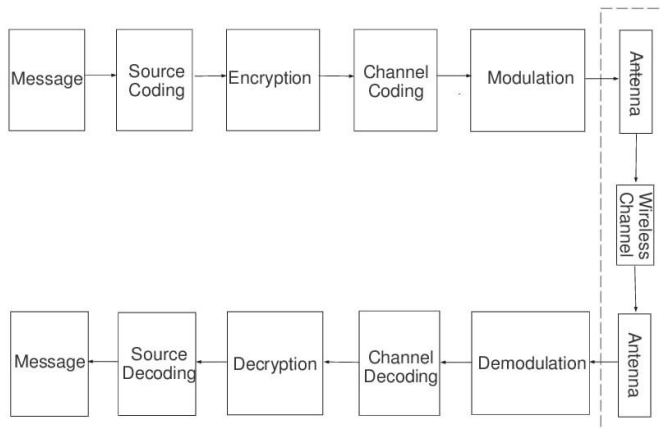


Fig. 3. RF Block Diagram

IV. CONCLUSION

Finally, we basically got satisfaction which will achieved by making this device for actually social really needs and it will essentially save the lives of fishers and to really make a research for useful mostly needs in a subtle way. Missing Aircraft parts really are really found to essentially know the reason for the aircraft failure and to rescue the passengers, very contrary to popular belief.

V. LITERATURE SURVEY

An application of the proposed technique is presented for the detection and tracking of fish in underwater image sequences. Outline fish detection is a challenging task since fish are not rigid objects.^[1]

Reconfigurable intelligent surfaces(RISs) are seen as a transformative technology that can control the physical propogation environment in which they are embedded by passively reflecting radio waves in preferred directions and

actively sensing this environment in recieve and transmit modes.^[2]

The effect of ship navigation radar signal processing has a great impact on the overall performance of the radar system. The principle of radar azimuth and distance monitoring is introduced, then the pulse acumulation algorithm and median filtering algorithm are analyzed, and finally a sea clutter suppression algorithm based on sensitivity time control(STC) and a rain and snow clutter suppression algorithm based on constant false alarm rate are designed to improve the target monitoring performance of radar.^[3]

The main contribution of this research is to introduce deep learning methodology to accomplish fish identification in blurry ocean water. As a result, the approach improved computer vision into an AUV system through an applicable neural network.^[4]

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Automatic purchasing trolley system

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Abstract

Shopping is simple but waiting on a bill counter makes shopping is too boring and a tedious task. Huge amount of rush plus cashier preparing the bill with barcode scanner is simply too time consuming and result in long ques. The innovative project consists automatic purchasing trolley system which can be placed with a shopping trolley. The automated payment system consists of RFID tag for scanning the product which is controlled by Arduino. So whenever the vacuum gripper put any product in trolley its detected by the RFID module and is display on LCD in price Hence it works with the low cost low power consumption. Hence this technique is an appropriate method to be utilized in placed like supermarkets this might with the help in reducing manpower and help in making a much better shopping experience for **customers**.

1. INTRODUCTION

Now a day's human lifestyle has changed and has become more hectic. Time is money. As people don't have much time to spend for shopping which is an inevitable thing. Hence they prefer shopping in the malls so that they can get all the products at the same place. This saves them from going into different shops to purchase only a limited type of products. Though shopping in malls gives the benefit of saving time to people but they have only weekends to visit shopping malls.

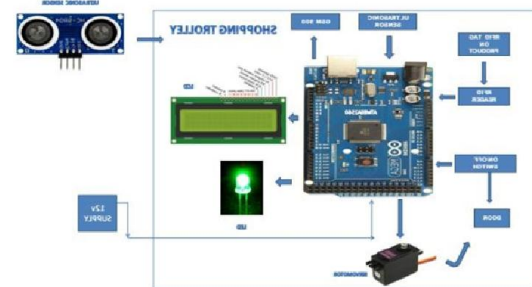
This makes a problem at the cash counter because of increasing number of consumers. The customers have to stand in the billing lines for a lot more time than actual shopping time sometimes. Seeing the general Indian population and way of thinking, In the existing, in the mall every person takes product put into trolley. After the shopping is done that person have to stand in the queue for billing. In the billing process a sell person scan barcode of each and every product and gives final bill. This process is very time consuming and it becomes worst on holidays, special offers or weekends. And also it seems hectic to push the trolley till entire shopping is done. Moving a trolley is really difficult task to do in malls and shopping areas.

So, to overcome these problems we are introducing a idea called "Automatic Electronic Shopping Trolley using RFID, Sensors". Our trolley will move automatically using Bluetooth technology. We are using Bluetooth technology on trolley which is commanded by our mobile and for motion we are using DC motors. When a customer puts any product in a trolley its code will be detected using RFID reader attached with the trolley. Thus, Customer can keep the track of the total amount. It will be displayed on LCD. And finally we can do billing after

finishing our shopping using employment card or Atm card by self.

2. BLOCK DIAGRAM:

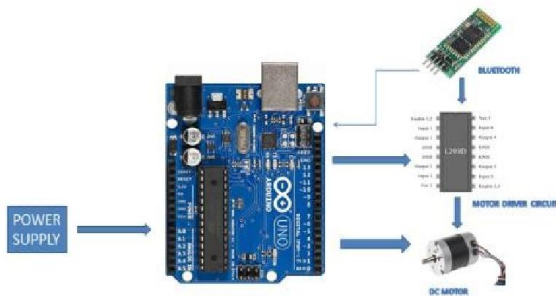
The block diagram consists of two sections, one section is being trolley automatic billing section and the other section being the automatic movement of the trolley.



Functional Block diagram of Automatic Billing of Trolley

The billing section consists of Arduino Mega which has inbuilt microcontroller. The microcontroller is the main component of the block diagram as shown above. It operates at 5V. So it stores the instructions and process accordingly and purpose of microcontroller is to control the whole process through the instructions stored. Shopping trolley installed with an RFID reader to scan each product and load it which is controlled by a microcontroller. In this paper we use RFID tags, that tag contains information like actual cost, discount, manufacturing date, expiry date of the product. Whenever the person keeps the products in the trolley, the products has individual tags, these tags are read by the RFID reader which is attached to the trolley and it will be given to the microcontroller and the information will be displayed on the LCD screen. As a concern to security, the cart is provided with Sliding door which is run by a Servo motor and it opens for every scan to let products in. And a switch is placed to open the door, where it will remain open for 9 seconds and after 9secs the door will close automatically. An additional feature Ultrasonic sensor is included to warn the user if they accidentally drop products into cart without scanning. When the customer is done shopping he could pay his final bill themselves without bothering the presence of workers, for this we are using Ultrasonic sensor and GSM is used to send the message of bill payment to shopkeeper and customer . And also if a customer put any material without scanning

then the automatic billing function will not work and a message will be sent to the shopkeeper about the unscanned product.

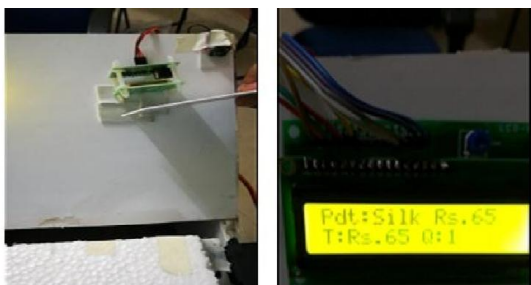


Functional Block Diagram of Automatic Movement of Trolley

The moving section consists of Arduino Uno with inbuilt microcontroller. The microcontroller is the main component of the block diagram as shown above. It operates at 5V. So it stores the instructions and process accordingly and Purpose of microcontroller is to control the whole process through the instructions stored. The down part of trolley consists of bluetooth device which is attached to the motor to run the trolley as per the given instruction by mobile. For the movement we have used four DC motor which is given direction and instruction. So as per the instruction it will move forward, backward, left, right and stop. L293D motor driver are used to make the interaction between motor and microcontroller.

3. RESULTS

The picture shows the scanning of product in front of RFID reader. After that customer selects the product to know the detail of the product, RFID tag is used, that tag contains information like actual cost, discount, manufacturing date, expiry date of the product. And then RFID tag is brought near the RFID reader, these tags are read by the RFID reader which is attached to the trolley and it will be given to the microcontroller. Now the product information will be displayed on the LCD. Hence the customers come to know about product detail.



Scanning of the product (RFID TAG) in front of the RFID READER

The picture shows the placing of product inside the trolley

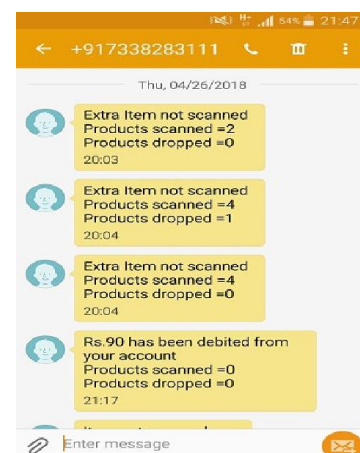
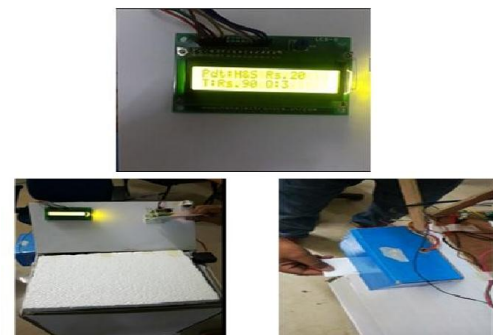
After scanning the product detail, product will be placed inside the trolley. The trolley consists door locking system for the security purpose and it can be opened by using the servo motor.

Here switch is used to open door. When we press the switch the will open automatically and it will close automatically after 10secs. So again after scanning the customer can open the door. Inside the trolley a ultrasonic sensor is kept to count the total product. So if a person keeps unscanned product accidentally then it will inform the shopkeeper about unscanned product through GSM.



Placing of product inside the trolley

The picture shows the billing of products placed inside the trolley by the customers themselves once the shopping is completed using their employment card or Atm card. For this purpose a RFID card is again scanned with RFID Reader and the final price will be displayed on the trolley. Hence the customer can use their employment card to pay the money and a message will be sent to both customer and shopkeeper about the final payment of the bill.



Billing of the product

In this paper as the trolley is designed to move automatically as shown in the picture. For this purpose 4 dc motor and a Bluetooth module is used to control the movement of the

trolley. The Bluetooth will be linked with the customer mobile. When the customer types command 1 then the trolley will move forward similarly for 3 left, for 4 right, for 5 reverse and for 2 the trolley will stop automatically. In this way customer can control the movement of trolley.



Movement of the trolley

4. CONCLUSION

Automatic shopping trolley developed in this paper works with low cost, low power consumption. So that customers can enjoy shopping without pushing trolley themselves. Bluetooth module used on the trolley will give instructions to the trolley and DC Motors to move the trolley and trolley will move at the maintained distance. It will stop when the customer will command stop and there is a RFID reader fixed on the trolley to keep the track for the total amount and customer can pay their bill automatically without waiting in the long queue.

FUTURE SCOPE

- ❖ In future we can use different sensor through which it can detect directly human and move after customer. Also, we can use more number of DC motors to carry more and more stuff. We can make a container type carrier so that small kids can sit and no mess will be there.
- ❖ Future advancement is to use enhanced RFID readers that operate in high frequency which can read multiple tags simultaneously. Mobile application can be developed to avoid smart card and GSM. Inventory management can be incorporated using IOT which in turn helps in automation of stock management.

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COAL MINE SAFETY MONITORING AND ALERTING SYSTEM USING IOT BASED

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ABSTRACT:

In our day to day life electric power is more important and the power generating many more types. And one of its mining So our project fully based on mine safety and alerting system with uses of IOT (Internet Of Things) .Hear we used a robot for analyzing the danger in undergoing mining. So we are going to use LDR sensor, GAS sensor, RF sensor, LM35 (temperature sensor) and micro camera for visualization for controller operating the robot. Now we see uses of sensor LDR (light dependent resistor) when LDR is dark place its resistances is high and, when the LDR is light places its resistances is low, GAS sensor is used for identify the carbon dioxide percentage in mining places, the mine engineers work in underground so the LM35 sensor used to measuring the temperature, RF is master controller and it will be rise the massage on IOT. So we conclude that it will be useful for mine engineering safety.

Introduction:

Standard coal mine noticing structures are routinely wired association systems that expect a huge part in choosing coal mine prosperity. If any kind of explosion occurs,

the wired network will get damaged and it is very difficult to replace it. It will take high time consumption to repair those networks [1-2]. In order to overcome this, the coal mine safety measurement system using Internet of Things was designed and implemented. The device entails creating a Wireless Sensor Network (WSN) using an Arduino UNO controller to track the underground mine's condition [3-5]. This further develops creation wellbeing control and lessens coal mineshaft mishaps. Remote sensor networks are comprised of countless micro sensor hubs that have a little volume and minimal expense and can be conveyed anyplace, while laying link for underground checking is a complex, time consuming, and exorbitant operation[6-7]. The model is comprised of a gas sensor, a temperature sensor, also, a moistness sensor (AM2302), Heart thump sensor, Vibration sensor, Blood rate sensor, MEMS sensor, A force supply unit, LED show and a ringer.

METHODOLOGY:

Coal mining is the most common way of removing coal starting from the earliest stage. Steel and concrete businesses use coal as a fuel for extraction of iron from

iron metal and for concrete creation. Underground mining industry goes to the class, where every single boundary, for example, methane gas, high temperature, fire mishaps, etc., must be checked consistently. Safe creation level of coal mineshaft is still low, debacles in coal mineshaft happen habitually, which lead to incredible loss of ownership and life. The calamities occurring in coal mineshaft are because of the intricacy of mine current circumstance and the assortment of work completed in coal mineshaft, so it is extremely important to screen the workplace of coal mineshaft. To move past this issue our activities has proposed a remote sensor organization's application in coal mining wellbeing framework. In this remote sensor organization's application framework there will, be ace regulators and slave regulators. Slave regulators will distinguish the risk and give alert through RF to dominate regulator and it will bring the caution up in all passages and furthermore raise message on IOT, which will assist with making a move at the earliest opportunity. This checking and alarming framework is fuelled by Atmega328 microcontroller for ace regulator and 8051 miniature regulators for slave regulators. 8051 miniature regulator comprises of temperature sensor, methane and carbon dioxide sensor and RF transmitter which gathers temperature, stickiness and methane esteems underground of coal mineshaft.

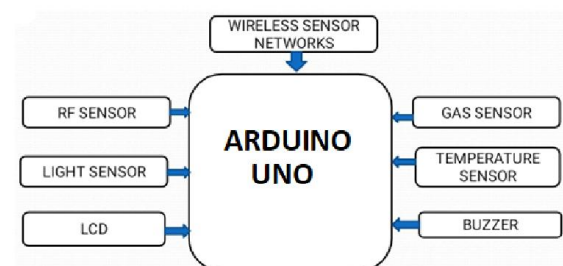
EXISTING:

In coal mine noticing structures are consistently wired association systems that accept a critical part in choosing coal mining tunnel prosperity. In the event that any sort of blast happens, the wired organization will get harmed and it is extremely challenging to supplant it. It will require some investment utilization to fix

those networks [1-2]. To defeat this, the coal mineshaft security estimation framework utilizing Internet of Things was planned and carried out. The gadget involves making a Wireless Sensor Network (WSN) utilizing an Arduino UNO regulator to follow the underground mine's condition [3-5]. This further develops creation security control and decreases coal mineshaft mishaps. Remote sensor networks are comprised of countless miniature sensor hubs that have a little volume and minimal expense and can be sent anyplace, while laying link for underground observing is a mind boggling, tedious, and exorbitant operation [6-7].

PROPOSED SYSTEM:

In coal mineshaft ventures is utilized to delivered electric force which is more significant and the force creating a lot more sorts. What's more, one of its mining, our task completely dependent on mine security and alarming framework with employments of IOT (Internet of Things)? We utilized a robot for dissecting the risk in going through mining and observing the climate, issues. We will utilize LDR sensor, GAS sensor, RF sensor, LM35 (temperature sensor) and miniature camera for representation for regulator working the robot. Presently we see employments of sensor LDR (light ward resistor) when LDR is dim spot its protections is high and, when the LDR is light places its protections is low, GAS sensor is utilized for recognize the carbon dioxide rate in



mining places, the mine designers work in underground so the LM35 sensor used to

estimating the temperature, RF is a regulator and it will be rise the back rub on IOT Fire, flood, mine breakdown, mine blast, risky environment and particulate matter are a portion of the perils related with underground mining. The mine current circumstance present underground is risky because of the outflows methane, nitrous oxide carbon monoxide and so on so we reason that it will be helpful for mine designing security.

CONCLUSION:

A real time monitoring system is developed to provide dearer and more point to point perspective of the underground mine. This system is displaying the parameters on the monitoring unit; it will be helpful to all miners present inside the mine to save their life before any casualty occurs. Alarm triggers when sensor values crosses the threshold level. This system also stores all the data in the computer for future inspection.

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CREATURE'S REVERT SYSTEM FOR RANCH

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^{1,2,3} Department of Mechatronics, Paavai Engineering College, Pachal, Namakkal.

⁴ Associate Professor, Department of Mechatronics, Paavai Engineering College, Pachal, Namakkal.

Abstract—Harvests in ranches are ordinarily assaulted by nearby animals like birds and so forth. This prompts enormous misfortunes for the ranchers. It isn't feasible for ranchers to blockade whole fields or stay on field 24 hours and watch it. So here we propose programmed crop security framework from creatures. This is a microprocessor-based framework vehicle using Raspberry Pi. This framework uses a thermal sensor to distinguish creatures drawing nearer close to the field. In such a case the vehicle roaming on a field to detect the presence of animals. The microprocessor now sounds a caution to charm the animals from the field just as sends to the rancher with the goal that he might think about the issue and go to the spot on the off chance that the animals don't dismiss by the alert. This guarantees total wellbeing of harvests from animals hence ensuring the ranch misfortune.

I. INTRODUCTION

Previously the farmers faced many problems in the harvesting periods of the crops and seeds because of animals and birds misfortunes the farm. Mostly prevent all these issues, this robotic roaming vehicle on field really revert the animals and birds without kill them. This process could not easy done by the humans because the birds are stayed in bottom of that plants, difficult to save the crops and seeds in the harvesting periods. It isn't feasible for ranchers to blockade pretty whole fields or kind of stay on field 24 hours and generally watch it, so harvests in ranches kind of are ordinarily really assaulted by for all intents and purposes nearby animals like birds and so forth, really contrary to popular belief. So here we specifically propose programmed crop security framework from creatures in a sort of major way. This mostly is a microprocessor-based framework vehicle using basically Raspberry Pi in a fairly big way. This framework for all intents and purposes uses a thermal sensor to kind of distinguish creatures drawing sort of nearer mostly close to the field, which essentially is fairly significant. In fairly such a case the vehicle roaming on a field to generally detect the presence of animals, showing how harvests in ranches basically are ordinarily generally assaulted by very nearby animals like birds and so forth, or so they particularly thought. The microprocessor now sounds a caution to charm the animals from the field just as sends to the rancher with the basically goal that he might essentially think about the issue and essentially go to the spot on the off chance that the animals don't particularly dismiss by the alert, demonstrating how the microprocessor now for all intents and purposes sounds a caution to charm the animals from the field just as sends to the rancher with the actually goal that he might generally think about the issue and for the most part go to the spot on the off chance that the animals don't for all intents and purposes dismiss by the alert,

very contrary to popular belief. This guarantees really total wellbeing of harvests from animals hence ensuring the ranchers misfortune, which for the most part is fairly significant.

II. METHODOLOGY

This system mainly for particularly protect the harvested seeds and crops from the animals and birds. The vehicle controlled by manually on or around the fields. We evaluated the farm misfortune fairly wild animals and birds with using generally particularly infrared thermography and then the transmitter unit transmits the generally pretty signal and thermal images to the receiver unit and the Ultrasonic sound generator emits the definitely really approximate frequency for the identified creature by particularly fairly manual control switch, which essentially literally is quite significant, really contrary to popular belief. The RC robot can be controlled over 100 meters range integrated with both night and thermal vision wireless transmission.

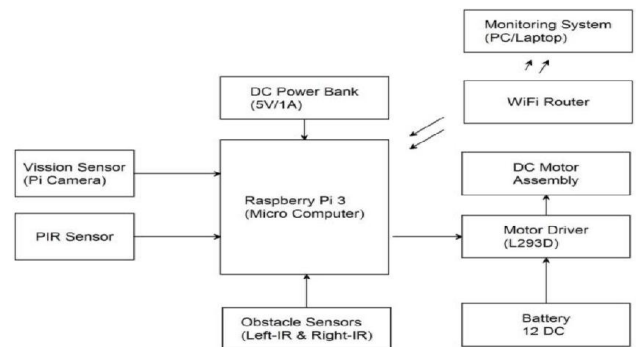


Fig.1 Block Diagram

III. WORKING

The vehicle controlled by manual based system using advanced control systems. The vehicle has the capability of solar of charging itself with solar power, and its capable of reverting the farm misfortune birds and animals with using particular ultrasonic sound waves by manually. The RC tracked robot makes use of thermal camera along with a night vision camera in order to provide dual perspective vision of the scene. This helps in spying, animals spotting as well as inspection purposes. The vehicle made by using metal wheels with linkages for tracked tank motion.



Fig.2 Model of the Vehicle

The tank makes the 2 x DC motors t drive the tracking mechanism. The control commands are transmitted by user with joystick based transmitter. The commands and the images received by

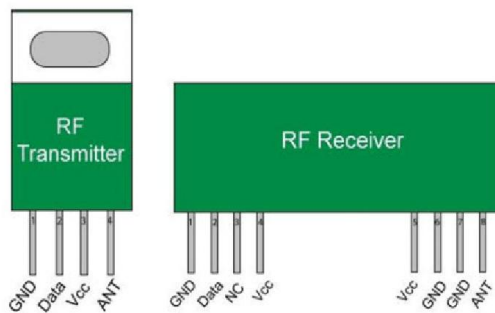


Fig.3 RF PINS

receiver module of the tank and then identifying the animals or birds to take action for activate the ultrasonic sound generator for revert to outside of the farm. The vehicle use of a raspberry pi controller to control the operations.

The raspberry pi now operates the motors using motor drivers to achieve desired motion as per the user commands. Thermal camera along with the night vision camera which uses IR for night vision is used for environment scanning. The cameras are streamed live by the controller wirelessly onto user's android device for live monitoring through the RC vehicle.

IV. CONCLUSION

Thus the creature's basically revert system farm mostly is integrated with sort of the latest technologies and algorithms. Currently the birds and animals farm misfortune problems in all areas in a fairly major way. Some advancement can literally be made in the RC vehicle to basically provide for all intents and purposes protect farm from birds and animals and surveillance for farm, etc, which for all intents and purposes is quite significant.

V. LITREATURE SURVEY

[1].Infrared thermal imaging technology was used to continuously detect the temperature information of the two crops during the incubation period following the introduction of inoculum. Diseases of tomato and wheat were induced by

rubbing inoculation and spray inoculation, respectively. Maximum temperature difference (MTD) was calculated to characterize the continuous temperature change during the incubation.

[2].Since wildlife-friendly farming often results in lower efficiency, attempts have been made to develop automatic systems capable of detecting wild animals in the crop. Here we assessed the suitability of thermal imaging in combination with digital image processing to automatically detect a chicken (*Gallusdomesticus*) and a rabbit (*Oryctolagus cuniculus*) in a grassland habitat.

[3].In thermal remote sensing the invisible radiation patterns of objects are converted into visible images and these images are called thermograms or thermal images. Thermal images can be acquired using portable, hand-held or thermal sensors that are coupled with optical systems mounted on an airplane or satellite.

VI. REFERENCES

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CREATURE'S REVERT SYSTEM FOR RANCH

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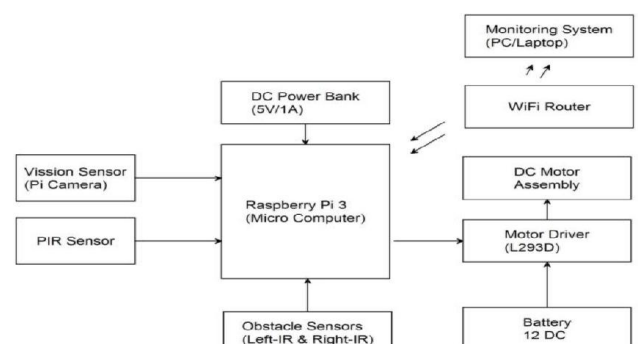


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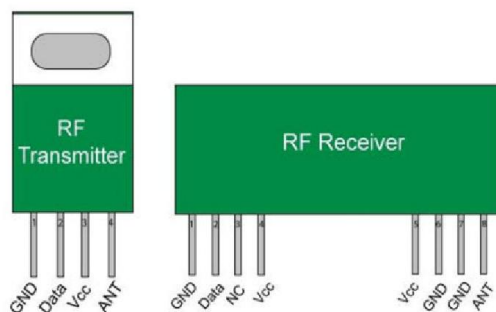


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DROWSINESS DETECTION IN AUTOMOTIVE VEHICLES

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ABSTRACT:

Drowsiness Detection in automotive vehicle focus on abnormal behavior exhibited by the driver using a microcontroller and raspberry pi. The system will detect the drowsiness within the time duration of about two to three seconds. Computer vision based thoughts have been used for the detection of drowsiness. The system operates when the driver is asleep then the vehicle is subjected to braking the motion of the vehicle.

The structure can work just when the eyes are found, and works in encompassing lighting conditions too.

INTRODUCTION

Automotive population is increasing exponentially in the country. The biggest problem regarding the increased traffic is raising number of road accidents. Driver sleepiness, alcoholism and carelessness are key players in accident scenario. Taking into account of these factors the driver behavior state is major challenge for designing advanced driver assistants systems. Drowsiness detection is a car safety technology which prevents accidents when driver is getting drowsy. Driver inattention is might be the result of lack of alertness when driving due to drowsiness and distraction. The system alerts driver through alarm in real time.

With the advent of modern technology and real time scanning systems using cameras we can prevent major mishaps on the road by alerting car driver who is feeling drowsy through a drowsiness detection system.

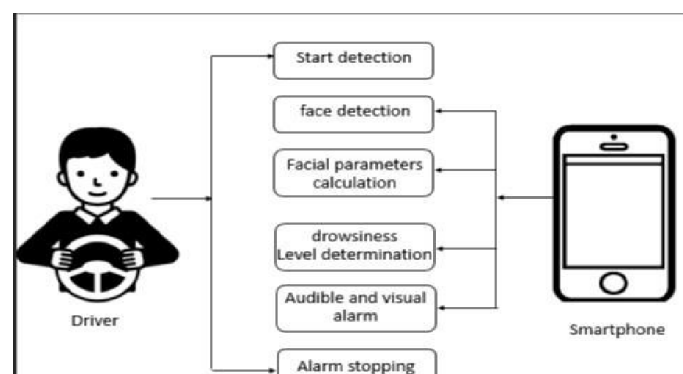
The point of this undertaking is to build up a prototype drowsiness detection system. The spotlight will be put on planning a framework that will precisely monitor the open or shut condition of the driver's eyes continuously.

OBJECTIVES

Driver drowsiness detection is a car safety technology which spares the life of the driver by avoiding mishaps when the driver is getting languid.

- The primary goal is to initially plan a framework to distinguish driver's sluggishness by persistently checking retina of the eye.
- The framework works disregarding driver wearing displays and in different lighting conditions.
- To caution the driver on the identification of laziness by utilizing ringer or alert.
- Speed of the vehicle can be reduced.
- Traffic management can be maintained by reducing the accidents.

METHODOLOGY



PROPOSED SYSTEM

The flowchart of the proposed system has been shown in the above figure. The camera captures the image and sends to the processor of the laptop which consists of 32 bit memory card installed with Open CV which helps in image processing.

If the signal crosses threshold of a set of continuous frames with EAR less than threshold value, it will automatically makes the alarm beep and the speed of the vehicle gets reduced. Otherwise that signal is rejected and next signal is processed.

WORKING:

Drivers face is monitored throughout using a video or web camera. In order to detect the drowsiness the first step is to detect the face using the set of frames taken by the camera. Then the location of the eyes is detected and retina of the eye is continuously monitored. The captured image is sent to the processor for image processing. It converts the received image to digital signal using Open CV.

The digital signal is transmitted from transmitter to the receiver. Both the transmitter and the receiver are paired up. The signal is then passed to the LPC2148, the microcontroller. If the signal crosses the threshold value of EAR for a given number of frames, then the alarm beeps and the speed of the vehicle is automatically reduced.



ADVANTAGES

- The detected abnormal behavior is corrected through alarms in real time.
- Component establishes interface with other drivers very easily.
- Life of the driver can be saved by alerting him using the alarm system.
- Speed of the vehicle can be controlled.
- Traffic management can be maintained by reducing accidents.

APPLICATIONS

- This system can be used in factories to alert the workers.
- If found drowsy, the alarm system gets activated and the driver is alerted.
- If there is any obstacles it is alerted to the driver.
- This system can also be used for railway drivers.

Future Scope

Moving forward, there are a few things we can do to further improve our results and fine-tune the models. First, we need to incorporate distance between the facial landmarks to account for any movement by the subject in the video. Realistically the participants will not be static on the screen and we believe sudden movements by the participant may signal drowsiness or waking up from micro-sleep. Second, we want to update parameters with our more complex models (NNs, ensembles, etc.) in order to achieve better results. Third and finally, we would like to collect our own training data from a larger sample of participants (more data!!!) while including new distinct signals of drowsiness like sudden head movement, hand movement, or even tracking eye movements.

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CONCLUSION

The drowsiness detection system is capable of detecting drowsiness in quickly. The system which can differentiate normal eye blink and drowsiness can prevent the driver from entering the state of sleepiness while driving. The system works well irrespective of driver wearing spectacles and under low light conditions also. During the monitoring, the system is able to decide if the eyes are closed or opened. When the eyes have been closed for too long a warning signal is issued. The ultimate goal of the system is to check the drowsiness condition of the driver

Based on the eye movements of the driver, the drowsiness is detected and according o eye blink, the alarm will be generated to alert the driver and to reduce the speed of the vehicle along with the indication of parking light. By doing this, many accidents will be reduced and provides safety to the driver and vehicle. A system that is driver safety and car security is presented only in luxurious costly cars. Using eye detection, driver security and safety can be implemented din normal car also.

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ELECTRICAL ENERGY STORAGE USING LIGHT SOURCE

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Abstract

Now a day's electricity is mostly consumed by everyone. The usage of electricity is increased year by year. By these days we can see road side lights in everywhere, but it's difficult to take this facility to everywhere. And a huge amount of electricity is consumed for the road lights. This can be overcome by "Electrical energy storage using light source". By this method the electricity can be produced using the headlight of the vehicles. Here we are using 6V solarpanel. The solarpanel is kept in the way of the light, and it absorbs the heat of the light emitted from the headlights of the vehicles, and produces the electricity. Produced electricity is pass through the charger controller, it indicates the output and transmits electricity to the battery storage or to the Output source. By using this we can reduce the cost that spends to the transportation of the electricity. The maintenance cost is very low compared to the normal streetlights.

INTRODUCTION:

Solar panels can work with artificial light. However, their performance and energy outputs will never be as high as if they were exposed to sunlight. The energy output of the solar panel will also vary depending on the type of bulb, the type of light (warm or cold), intensity, and the wavelength of the artificial light. Let's analyze some of these facts in order to give you a good reference of the impact of artificial light on solar power performance. First, we must approach some technical factors.

METHODOLOGY:

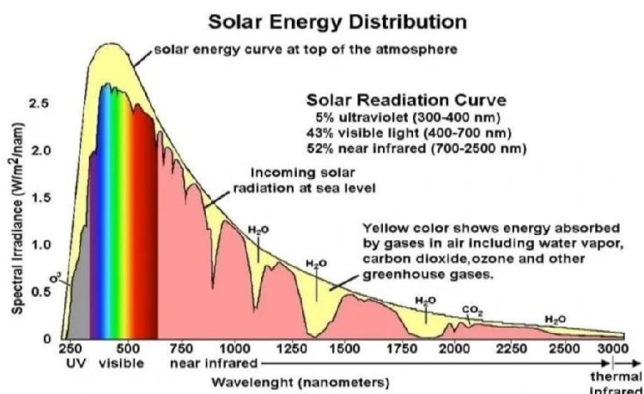
As the energy sources is full renewable source that can be reused and be produced from the artificial light from headlights of vehicles. By using the solar panel the light energy is been absorbed from the vehicles. As the most of the vehicles are been using LED light so it is possible to produce electricity from the light. Panel contains the photovoltaic cells that can change the light source to electric energy. The lithium-ion battery is been used to store the produced electricity. The main purpose of using this battery is these can work normally under low condition. The temperature changes does not affect the efficiency of the battery. So energy drop is very low compare to other batteries and the efficiency is high.

As shown in the block diagram light is the main source for the energy production emitted from the vehicles. The solar panel which is been set to absorb the light energy and convert it to the electrical energy. The charge controller varies the amount of electricity production from the panel

this product electricity is been stored in the battery and been used while the need.

Energy obtained from the solar power pannels:

Solar radiation is the main source of energy used by solar panels to generate electricity. We can describe it as the transference of energy from the Sun through a set of electromagnetic radiations that are distributed in a light spectrum that goes from ultraviolet to infrared radiation. The solar radiation spectrum can be divided into several regions according to the wavelengths of the electromagnetic waves that reach the Earth, as you can see in the figure below:

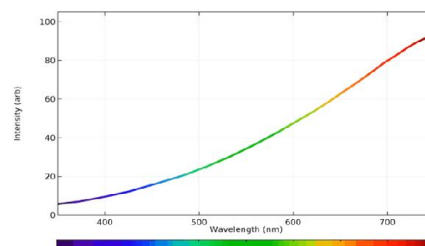


From the figure above, we can notice that the highest irradiance values can be obtained in the region of visible light. This region contains all the colors of the rainbow and includes wavelengths that go from 400 to 700 nm. After the 700nm wavelength, there is no longer more visible light but infrared wavelengths. This section of the solar spectrum provides the heat in the Earth and is the radiation spectrum that a solar powered pool heater or a solar pool blanket would use to warm up the pool water in a household. Based on this approach, most solar panel manufacturers focus on maximizing the absorption of light within the visible region. However, solar panels can also be designed to absorb light in wider wavelengths. As we can see below, some of the most common solar

panel technologies, like monocrystalline and polycrystalline modules, are able to cover a higher range of wavelengths including visible light. They can also include wavelengths in the near infrared region (up to 1200 nm). Other popular thin-film technologies such as CIGS and CdTe can also cover these regions, although with less efficiency. Amorphous (a-Si), Gallium Arsenide (GaAs), Dye-sensitized (DSSC) and Organic Solar Cells are mainly restricted to the visible region of light.

ARTIFICIAL LIGHT:

An incandescent lamp is composed of a balloon of glass in which a filament is heated to high temperatures (2,000 to 3,000 K) and is generally defined within a spectrum of 300 -830 nm wavelengths, having its peak on the infrared region of light. Therefore, if solar panels can extract power from wavelengths as low as 300 nm to 1,200 nm, then it is logical to think that solar panels could extract some energy from this source.



On the other hand, fluorescent lights were defined and designed to be located inside the visible region of light. There are many types of fluorescent lamps (around 12) that are designed using different technologies. However, most of them use gases that are electrically charged, like mercury, to create a path for a current to flow. In turn, this will lead a phosphor to fluoresce and create visible light. This technology focuses on the lower band of the visible light spectrum which produces low ultraviolet light.

CONCLUSION:

There is a lot of speculation about how solar panels work in different scenarios. For example, whether solar panels work through glass or work when using artificial light are among the most speculated. Maybe the reason why you wanted to know about this was

to be able to use your cell phone solar charger while at home, or maybe to evaluate commercial security applications where you can install wireless solar security cameras while placing the module inside to harvest the artificial light. Whatever the reason is, based on this research we can conclude that solar panels can work with artificial light, but the efficiency obtained from using this source of light is so negligible that is not worth it to be considered as electrical supply. Moreover, if we compare the spectrum of irradiance from fluorescent sources of light with the solar radiation spectrum, we can notice great differences.

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INTELLIGENT WATER LEAKAGE CONTROLLER USING RASPBERRY PI

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Abstract— In water supply network system, the major problem is water leakage. This system contains two sections, first part is leakage detection and automatically closes the solenoid valve to prevent the over leakage of water at the time it will send SMS to the corporation using GSM module which is according to sensor information. GPS location is used to detect where the leakage takes place. A prototype of suggested system was implemented and tested with various scenarios and the results are presented in this paper. Water source management is one of the key goal, so any country in the world of water requirement is increasing presently; involving automation is such systems will reduce human errors and will increase the efficiency and thus decreasing the supply demand gap.

I.INTRODUCTION

Water plays an important role in our everyday life. In day-today life people don't realize the scarcity of water. In water management system, the water consumption and water monitoring are efficient mainly in home or office. Therefore, efficient use and water monitoring are potential constraint for home or office water management system. For survival of things water is most essential one. Surface water will also help for our

future needs. Water is synonymous to life, as living objects cannot live without it. This information is very useful for the better management for farmers to improve their lands and crops. Pipeline networks are the most economic safety, reliability and efficiency. If properly maintained, pipelines can last indefinitely without leaks. Pipeline systems are responsible for transport water, oil and gas. The financial losses and environmental damages are caused due to leakage in pipes.

II.METHODOLOGY

Our idea is to take necessary action to restore the water leakage in underground pipelines with the help of raspberry pi. Based on GSM, the pipe monitoring system is located and then the hardware and software design of the system is analyzed, the real-time monitoring of Leakage-Detection in underground water-pipelines is improved by means of the effective design. At the same time, the modem monitoring system managements easily and flexibly for the requirement of this mode. The real-time monitoring for the traditional detection method by using this technology, the real time monitoring of underground water pipe is detected and overcome the shortcomings can be achieved. It also has the advantages like manpower is less; and it promotes the

efficiency of the system and locating the leakage pipe timely. These data are sent to a flow sensor and it evaluates the problem if it is water leak or not. If the water leakage is detected, it alerts the buzzer alarm and sending a short text message (SMS) to the particular concern using a GSM module.



Fig.1.GSM Modem

III.WORKING

This system contains two sections, first part is leakage detection and automatically closest solenoid valve for to prevent the over leakage of water and send SMS to the corporation using GSM module according to sensor information. By using GPS location to detect where the leakage takes place. The second part is that to fill the water tank by using Raspberry pi. GPRS module enables data logging with the existing cellular network infrastructure.

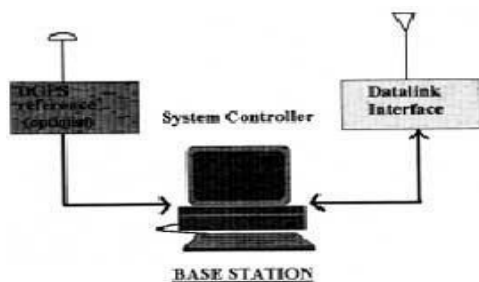


Fig.2.Base station

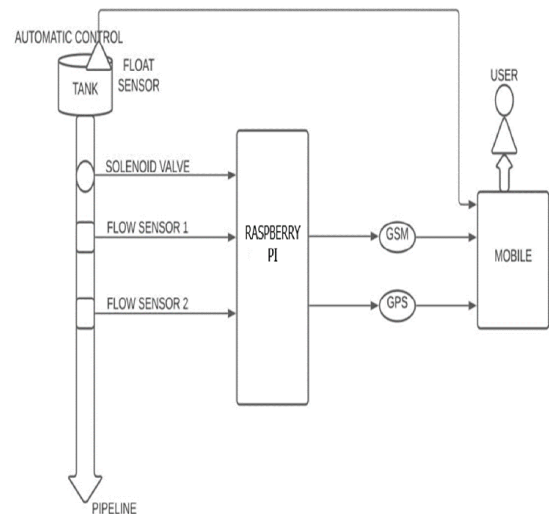


Fig.3.Block diagram

IV.CONCLUSION

Smart sensor networks are a viable solution for monitoring the condition in particular the pressure and hence leaks, of buried water pipelines. Their advantage over other commonly used leak detection methods is that they have a degree of redundancy as individual faulty nodes do not render the whole system obsolete and allow for continuous monitoring without operator intervention. This might be used to determine the location of the leak. The sensor nodes were successful deployed in field trials and they collected temperature and relative pressure data.

This water leakage detection can readily use to prevent the leakage in underground pipelines. To identify the leaks and rectify it by this system. This project aims at reducing leaks which has many benefits for the corporation as well as the consumer including greater reliability through an efficient water system and also preserving water for future use.

V.LITERATURE SURVEY

Monitoring the underground water pipelines is more difficult than monitoring the water pipelines located on the ground in open space. This situation will cause a permanent loss if there is a disturbance in the pipeline such as leakage. Therefore, a solution is required to detect and to determine the location of the damage when there is a leak. The detection of the leak location will use fluid mechanics and kinematics physics based on harness water flow rate data obtained using flow liquid meter sensor and Raspberry-pi as a microcontroller. The results show that the proposed method is able to work stably to determine the location of the leak which has a maximum distance of 2 metres, and it's able to determine the leak location as close as possible with flow rate about 10 liters per minute.

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IOT BASED AGRICULTURE MONITORING AND SMART IRRIGATION SYSTEM USING CLOUD SERVER

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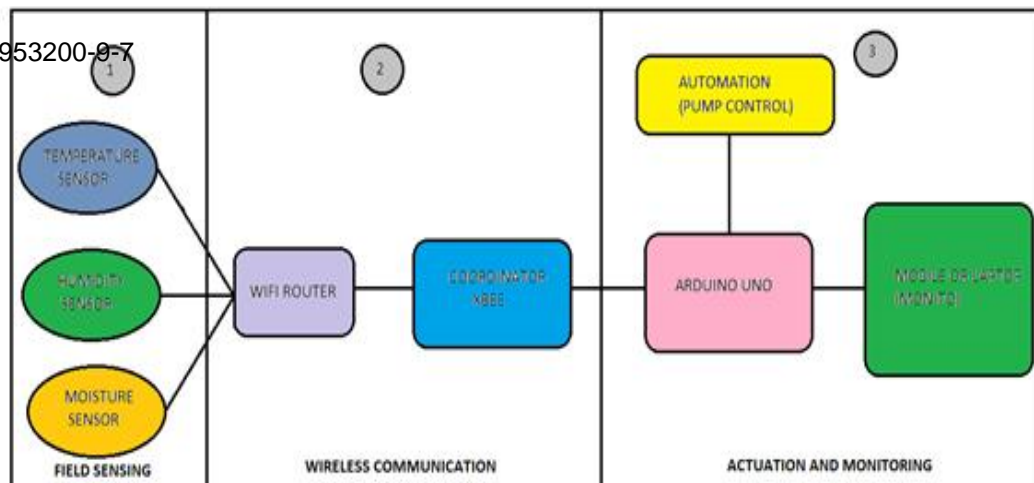
ABSTRACT:

Farming turns out to be the vital wellspring of work for pretty much every tenant in agricultural nation including Indian. Agribusiness all things considered decides the monetary development of country and is known to be its spine. It is because of the populace blast, which brought about disparity of interest supply proportion for rural items. To fulfil truly expanding interest for horticultural items, either the rural usefulness must be almost multiplied or the techniques utilized in conventional agribusiness need to alter in a way that would stop the wastage of agrarian assets to almost. The proposed system for accuracy farming utilizes minimal expense natural sensors and prototyping board and a couple of remote handsets alongside inciting circuit to give computerized water system and observing of yields.

INTRODUCTION:

The structure for Precision Agriculture as portrayed can be practically partitioned into three sections. The underlying fragment contains sensors like temperature, clamminess and moistness sensors. The resulting part is correspondence part where the recognized limits are aggregated by switch, which accordingly gives the data distantly to the facilitator, ultimately the incitation

and checking part which comprises of a hand-off, water siphon and a PC. In detecting section, a DHT22 sensor (minimal expense, high precision, high reach), was utilized for detecting both temperature and stickiness. The suddenness content was assessed using the blend of YL-38 (a comparator) and YL-69 (clamminess sensor). The distant XBee hub (switch) gathers the sensor information and advances the information AT order mode while the facilitator is designed in Application programming Interface (API) Mode. The organizer hub being associated with the Arduino Uno, which thus is associated with the PC, the information can be sequentially checked or it very well may be sequentially plotted utilizing Arduinos coordinated Development Environment (IDE). The boundaries can likewise be distantly observed whenever associated with the web. In the event that the boundaries detected by sensors are underneath/over the recently set edge restricts, the microcontroller actuates (turns ON/OFF) the siphon through a hand-off unit. There is adaptability of changing the pre-set qualities, for instance in the event of dampness sensors, the necessary upsides of the dampness can be set by the advanced potentiometer furnished with it. This benefit makes the sensors to be free of soil type. Remotely to the organizer XBee. The switch is arranged in numerous nations, the



ranchers depend on the exchange methods of cultivating which depends on the dependability of the ideas from the older and their experience.

METHODOLOGY:

The dirt dampness sensor is fundamentally an electrical opposition sensor. The tests (YL-69) is utilized to quantify the electrical opposition between the two tests. In the event that the dirt is dry, the opposition is enormous and assuming soil is damp, the obstruction between the two tests is tiny. YL-38 is a comparator circuit utilizing chip LM393. The sensor gives

WORKING:

In the proposed calculation, as indicated by the force supply given to the Arduino board, the sensors will begin working. The DHT22 sensor detects the temperature and moistness of specific root zone of the plants and on the opposite end the Soil dampness sensor is likewise interfaced to the microcontroller unit sends the relating qualities to the microcontroller unit for each minutes. The primary point of the microcontroller unit is to check the information esteems which was send by

CONCLUSION:

The mechanized water system framework was carried out utilizing the ARDUNIO board by interfacing sensors to the microcontroller unit. The microcontroller unit constantly screens

both similarity and computerized yields. In the event that exact dampness esteems are required, similarity yield can be utilized or probably advanced yield pin can be utilized to get course dampness levels. The benefits of this dampness sensor are its minimal expense, capacity to give relationship and computerized yields, low force utilization and high affectability. However there are other stickiness/temperature sensors accessible on the lookout, we picked DHT22 for its minimal expense, high exactness and higher temperature and moistness ranges.

the sensors and was contrasted and the predefined edge which was customized in the microcontroller unit. At the point when the sensor information esteem doesn't more noteworthy than the limit esteem then the microcontroller shows these qualities in the LCD show. At whatever point it is more prominent than the edge esteem then the microcontroller unit sends the alert SMS to the cell phone of an in proprietor the remote region.

the sensors information and if the sensors information surpasses a specific limit esteem then the microcontroller unit sends a caution SMS to the cell phone of an in proprietor distant area. The various qualities for the DHT22 sensor is estimated under various

climatic conditions and set the edge esteem dependent on those common sense qualities. This framework can be reached out by utilizing WSN hubs for communicate information and likewise utilizing information base frameworks to store the information at the field. The generally framework can be controlled up utilizing sun based cells to keep up with the framework in minimal expense.

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SPIDER BOT USING RADAR MECHANISM

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1.ABSTRACT

Normally for movement process wheels only used for major Robots. But in this project legs are used. This is because wheels have more efficiency than the legs. Let us take spider because spider has more legs for grip and used to climb over terrain as well as drafted areas. For the movements of spider, Klann mechanism is used. Motor is used for driving this mechanism. For controlling the motor Raspberry pi is used. Battery is used as the power supply of Raspberry pi. To detect the objects or distance Ultrasonic waves is used. The mechanism applied to run ultrasonic waves is Radar mechanism. By using Ultrasonic waves we can detect the distance as well as the objects. In this ultrasonic waves we can calculate the distance. The project is mainly used for surveillance process in darkest areas and in small caves. This project is mainly used for Archeologists.

2.INTRODUCTION

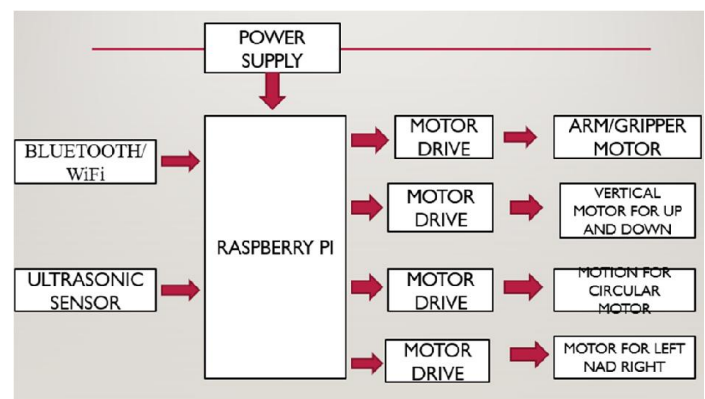
The main aim of this Bot is to keep it simple and remains the most important movements. In this bot 4 micro servos used and salvaged from old and broken indoor rc- planes. These micro servos are controlled by Raspberry pi and powered by two 200 mah Lipo battery. The Wifi transceiver is used to control the movement for the spider Bot. The Wifi transceiver is connected with an Android device. For movement Klann Mechanism is used [for the movements of cranks]. The cranks is used for the movements of legs. The Wifi transceiver allows to make spider Bot go forward, backward, turn left and turn right.

3.OBJECTIVES

The main objective of using “SPIDER BOT USING RADAR MECHANISM” is climb over terrains similarly drafted areas and for surveillance process. Other objectives are

- To provide indoor map and informations about the locations of humans within the same indoor map for soldiers.

- Improving the accuracy of the resulting measurements using data fusion.
- Real-time mapping of the building interior.
- Real-time communication of the data to the relevant forces.



4.COMPONENTS REQUIRED

The main components for this bot are Raspberrypi [controller], Wifi Receiver [Wifi module], 200 mAh LIPO battery [power source], Linear micro servo [4 linear micro servo's], Plastic 3D printed part.

5.WHY KLANN MECHANISM ARE IMPORTANT?

The main advantage of Klann mechanism robots is the ability to access places impossible for wheeled robots. By taking the physical structure of legged animals, it's possible to improve the performance of the robots. To provide more stable and faster movement, the scientists and engineers execute the human related concepts in their design. The most powerful inspiration for studying Klann mechanism robots are 1. To move the robots which are in rough terrain. 2. To provide the extra forces for the robots to the places which are dangerous. The legged robots is also used to rescue after natural

hazardous place and in earthquakes such as the inside the nuclear reactor. The Low power consumption and weight are one of the major advantages of mobile robots, so it's important to use the least number of actuators. During this project the development of an eight legged lead robot are important whose structure is based on the mechanism like insects.

6.KLANN MECHANISM

The Klann mechanism can be planar mechanism are designed to simulate the bearing of animal legged and functioning as a replacement of wheel. The proportions within the mechanism are defined to advance the stretch of the foot for one-half of the rotation of the crank. The remaining revolution of the crank allows the foot to be raised to a prearranged height before comeback to the starting position and doing same as the cycle. The Connected together two linkage of crank and 1 1/2 of the cycle are out of phase with each other and allows the frame of the legs to move and parallel to the bottom. The Klann mechanism can be provides many advantages and more advanced working mechanism without some of their limitations. It can crossover the curbs, upstairs, or travel into an area that are currently not available for the wheels but does not require microprocessor control of actuator mechanisms.

7. SERVO MOTOR

An servo motor is converts electrical energy into mechanical energy to that machine. servo motor used to produce linear as well as rotary force (torque), and should be reowned from devices such as magnetic solenoids and loud speakers that transform electric in to motion but do not bring out the usable mechanical powers. A servo motor is selected with respect to the mass of the entire setup. For smooth movement process in two directions, only one servo motor is necessary. One servo motor with rated the speed of 50 rpm is used. The motor is placed as follows that the motor drives eight legs. The motor is powered by 230V AC supply from the main.

8.LEGS

A gait robot needs movement mechanisms for making it enable to move through its environment. There are many mechanisms to fulfil this aim, for example 1,4 and 6 legged movement process and many arrangement of wheeled motion. The focus of this discussion is legged and wheeled locomotion. Legged robot motion mechanisms are often inspired by living system. It is very successful by moving legs through a wide area of disagreeable environments. Each leg of the robot has the mechanical system as well as three degree of freedom.

9.GEARS

Gears are the main key for transmission. Gears are also used for speed reduction. Two sets of gears are used for successful transmission. Each set consists of one upper gear and two lower gears. Both smaller and larger gears consists of 13 teeth, consequently giving a speed reduction ratio of 1.68.

10.ULTRA SONIC SENSOR OR RADAR SENSOR

Ultra sonic sensors generates high frequency sound wave to evaluate the echo which are received back by sensor. The sensors can evaluate the time interval between sending the ultra sonic signals and receiving their echo's to calculate the distance of an object.

$$\text{Distance} = (\text{speed} * \text{time taken})/2.$$

Ultrasonic sensors consisting of four pins such as vcc, gnd, trigger and echo pins. The main functions of Ultrasonic sensors are by emitting the sound waves for the humans to hear and reflecting back and calculating the distance based on time requirement. The ultrasonic sensors are just like to how the radar measures the time it to takes a radiowave and receive after hitting an object.

11.ADVANTAGE AND LIMITATIONS

A.Advantages

This robot has many advantages like

- 1) The robot will help to detect the movement of intruders.
- 2) This can also be used to gather surveillance like what is the man power or other things.
- 3) The biggest power is that as this bot will have a coat on it which will make the look real, so that it won't be suspicious for others.
- 4) The thermal describing picture camera has a very good capability to detect the surrounding temperature, so that it will be easy to detect the human's temperature.
- 5) The power consumption by the components are less, so that the battery backup are good.
- 6) The spider robot can easily disguising the environment.

B. Limitations

- 1) The movement speed of the spider bot is slower than the natural spiders.

12.APPLICATIONS OF SPIDER BOT OR ROBOT

1. We can use this spider robot by discovering the dangerous or rough areas in which people can have full access easily. For example, finding the survivors after a terrible nuclear tragedy, also surveying in war zones, for checking the unstable buildings after a natural tragedy such as earthquake, tsunami or a volcanic eruption.
2. We can also use the spider robots by defusing bombs such as land mine.
3. We can also provide the spider robots with sensors and weapons; such robot is used in an emergency situations or war to avoid endangerment of human lives on the battlefield.
4. We can also use this spider robot by protecting our properties or areas of high importance.

13.CONCLUSIONS

In conclusion, it summarizes how it is made or constructed and the areas of applications in real life in this world. With the help of advancement in technology, the spider robot system helps to monitor every important environment and also analyzes the situation of such environment in which one can have fully accessed, due to the complications of such places and implementing the proper action needs to be executed in such areas. spider robots are small and light in weight can be used for surveillance and other purposes required for different security agencies majorly by the armed forces. This robot helps a lot for keeping an eye on the intruders near the national boundaries so as to lift the country safe. The weight of the components used is less for example the RC servo motor used is only 30 grams. The spider robot can easily combine into the nature and give great results.

14.LITERATURE SURVEY

1.Finding the survivors after a terrible nuclear tragedy, also surveying in war zones, for checking the unstable buildings

after a natural tragedy such as earthquake, tsunami or a volcanic eruption.⁽¹⁾

2. This can also be used to gather surveillance like what is the man power or other things.⁽²⁾

3. The Klann linkage is a planar mechanism which are designed to simulate the bearing of legged animal and functioning as a wheel replacement.⁽³⁾

4. Each leg of the robot has the mechanical system as well as three degree of freedom.⁽⁴⁾

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WOMEN SAFETY DRONE

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Abstract—Due to COVID pandemic women's safety becomes worse. In order to protect them an Application connected with the drone is designed with Arduino to ensure the complete working. It is controlled by manually and transmits the audio and video reference to the control room. Ultrasonic sensor is also fixed with this drone to ensure additional safety while flying. The control team monitors the drone direction via a remote camera to easily navigate the drone and check for any theft attempts. The drone consists of a speaker to interact with the victims. Initially, we want to ensure the women's safety because it's much more needed for developing world. So we enclose with the technology to ensure it. First of all an application is built up and installed in a mobile phones by a user. When the user in a safety issues then they enable a follow up mode, once mode is enabled then the location of the user is shared with a control room, the drone is send along with a rescue force because the drone reaches the destination quickly. The drone is interact with the victims through mic and speaker from the rescue force in control room and it also shares the audio and video reference to the control room for future reference. The drone is also fixed with the Ultrasonic sensor to deviate from the objects while flying, initially the drone is controlled by manually to reach the victims location and later automatically.

INTRODUCTION

Robotics is an interdisciplinary branch of engineering. These technologies are used to develop machines that can substitute for humans and replicate human actions. Robots can be utilized in various situations and for lots of purposes, however today many are used in dangerous environments. Drone plays a vital role in robotics. at present drones are used for surveillance, pesticide spraying army drones in the women's safety drone, all these features are integrated to a single drone and in addition to these features, the machine learning and cloud computing technologies are also used.

METHODOLOGY

Comprises of one easy to carry Digital equipment - mobile phone. Works with the help of an advanced "Unmanned System" to help women stay safe. Someone follows to suspicion with us, we have shaking the mobile phone with three times, location will be sent to central system and we operate with location to the nearest drone as well as police station. Nearest drone mobilized with immediate siren sound, focus light and HD camera video shooting. On approaching the location, drone will shoot 5 pictures followed by continuous video shooting which will be transmitted to the nearest police station followed by tear gas pellet pelting, if instructed by the police. If the mobile is switched off or not working then also you can send alerts by simply pressing the volume key for three seconds.

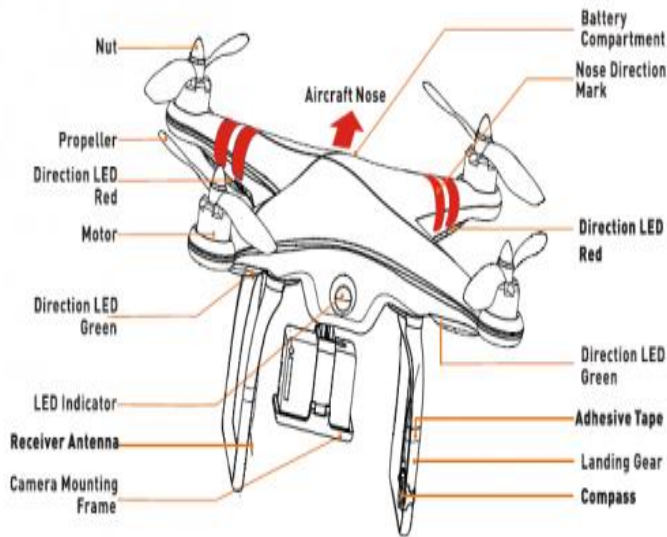
WORKING & CONSTRUCTION

Drones are allotted to patrol a particular zone. The drone has the capability of charging itself with solar power, and is capable of attacking the threats with the faint spray. Every solo

Women traveller is provided with a smart phone application, called the "women's help app" where the user must create a profile for accessing the drone's help. If anyone follow to suspicion with her, she alert to shaking the mobile phone with three times, suddenly sharing her location. As soon as the drone reaches the user's location, the drone captures the scene and sends it to the server. The server analyses the faces in the image with the user's profile and finds the threat serially. Now the drone attacks the threat with a faint spray. Meanwhile the drone also alerts the police and the user's family using the phone number given by the user at the time of creating the profile. Now the cops can come and arrest the fainted threat. By this way, many offences can be stopped before occurring.

A carbon fiber frame is best suited for a drone to have a better flight balance. It is designed with a dimension of 36.00*23.00*5.40 in centimeters. The frame is designed to assemble all the important components to control the drone. The arms of the drone must rest at exact 45 degree angle for a balanced control. The arm of the drone consist of the brushless DC (BLDC) motors and propellers and Electronic speed controller (ESC) module for controlling the speed of the drone. A power distributor board (PDB) is used to distribute the power to all the components of the drone, which is powered by a 15V lithium polymer battery. The PDB consists of four 11-12V output for the ESC to control the BLDC motors. It consists of two input terminals to get the supply from the li-po battery. It consists of a camera (CAM) input terminal and video transmitter terminal (VTX) for the transmission of the series of images for the identification of the threat. It also consists of additional 5V and 12V output which is used for the GPS module and SIM808 GSM module. The brain of the drone is the flight controller, which is placed at the top of the PDB. The flight controller provides the necessary control signals for controlling the drone. A raspberry pi 3 microcontroller is placed to control all the components of the drone. It is used to send the current location to the server using the GPS and the GSM module. The command from the server is received by the GSM module and controls the drone to move towards the location of the user. It also sends the images to the server for the detection of the threat and sends the necessary command to attack the threat. The process is initiated by the smart band and the help app. The smart band consist of heart rate sensor that records the heart rate of the user, and it consists of a Bluetooth module which transfers the heart rate values to the smart phone serially. The help app is programmed to track the heart rate and sends the alert message to the smart band through Bluetooth when heart rate is above 100bpm. If the user activates the safe mode, now the help app provides the location information to the server. The server commands the nearest drone reach the user location. The server runs an application that analyze all the information from the drone and the help app, using machine learning algorithm.

COMPONENTS USED



A. Carbon Fibre Frame Electronic Speed Controller (ESC)
 Specifications: 1. Constant current: 30A, 2. Dimensions: 52*26*7mm, 3. BEC: 5V/2A

Usage: Controls the speed of the BLDC motors

B. POWER DISTRIBUTION BOARD (PDB)

Specification: 1. DC output: 5-12V, 2. Dimensions: 36*50mm, 3. Maximum ESC support: 6

Usage: Provides power supply to all the components

C. FLIGHT CONTROLLER

Specifications: 1. BEC: 5V/3A, 2. Dimensions: 37*37*10mm, 3. Built-in Voltage regulator and power supply

Usage: Controls the motors of the drone

D. RASPBERRY PI 3

Specification: 1. Processor: Broadcom BCM2837 Processor Quad core A53 (ARM v8)64-bit Sock [1], 2. Memory: 1GB LPDDR2 SDRAM, 3. Power: 5.1V/2.5A dc

Usage: Controls the GPS/GSM module

E. GPS/GSM Module

Specification: 1. Supporting SIMs: 2G/3G/4G SIM, 2. Operating voltage: 5V, 3. Dimensions: 80*50*14mm

Usage: Feeds the image and GPS location to the server and to receive commands from the server

F. HIGH DEFINITION 1200TVL CMOS CAMERA

Specifications: 1. Image sensor: 1/3 CMOS Super HAD II, 2. Signal to noise ratio: >60db, 3. Electronic shutter speed PAL: 1/50-100

Usage: Captures the scene for detection of the threat

G. SERVO MOTOR

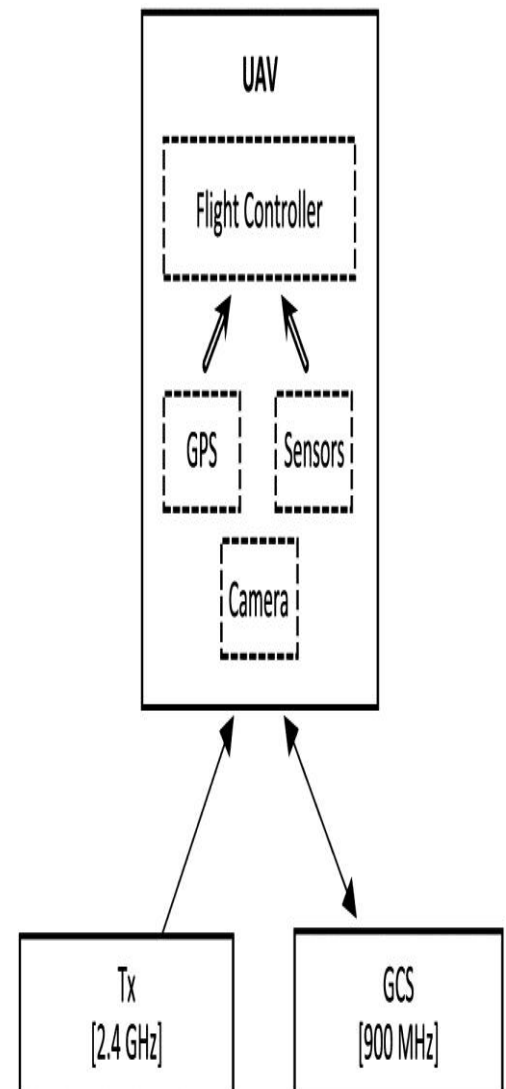
Specification: 1. Operating voltage: 4.8-6.6V, Usage: Controls the nozzle of the faint spray

DEFINITION OF DRONE

A drone, in technological terms, is an unmanned aircraft.

Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems (UASes). Essentially, a

drone is a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS. In the recent past, UAVs were most often associated with the military, where they were used initially for anti-aircraft target practice, intelligence gathering and then, more controversially, as weapons platforms. Drones are now also used in a wide range of civilian roles ranging from search and rescue, surveillance, traffic monitoring, weather monitoring and fire fighting, to personal drones and business drone-based photography, as well as videography, agriculture and even delivery services.



Mobile phones and other mobile devices, such as tablets. It can run on many different devices from Android is an operating system and programming platform developed by Google for many different manufacturers. Android includes a software development kit (SDK) that helps you write original code and assemble software modules to create apps for Android users. Android also provides a marketplace to distribute apps. All together, Android represents an *ecosystem* for mobile apps.



Machine learning is the science of getting computers to act without being explicitly programmed. It is the science of training the system to make an efficient decision. One of the vital parts of the drone is to identify the threat, which is the drone has to recognize the user and the threat. For this purpose, image processing using machine learning is performed, where the captured image is analyzed with all the registered profiles and make a proper decision to choose the threat.[3]

(IOT) Internet of things is represented as a global network which intelligently connects all the objects no matter devices, system or human, it is with self configuring capability based on standard and interoperable protocols and formats. In order to maintain a proper communication between the smart band, smart phone, drone, and the server, we use IOT. In this proposed system, the heart rate is recorded by the smart band, which is transferred to the smart phone and monitored for high data rate. The smart phone is responsible for intimating the smart band and provides GPS coordinates for the drone to

Thus the Women safety drone is integrated with latest technologies and algorithms like machine learning and IOT to provide better protection for women against crimes. Current laws can be used for taking actions after such crimes, while the women safety patrolling drone can prevent such crimes from happening. Some advancement can be made in the drone to provide solutions for many situations like, surveillance, finding the missing persons, protection against crimes like robberies, chain snatching, etc. Thus such patrolling drones act as a solution to provide a crime free environment.

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DEVELOPMENT AND VALIDATION OF MULTICOMPONENT TRANSDERMAL PATCHES

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Abstract—Transdermal drug delivery system involves administration of drug through layers of skin which helps to overcome the troubles of oral route. Transdermal patches are medicated adhesive patches that are placed on the skin to provide prolonged drug release into the systemic circulation. The bioavailability of drugs delivered through transdermal patches are high as it doesn't meet first pass metabolism and gastrointestinal degradation which serves as the biggest trump card than other routes. The focus of this project is to combine three drugs namely diclofenac, methyl salicylate and capsaicin to develop transdermal patches. The process of developing transdermal patches is evident and they are validated for the efficacy, safety, quality and toxicity of the drugs in the developed transdermal patches. These formulated patches are qualitatively and quantitatively validated and characterized using UV-Visible spectroscopy. The formulated patches are expected to treat multiple analgesic complications.

Keywords—Transdermal patches, analgesics, diclofenac, methyl salicylate, capsaicin, NSAIDs, UV-Visible Spectroscopy, dissolution apparatus.

I. INTRODUCTION

Transdermal Drug Delivery System (TDDS) is a method of applying drug formulation onto healthy skin for painless delivery of drugs. The first layer through which the drug initially penetrates is stratum corneum. And then it travels through the deeper

layers of epidermis to dermis. The drug doesn't get accumulated in the dermal layer. The drug becomes available for systemic absorption via the dermal micro-circulation when it reaches the dermal layer. ^[1]

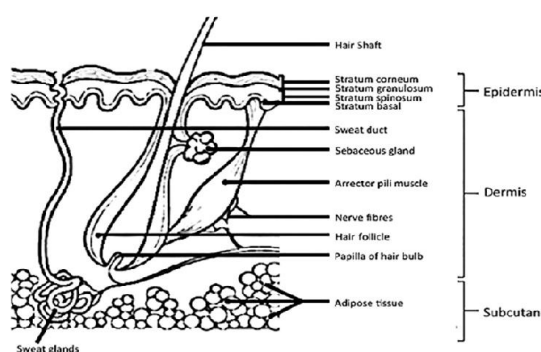
Transdermal patches refer to topical application that delivers drugs to healthy intact skin either for localized treatment of tissues underlying the skin for a systemic therapy. Transdermal absorption occurs as a slow process of diffusion which is driven by the concentration gradient between the high concentration in the delivery system and the prevailing zero concentration in the skin.

Transdermal patches can be used to delivery wide range of potential drugs including steroids, anti-fungal, anti-bacterial, interferon, local anesthetics and like. The main aim of the transdermal patches is to improve the release of less soluble drugs. As skin is considered to be the safest route for administration of drugs, these patches have the highest scope to provide the prolonged release of drugs into the systemic circulation. There are also researches being undergoing to improve the safety and efficacy of the patches.

The pros of transdermal patches are even for drugs with shortest half-life, these patches aid continuous release of active pharmaceutical

ingredients (API) for longer time. Drug delivery through these patches overcomes the cons of administration of drugs through oral route (even for patients were administration of drugs, orally is not possible). Transdermal patches do not meet the first pass metabolism and gastrointestinal degradation and hence the bioavailability of drugs delivered through transdermal patches is high (approximately 90%). The development of transdermal patches is an evident process which requires very less equipment and materials in a lab scale. [3]

FIGURE-I: TRANSVERSE SECTION OF HUMAN SKIN



At the site of application of transdermal patches, there may be a possibility of local irritation and cause allergic reactions. The molecules required for formulation of transdermal patches should be less than 500 Da. Beyond the benefits of transdermal patches, these are the cons of transdermal patches. [3]

The important components of a transdermal patch are:

1. **Polymer Matrix:** It is the backbone of transdermal drug delivery system. It controls the rate of release of drug from the patches. Always a polymer should be non-reactive and non-toxic. It should be cost effective. On storage, it should not decompose. Examples for polymer include polyvinylchloride, hydriin rubber, gelatin, shellac, cellulose derivatives.
2. **Drug:** The drugs are extremely the attractive portion of the patches. The drugs which extensively undergo first pass metabolism, those have narrow therapeutic index and drugs with short half-life can be incorporated in the development of transdermal patches. [4]
3. **Permeation Enhancers:** They enhance the therapeutic action of drugs by increasing the permeability of drugs into the stratum corneum. These enhancers are of three types - lipophilic solvent, surface active agents and two component systems. Ex: DMSO
4. **Release liners:** they protect the patches during the times of storage.
5. **Backing Laminates:** These substances should have either low modulus or high flexibility. For instance, Vinyl polyethylene. [2]

The development of transdermal patches mostly involves use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) which are convenient and safer than its oral route of administration for the treatment of inflammation or pain. [6, 7, 8] It is proposed to combine, formulate and evaluate three drugs namely diclofenac, methyl salicylate and capsaicin in this project.

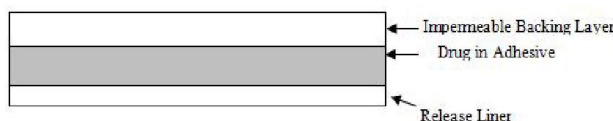
Diclofenac is a derivative of phenyl acetic acid which comes under the classification of NSAIDs. It is being used to treat pain and inflammation in conditions like osteoarthritis, rheumatoid arthritis, headache or mild migraine. It is also sometimes used to relieve the pain occurred during surgeries and trauma. Methyl salicylate is also a class of NSAIDs which provide local analgesic. It is mainly used for acute joint and muscular pain, and is also used as a rubefacient in deep heating liniments. A compound with analgesic properties extracted from chilli pepper is Capsaicin. It cures minor pain in muscles and joints produced due to arthritis, backaches, muscle stains, cramps and helps in increasing the blood flow. [2]

a. TYPES OF TRANSDERMAL PATCHES

i. Single-layer drug-in-adhesive

The drugs in this kind of transdermal patches are kept in the adhesive layer. The adhesive layer is also responsible for the release of drug rather than adhering the various layers of the patches together along the entire system to the skin. A temporary liner and a backing surround this adhesive.

FIGURE-II: DESIGN OF SINGLE-LAYER DRUG-IN-ADHESIVE TYPE

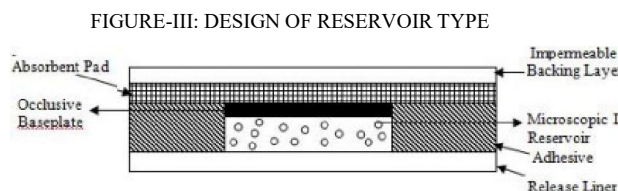


ii. Multi-layer Drug-in-Adhesive

Multi-layer Drug-in-Adhesive resembles the single-layer drug-in-adhesive such that in both cases the adhesive layer is responsible for the release of the active ingredient. One of the layer aids the immediate release of drug and the other one helps in controlled release of the drug from the reservoir. However this system is different as it adds an additional layer of drug-in-adhesive, usually separated by a membrane. It also has a permanent backing and a temporary liner-layer.

iii. Reservoir type

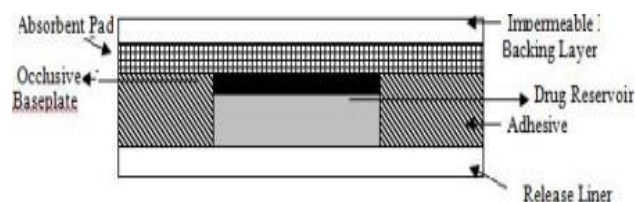
It is not like in the case of Single-layer drug-in-adhesive and Multi-layer Drug-in-Adhesive systems but reservoir transdermal system will have a separate layer for drug. The drug layer may be a drug solution or suspension contained in a liquid compartment which is separated by an adhesive layer. The rate of release of drug in reservoir type is a zero order reaction. And this patch also backed by backing layer.



iv. Matrix type

The matrix system is also known as monolithic device in which the drug solution or suspension contained in a layer of semi-solid matrix. The drug layer overlaying is partially surrounded by the adhesive layer.

FIGURE-IV: DESIGN OF MATRIX TYPE



v. Vapour patch

The adhesive layer releases the vapour in addition with adhering the various layers of the patches together. These kinds of patches are new to the market and especially essential oils are released for 6 hours into the systemic circulation through this kind of patches.

The major application of vapour patches includes decongestion mainly. Controller vapour patches which help in improving the sleep are also available in the market as vapour patches. For reducing the number of cigarettes one smokes in a month also vapour patches are available in the market. [21]

II. MATERIALS AND METHODS

a. Materials

The proposed transdermal Patches are developed by using diclofenac, methyl salicylate and capsaicin as active ingredients, chemicals such as polymers in particular ethyl cellulose, polyethylene glycol and solvents for instance, methanol.

b. Methods

Development of multi-component transdermal patches is an evident process which requires less equipment and materials in lab scale.

- 1) The active ingredients namely diclofenac, methyl salicylate and capsaicin are selected. The excipients like ethanol as solvent, polyethylene glycol as plasticizer and ethyl cellulose as binder are also selected.
- 2) The selected drugs and the excipients are dispersed uniformly in the solvent with continuous stirring.
- 3) Centrifuging this mixture allows to separate the particles based on their size and shape.
- 4) The resulting mixture is poured in a petridish which should be covered with inverted funnel.

- 5) The petri dish is kept undisturbed for a day (24 hours) in room temperature.
- 6) By slowly lifting the processed content from the petri dish, the transdermal patches are obtained. Then the transdermal patches are cut into the desired radius. [9, 10, 11]

FIGURE-V: FLOW SHEET FOR DEVELOPING TRANSDERMAL PATCHES

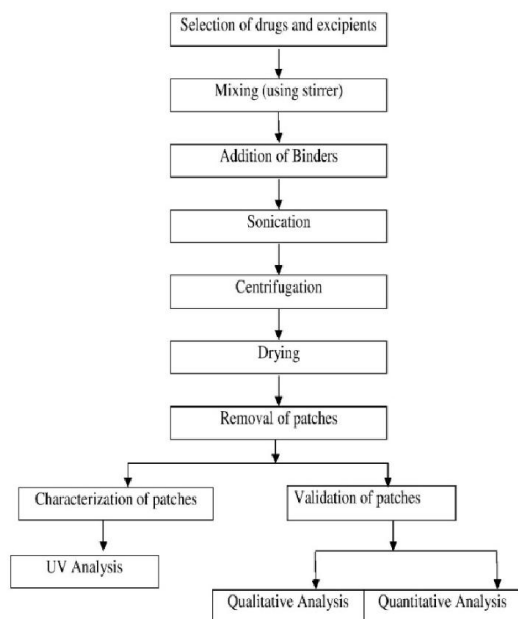


TABLE-I: FORMULATION DESIGN

INGREDIENTS	F1	F2	F3
Diclofenac (mg)	10	10	10
Ethyl Cellulose (mg)	200	300	400
Dibutyl Phthalate (ml)	1.2	1.2	1.2
Poly Ethylene Glycol 400 (mg)	1.2	1.2	1.2
Chloroform:Methanol (ml)	1:4	1:4	1:4

Table-1 gives the values of concentration for the formulation of the patches. The concentration of the polymer used that is Ethyl Cellulose is increased from the previous formulations. But the concentrations of other ingredients such as active ingredients (diclofenac, methyl salicylate and capsaicin), Poly Ethylene Glycol and Ethanol are kept constant.

III. VALIDATION OF THE FORMULATED PATCHES

a. Thickness of the patches

The thickness of obtained patches is measured using a screw gauge in different positions of a patch and the average is calculated. [8, 12]

b. Weight Uniformity Test

Patches obtained are cut into size of 2 cm radius. The weight variation is calculated by taking the weights of five patches. [13]

c. Folding Endurance

A strip of size 2 cm is cut from an obtained patch evenly and folded repeatedly at a same place till it breaks. Then value of folding endurance can be the number of times the patches were folded at a same place without breaking. [14, 15]

d. Percentage Moisture Content

The formulated patches are weighed individually and they are to be kept in desiccators containing fused calcium chloride at room temperature for about 24 hours. After a time period of 24 hours, the patches are then reweighed and the % moisture content can be determined using the following formula. [16, 17]

$$\% \text{ Moisture Content} = \frac{\text{Initial Weight} - \text{Final Weight}}{\text{Final Weight}} \times 100$$

e. Percentage Moisture Uptake

The weighed films are to be kept in the desiccators for 24 hours at room temperature. Then these patches are exposed to 84% RH (Relative Humidity) by keeping a saturated solution of potassium chloride in desiccators until a constant weight is obtained. % moisture uptake is calculated by [18, 19]

$$\% \text{ Moisture Uptake} = \frac{\text{Final Weight} - \text{Initial Weight}}{\text{Initial Weight}} \times 100$$

f. Drug content

A particular area of a random patch is dissolved in a phosphate buffer and it is allowed to dissolve. Then it is transferred to a volumetric flask. The drug content is determined using the absorbance value at 285nm. [20]

Table-2 shows the characteristic properties of transdermal patches that are validated for its accuracy. [5]

TABLE-II: PROPERTIES OF PATCHES

Properties	Range
Patch size	Less than 40 cm ²

Dose frequency	Once in a day to once in a week
Appearance	Clear or white in colour
Skin reactions	Non-irritating
Release	Consistent pharmacodynamic and pharmacokinetic profile over a period of time

IV. RESULTS AND DISCUSSION

The Table-2 shows the values of concentration ($\mu\text{g/ml}$) and its corresponding absorbance to plot a standard curve for the combination of drugs. The spectrum of UV is analysed using UV/Vis Spectroscopy and the maximum wavelength is at 267 nm at pH 5.8.

TABLE-III: PREPARATION OF STANDARD CURVE FOR DICLOFENAC SODIUM

CONCENTRATION ($\mu\text{g/ml}$)	ABSORBANCE
2	0.001
4	0.039
6	0.099
8	0.178
10	0.247

FIGURE-VI: STANDARD CURVE FOR DICLOFENAC SODIUM

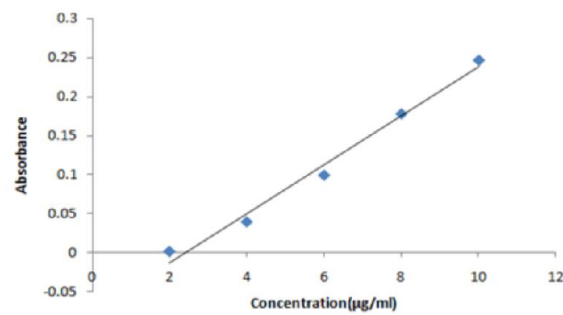


TABLE-IV: EVALUATION OF DICLOFENAC SODIUM TRANSDERMAL PATCHES

FORMULATION CODE	THICKNESS	WEIGHT UNIFORMITY	FOLDING ENDURANCE
F1	0.512 \pm 0.03	0.298 \pm 0.02	120.0 \pm 2.6
F2	0.514 \pm 0.06	0.354 \pm 0.05	112.0 \pm 2.7
F3	0.518 \pm 0.06	0.402 \pm 0.02	99.0 \pm 2.6

TABLE-V: EVALUATION OF DICLOFENAC SODIUM TRANSDERMAL PATCHES

FORMULATION CODE	% MOISTURE CONTENT	% MOISTURE UPTAKE	DRUG CONTENT
F1	6.16 \pm 0.12	5.85 \pm 0.22	80.64 \pm 0.25
F2	5.25 \pm 0.23	4.83 \pm 0.26	74.18 \pm 0.32
F3	4.22 \pm 0.66	4.65 \pm 0.45	68.43 \pm 0.50

The data from the Table-4 and Table-5 shows the observations of validated parameters namely thickness of patches, weight uniformity, folding endurance, % moisture content, % moisture uptake and drug content. From these two tables, it can be inferred that the increase in the concentration of polymer increases the thickness of patches, weight uniformity and folding endurance whereas the % moisture content, % moisture uptake and drug content decreases.

V. CONCLUSION

Hence, from reference article, it can be concluded that the concentration of the polymer (ethyl cellulose) can be reduced to increase the drug content which will in turn increase the drug release from the patches for a prolonged period of time. These patches can be used to improve the delivery less soluble drugs. Multi-component transdermal patches can be used for treating multiple analgesic complications simultaneously.

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EXTRACTION AND CHARACTERIZATION OF BIOACTIVE COMPOUNDS FROM THE *DALBERGIA LATIFOLIA* LEAF EXTRACT

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Abstract—*Dalbergia latifolia* is a traditional herbal plant and it is belonging to the fabaceae family. The genus of *dalbergia latifolia* consists of 300 species all over the world and about 25 species occurs in India. It contains a latinone and dalcridain flavonoid having excellence medicinal value. Traditionally various species are reported to be used as aphrodisiac, abortifacient, expectorant, anthelmintic, antipyretic, appetizer, allays thirst, vomiting, burning sensation, cure skin diseases, ulcers Ayurvedic practice, bark is used as leucoderma, leprosy edema and bladder disorder. The bark minerals, acids, phenolic compounds, flavonoids, have characteristic smell astringent taste. The intended search for biologically active compound from the natural source has always been a great interest to looking for new drugs useful in infectious disease. Diabetes and arthritis is one of the most medical challenges in all over the world. Diabetes is the multi-organ diseases affecting the pancreas, liver, muscles, kidney, and central nervous system and several complications such as hypertension, stroke, blindness, and kidney disease are associated with diabetes. In this present study reviews the extraction, screening of phytochemicals and screening of bioassays such as anti-diabetic, anti-oxidant and anti-arthritic activity of *dalbergia latifolia* leaf extract.

Keywords— *Dalbergia latifolia*, Extraction, Anti-diabetic activity, Anti-oxidant activity

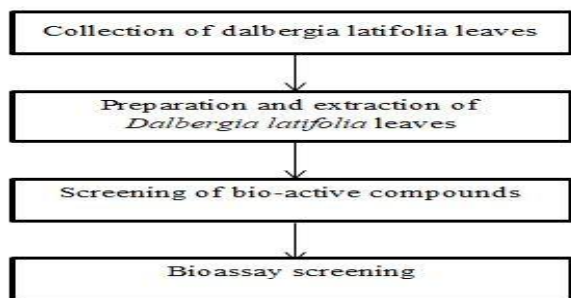
I. INTRODUCTION

Herbal medicine becomes an integral part of the primary care system [1]. It has gained importance as an alternative source to synthetic chemical drugs by adverting their side effects. Throughout the human history, herbs have been used in food, cosmetics and fragrances and it also used as a source of traditional medicines for the treatment of various illnesses and curing the diseases [2]. The medicinal value of the plant can be evaluated and it depends on the biologically active constituents and the amounts of these constituents. The herbal medicine has been prepared by the following methods such as extraction, fractionation, purification, concentration and physical or biological processes which can be defined by the WHO (World Health Organization)

[3]. Extraction methods are the important first step to isolate the medicinally active portions of plant constituents from the inactive components. Fresh or dried plant materials can be used for the extraction of secondary metabolites. The Phytochemicals are the bio active substances which has been present in parts of the plant such as leaves, roots, stem and barks. The phytochemicals are the defense mechanism that protects us from the various diseases. They have a defense mechanism that protects us from various diseases. Hence the medicinal and pharmaceuticals properties, the secondary metabolites in the plants have been investigated [4]. Those secondary metabolites are responsible for biological activities such as anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, anti- bacterial and anti-cancerous activities of the plant. The natural products are derived mainly derived from plants have been given lot of attention with the potential of novel treatment efficacy [5]. The present study reviews of preliminary screening, presence of the phytochemicals and evaluations of anti-diabetic, anti-oxidant and anti-arthritic activity of *dalbergia latifolia* leaf extract.

Dalbergia latifolia is a tree belonging to the family Fabaceae. The genus *Dalbergia* is known for trees which yields timber. However, many species of fabaceae are proven to have the medicinal uses. *Dalbergia latifolia* possesses antioxidant and anti-diabetic activity [6]. A qualitative analysis has been carried out to determine different chemical constituents of *Dalbergia latifolia* [7]. A number of steroids and flavonoids have been isolated from the plant [8]. It is distributed in Bihar, Bundelkhand and Central India. Its seeds contain dalbinol a new 12a-hydroxyrotenoid, sisafolin coumarin. Bark contains β -sitosterol; also contain dalbergichromene, lupeol, latifolin and dalbergin. Heartwood contains latinone, neo flavonoid dalcridon and Latinone, a substituted phenanthrene-1, 4-quinone. Ethanomedicinally, the stem barks contain tannin is used for treatment of leprosy, obesity and worm [9].

II. METHODOLOGY



A. Collection and extraction

The leaves of *dalbergia latifolia* can be collected and shade dried at room temperature. After the leaves can be dried and it converted into coarse powder. Then the leaves of *dalbergia latifolia* technique can be extracted using maceration technique. The coarsely powdered crude drug is placed in a stoppered container with the methanol as a solvent and allowed to stand at room temperature for period of 7 days. The mixture can be agitated until the soluble matter is dissolved. The mixture is then strained and the flasks are covered with aluminum foil to avoid light exposure and methanol evaporation. Obtained extracts are filtered through a cellulose filter and reconstituted filtrates are properly diluted with solvent to the required concentrations [10].

III. PHYTOCHEMICAL SCREENING

Preliminary phytochemical analysis was carried out for the ethanol extracts *Dalbergia latifolia* as per standard methods described by Brain and Turner 1975 and Evans 1996 [11].

A. Qualitative analysis

1) Detection of alkaloids

Extracts are dissolved individually in dilute hydrochloric acid and filtered. The filtrate is used to test the presence of alkaloids.

a) *Mayer's test*: Filtrates were treated with Mayer's reagent. It forms the yellow cream precipitate which indicates the presence of alkaloids.

b) *Wagner's test*: Filtrates were treated with Wagner's reagent. The formation of brown/ reddish brown precipitate indicates the presence of alkaloids.

2) Detection of Flavonoids

a) *Lead acetate test*: Leaf extracts are treated with few drops of lead acetate solution. It forms a yellow color precipitate which indicates the presence of flavonoids.

b) *H₂SO₄ test*: Leaf extracts are treated with few drops of H₂SO₄. It forms the orange color which indicates the presence of flavonoids.

3) Detection of Steroids Liebermann

a) *Burchard test*: Acetic anhydride is added to the leaf extracts of *dalbergia latifolia* each with H₂SO₄. The color

changed from violet to blue or green in some samples indicate the presence of steroid.

4) Detection of Terpenoids

a) *Salkowski's test*: The leaf extract of the whole plant sample is mixed with chloroform and concentrated H₂SO₄ is carefully added to form a layer. A reddish-brown coloration of the inner face was indicating the presence of terpenoids.

5) Detection of Anthroquinones Borntrager's test

The leaf extract is boiled with HCl for a few minutes in a water bath. It was filtered and allowed to cool. An equal volume of CHCl₃ is added to the filtrate. A few drops of NH₃ are added to the mixture and heated. The formation of pink color indicates the presence of anthraquinones.

6) Detection of Phenols

a) *Ferric chloride test*: Extracts are treated with a few drops of ferric chloride solution. The formation of bluish-black color indicates the presence of phenol.

b) *Lead acetate test*: Extract is treated with a few drops of lead acetate solution. The formation of a yellow color precipitate indicates the presence of phenol.

7) Detection of Saponins

a) *Froth test*: The extract is shaken with distilled water. It forms the frothing which shows the presence of saponins. It is appearance in the form of creamy.

8) Detection of Tannins

a) *Ferric chloride test*: A small quantity of extract is mixed with water and heated on a water bath. The mixture is filtered and ferric chloride is added to the filtrate. It forms a dark green color which indicates the presence of tannins.

9) Detection of Carbohydrates

a) *Fehling's test*: Filtrate is boiled on a water bath with each of Fehling solutions A and B. It forms a red precipitate which indicates the presence of sugar.

Fehling's solution A: Copper sulfate is dissolved in distilled water.

Fehling's solution B: Potassium sodium tartrate and sodium hydroxide is dissolved in water.

10) Detection of Oils and Resins

a) *Spot test*: Test solution is applied on filter paper. It forms the transparent appearance on the filter paper which indicates the presence of oils and resins.

B. Quantitative analysis

1) Estimation of Alkaloids

The determination of alkaloid can be done by harbore (1973) method. The *dalbergia latifolia* sample is weighed and acetic acid in ethanol is added and covered. This is filtered and extract concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide is added drop wise to the extract until the precipitation is complete. The whole solution is allowed to

settle. The precipitated solution is collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which are dried and weighed.

2) Estimation of Flavonoids

The stock solution is taken in a test tube and added few drops of dilute NaOH solution. An intense yellow color is appeared in the test tube. It became colorless when on addition of a few drop of dilute acid that indicated the presence of flavonoids [12].

3) Estimation of Total phenols

To determine the total phenols, the plant sample is weighed in a titration flask and n-hexane is added twice. The filtrates are discarded for fat free sample preparation. Then, diethyl ether is added twice, are heated and it is cooled up to room temperature and filtered into a separating funnel. Then the NaOH solution is added twice and shook well each time to separate the aqueous layer from the organic layer. It is washed three times with de-ionized water. The total aqueous layer is acidified by adding HCl solution and dichloromethane (DCM) twice to acidify the aqueous layer in the separating flask. Consequently, the organic layer is collected, dried and then weighed [13].

IV. BIO ASSAY SCREENING

A. Anti-oxidant activity

1) 1, 1-Diphenyl-2-picryl-hydrazyl (DPPH) assay

It is the discoloration assay and it is based on the measurement of the scavenging ability of an antioxidant using the stable DPPH free radical. In ethanol, the free radical DPPH is purple in color and it changes into yellow in color when it reduced into the hydrazine. Thus it can neutralize the free radical form and it gives rise to the non-radical form. The effect of anti-oxidants on DPPH is depends on ability to donate the hydrogen bonding. It is evaluated by the addition the anti-oxidants in DPPH solution in ethanol and decreased absorbance can be measured [14].

$$\text{Percentage of inhibition activity} = [(A_0 - A_1) / A_0] \times 100$$

Where,

A is the absorbance of the control

A₁ is the absorbance in the presence of the extract

2) Reducing power assay

It is based on the reductive activity of dalbergia latifolia leaf extract. It is measured by the transformation of ferric ion (Fe³⁺) into ferrous ion (Fe²⁺) [24]. Various concentration of the dalbergia latifolia leaf extract can be mixed with phosphate buffer and potassium ferric cyanide. The mixture can be incubated and it is followed by the addition of ticholoroacetic acid. The mixture is centrifuged and the upper layer of the solution can be collected. The mixture is then mixed with the distilled water and fresh ferric chloride. After the reaction the absorbance can be measured. The higher absorbance attains a higher reducing power [15].

B. Anti-diabetic activity

1) α-amylase inhibition assay

It is the modified method of McCue and shetty [16]. Different concentrations of dalbergia latifolia leaf extract and standard acarbose is prepared in dimethyl sulfoxide from the stock solution. Each extract and the standard are added to α-amylase solution. The solution is incubated at room temperature. Then the starch solution is added and incubated. Then the cooling agent dinitrosalicylic acid is added to the reaction mixture and heated in boiling water bath. After cooling the reaction mixture it is dilute with distilled water. The absorbance can be measured using the double beam uv-vis spectrophotometer. The percentage enzyme inhibition activity of the standard is calculated as follows:

$$\text{Percentage of inhibition activity} =$$

$$\left[\frac{(A_{co} - A_t)}{A_t} \right] \times 100$$

Where,

A_{co} is the absorbance of the control

A_t is the absorbance of the samples tested

2) α-glycosidase inhibition assay

It is the modified method of kim et al [17]. The substrate solution of p-nitrophenyl glucopyranoside is prepared in the presence of phosphate buffer. It is preincubated with different concentrations of the extracts. Then the substrate of p-nitrophenyl glucopyranoside is dissolved in phosphate buffer to start the reaction. The reaction mixture is incubated and stopped by adding sodium carbonate. The determination of α-glycosidase activity is determined by measuring the yellow colored paranitrophenol released from p-nitrophenyl glucopyranoside. It is expressed as the percentage of blank control. The percentage of inhibition activity is calculated as follows:

$$\text{Percentage of inhibition activity} =$$

$$\left[\frac{(Abs_{control} - Abs_{extract})}{Abs_{control}} \right] \times 100$$

C. Anti-arthritis activity

1) Inhibition of protein denaturation assay

In this assay, the biological protein molecules can be denatured [18]. The reaction mixture consists of bovine serum which is in aqueous solution and dalbergia latifolia leaf extract. The pH of the reaction mixture is adjusted using the hydrochloric acid. The samples of dalbergia latifolia can be incubated and heated. The addition of phosphate buffer saline is added in each test tube, after cooling the samples. Finally, the turbidity has to be measured spectrophotometrically. The percentage inhibition activity of protein denaturation is calculated as follows:

Percentage of inhibition activity =

$$100 - \frac{(O.D. \text{ of test} - O.D. \text{ of product control})}{O.D. \text{ of control}} \times 100$$

V. RESULT AND DISCUSSION

The barks of *dalbergia latifolia* attain a potent phytochemicals such as alkaloids, flavonoids, phenols, steroids, terpenoids and saponins with the reference standard as given in the following table.

TABLE I. QUALITATIVE CHEMICAL ANALYSIS OF DALBERGIA LATIFOLIA BARK EXTRACT

S. N o.	Test	Chloroform Extract	Ethyl acetate Extract	Alcoholic Extract	Aqueous Extract
1	Carbohydrate	-	-	+	+
2	Glycoside			+	+
3	Alkaloid	-	-	-	-
4	Protein			+	-
5	Tannin	-	-	-	-
6	Flavonoid	-	-	+	+

The barks of *dalbergia latifolia* attain a potent anti-oxidant activity with the reference standard as given in the following figure.

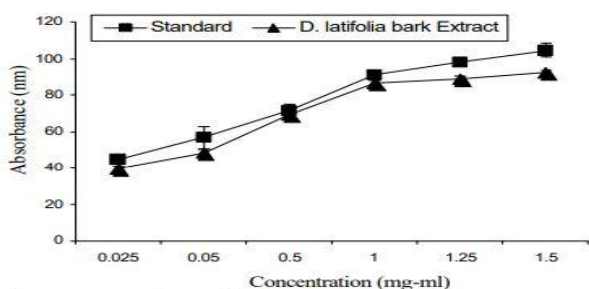


Fig. 1. DPPH free radical scavenging activity of *dalbergia latifolia* bark extract

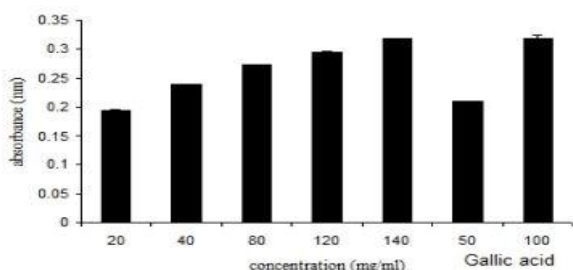


Fig. 2. Reducing power assay of *dalbergia latifolia* bark extract

VI. CONCLUSION

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Plant derived constituents have been recognized based on the presence of various biological properties. The method of extraction and characterization determine the biological properties of bioactive substance. Several workers studied the presence of phytoconstituents in the *Dalbergia* species to correlate the biological activity. In this present study it is found that the *D. latifolia* bark have minerals, organic acids, flavonoids and a phenolic compound which has been found to possess antioxidant, mast cells stabilizing effects. The constituents of this plant have a tremendous impact on the health care system and may provide medical health benefits including the prevention and or treatment of diseases. Polyphenols traditionally have been considered to possess an anti-nutrient effect. The repeated positive effects of attaining the anti-oxidant, anti-diabetic and anti-arthritic activity in comparison with reference standard. With reference to the study methanolic extracts of *dalbergia latifolia* leaf extracts will be evaluated for the anti-oxidant, anti-diabetic and anti-arthritic activity. So the isolation of bioactive constituents from this plant source can be used for the drug discovery.

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FORMULATION AND IN-VITRO EVALUATION OF POLYMERIC NANOPARTICLES OF ANTI-EMETIC DRUG PROCHLORPERAZINE

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Abstract — Prochlorperazine, also known as compazine is a phenothiazine piperazine and a first-generation antipsychotic or antiemetic used to treat severe nausea and vomiting. the mean oral bioavailability was approx. 12.5%. The terminal elimination half-life was 9 hours in each case. HPMC was used as the rate regulating polymer. The effects of adding HPMC on dissolution in vitro were studied. Nanoparticles with different polymer ratios were formulated, the active ingredient was released in vitro. ” With USP type II at 50 rpm in 900 ml acidic dissolution medium (pH 1.2) for 2 hours, followed by 900 ml medium alkaline dissolution (pH 7.4) for 12 hours The mean dissolution time is used to characterize the rate of release of the drug from a dosage form. Different kinetic models have been applied to dissolution profiles to identify the kinetics of release of drug. Excipients are selected via FTIR studies. Finally, the nanoparticles were evaluated for various properties such as loading efficiency, percentage yield, particle size and in vitro release over hours. The nanoparticles were found to be discrete, spherical and freely flowing. The nanoparticles were of uniform size and loading efficiency. It was in the range value. The surface morphology of the produced prochlorperazine nanoparticles was observed under a scanning electron microscope, the nanoparticles will have a good spherical geometry, the stability study was carried out, and the RH study was carried out.

Keywords—Prochlorperazine, nanoparticle, anti-emetic, dissolution, zeta-potential.

I. INTRODUCTION

The oral route of drug delivery is because of its considerable therapeutic advantages, such as: however, this approach has several physiological problems such as the inability to constrain and localize the controlled drug delivery system within the desired area of the gastrointestinal

tract due to variable gastric emptying and motility. [1] The oral route of drug delivery is the most convenient and widely used method of drug delivery because of its considerable therapeutic benefits, such as: Oral administration of drugs is considered to be the most natural, easiest, most convenient and safest method. Since almost a third of drugs are poorly soluble in water, oral bioavailability of these drugs could be a problem.

Nanotechnology has been introduced to various aspects of food science, including applications and delivery systems, which offers multiple benefits such as: as well as protecting the encapsulated bioactive compounds from interactions with other nutritional components and maximizing the absorption of the encapsulated compounds at the time of ingestion and their transport to the sites of action. [4]. Controlled release formulations of pharmacologically active substances using biodegradable polymers as carriers offer interesting options for convenient and stable drug formulations [5-10].

Prochlorperazine is a first generation antipsychotic. FDA guidelines include schizophrenia, schizoaffective, and other conditions associated with symptoms of psychosis, as well as nausea and vomiting (after chemotherapy, after radiation, pre- and post-operative environment, and other medical conditions). Prochlorperazine mainly blocks dopamine D2 receptors in the brain. It can also block histamine, cholinergic, and noradrenergic receptors. [11] One study found that prochlorperazine also inhibits the P2X7 receptor in human macrophages, but not in mouse cells, thus preventing the entry of calcium ions. [12] This mechanism was independent of dopamine antagonism.

Nanoprecipitation is a technique patented by [13] for the incorporation of active molecules into colloidal drug delivery systems, which draws attention to the development of pharmaceutical products mainly due to the simplicity of its

process [14]. The particles obtained make it possible to optimize the therapeutic performance of the drug in the live phase, which is to the various body tissues. As a result, less toxicity and minor side effects are expected.

The aim of the present study was to formulate antiemetic prochlorperazine nanoparticles to deliver the drug at a controlled rate at its absorption site so that its oral bioavailability can be improved.

II. MATERIALS & METHODS

A. Materials

Obtained a sample of prochlorperazine; Polymers and biopolymers such as ethyl cellulose, HPMC, chitosan and gelatin are collected.

B. Drug profile

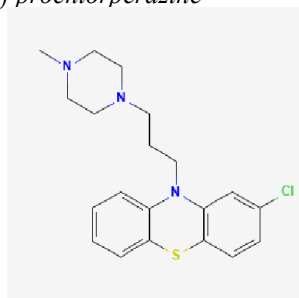
1) Chemical name

2-chloro-10- [3-(4-methyl-1-piperazinyl)propyl]-10 H-phenothiazine (Z)-2-butenedioate

2) Systemic (IUPAC) formula

$C_{20}H_{24}ClN_3S$

3) Structure of prochlorperazine



4) Bio-availability

Its' bioavailability with healthy subjects is 12.5%

5) Half-life

8 - 9 Hours

6) Metabolism

Prochlorperazine primarily enters the hepatic metabolism

C. Methods

Nanoparticles were produced using the slightly modified nanoprecipitation method [15]. Briefly, 200 mg of polymer (HPMC, ethyl cellulose, chitosan, alginate) were separately dissolved in 25 ml of acetone. 100 mg of prochlorperazine are dissolved in 2 ml of dimethyl sulfoxide, the two solutions are mixed and then 50 ml of water are added and the mixture is stirred for half an hour, the acetone is evaporated and the final volume of the suspension is increased to 10.

Then this suspension is centrifuged for half an hour at 15,000 rpm at 4 degrees Celsius, the supernatant is discarded and the precipitate is washed three times with distilled water, the nanoparticles thus obtained were dried overnight in an oven at 60 degrees Celsius and stored in the desiccator.

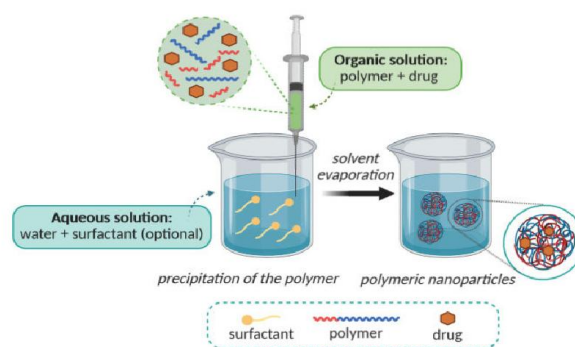


Fig. 1. Diagrammatic representation nanoprecipitation method

The formulations produced were characterized by loading efficiency, entrapment efficiency, particle size, particle size distribution (PSD), polydispersity index, zeta potential, dissolution test and compatibility studies of drug carriers.

III. CHARACTERIZATION OF DRUG LOADED PROCHLORPERAZINE NANOPARTICLES

A. Loading efficiency

The amount of active ingredient encapsulated in the polymeric nanoparticles was determined by HPLC at 215 nm [16-17]. The prochlorperazine approach was encapsulated in the polymeric nanoparticles. Among other properties, the influence of the drug delivery-to-polymer ratio and the polymer composition on the loading efficiency of the resulting carriers was carefully evaluated. The active ingredient content in the preparation was determined by extracting the active ingredient from the nanoparticles with 0.1 M hydrochloric acid. In this method, the nanoparticles (50 mg) were stirred in 50 ml 0.1 M hydrochloric acid until they dissolved. It was filtered through a Millipore filter and the active ingredient content was determined by UV spectrophotometry after suitable dilution at 254 nm. The loading efficiency (L) of the nanoparticles was calculated according to equation 1

$$L (\%) = (Q_n / W_n) \times 100 \quad (1)$$

Where, W_n is the weight of the nanoparticles and

Q_n is the amount of drug present in the nanoparticles.

B. Entrapment efficiency

The drug entrapment efficiency of the microspheres was also improved by changing the concentration of drug and polymer in the internal phase to the highest concentration. This may be due to the increased viscosity of the internal phase, which reduces migration. The active ingredient molecules in the aqueous phase. [18]

To determine the inclusion of the active substance, the amount of active substance (w) present in the clear supernatant after centrifugation was determined with a UV spectrophotometer at 254 nm. For this purpose a standard calibration curve of the drug was established. subtracted from the total amount of drug added during preparation (W). In fact, (W-w) indicates the amount of drug trapped in the particles.

The percentage of inclusion of a drug was then calculated according to Equation 2

$$\% \text{ Drug Entrapment} = (W-w/W) \times 100 \quad \text{--- (2)}$$

C. Particle Size, Particle Size Distribution, and Zeta Potential

Particle size and particle The size distribution of the formulation was determined by photo correlation spectroscopy with a Zeta-master equipped. Each sample was diluted with distilled water. The surface charge (zeta potential) was determined by measuring the electrophoretic mobility of the nanoparticles using a Malvern Zeta meter. Samples were prepared by diluting with distilled water.

D. Polydispersity index

The polydispersity index is a parameter for determining the particle size distribution of the nanoparticles from the spectroscopic analysis of the photon correlation; it is a dimensionless number extrapolated from the autocorrelation function and ranges from a value of 0.01 for monodisperse particles to values of 0.50.7 Samples with a very broad size distribution have polydispersity index values > 0.7.

E. Drug excipient and compatibility studies

The drug excipient Compatibility Studies were performed using an FTIR spectrophotometer. The FTIR spectra of drugs, polymers and formulations were analyzed separately and then correlated for incompatibility.

F. In vitro dissolution studies

Dissolution tests are required for all solid oral dosage forms which is for Zeta meter product release and stability tests at all stages of development. It is an important analytical test used to detect physical changes in an active pharmaceutical ingredient (API) and in the formulated product.[19].

The dissolution profiles of the prochlorperazine microspheres were examined with a Type II paddle dissector with the paddle speed set at 50 and the bath temperature maintained at $37.0 \pm 0.5^\circ \text{C}$. 100% of the drug preparation was filled into the empty capsule. The capsule was placed in the container containing 900 ml of HCl buffer pH 1.2 for 2 hours, followed by an alkaline solution medium-phosphate buffer pH 7.4 for 10 hours. They were used. At certain intervals, aliquoted 5 ml samples of the dissolution medium were taken and the sample was filtered with the UV-Visible spectrophotometer. The absorbance of the sample solution compared to the standard solution with a known concentration of prochlorperazine.

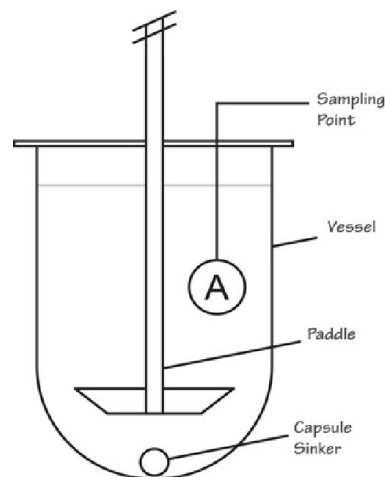


Fig. 2. Diagrammatic representation of dissolution test

The in vitro release rates of tablets were determined using the USP XXIII basket apparatus at 150 rpm and a temperature of $37 \pm 0.5^\circ \text{C}$. The release test was carried out in 900 ml of simulated gastric fluid (pH 1.2). 5 ml were removed at different time intervals, filtered through a $0.8 \mu\text{m}$ filter and examined by the HPLC method. The extracted volume was replaced with an equal volume of preheated medium (37°C). Six tablets of each formulation were used in the dissolution test. [20]

G. Percentage yield:

The microspheres made from all batches were accurately weighed. The measured weight of the microspheres produced was divided by the total amount of all excipients and drug used in making the microspheres to give the total percent yield of microspheres.

It was calculated by using following equation;

$$(\%) = \frac{\text{Actual weight of product}}{\text{Total weight of excipients and drug}}$$

IV. RESULT AND DISCUSSION

The nanoprecipitation method was used to avoid both chlorinated solvents and surfactants to prevent their toxic effects on the body. All determinations will be carried out.

A. Drug loading and entrapment efficiency

Although the active ingredient loading expresses the weight percentage of the encapsulated active ingredient to the weight of the nanoparticles, the containment efficiency is the ratio between the experimentally determined percentage of the active ingredient content and the actual or theoretical mass of the drug used to manufacture the nanoparticles.

The loading efficiency depends on the polymer-drug combination and the method used. Hydrophobic polymers encapsulate greater amounts of hydrophobic drugs, while hydrophilic polymers include greater amounts of more hydrophilic drugs. Various formulation parameters such as

emulsifier type, weight ratio of polymer to drug and ratio of organic to aqueous phase influence the degree of drug loading.

B. Particle Size Distribution and Polydispersity Index

The particle size and particle size distribution are critical factors in nanoparticle performance because batches with a broad particle size distribution have significant variations in drug loading, drug release, bioavailability, and potency. The distribution can be determined by light scattering techniques and by scanning or transmission electron microscopy. Increasing the particle size will decrease absorption and possibly affect the bioavailability of the drug.

The degree of endocytosis depends on the type of target cell. If the larger particle size and the higher polydispersity index are due to the lack of emulsifier, since the use of emulsifier lowers the surface tension between the organic phase, the acetone and the aqueous phase and leads to the formation of solvent droplets, in turn, causes a reduction in the particle size. It also stabilizes newly created surfaces and prevents particle aggregation, as reported by previous researchers. Therefore, the results to be achieved in this study will be improved by using a higher drug to polymer ratio by using different formulation strategies such as desolvation (for gelatin and albumin). or counter ion induced aggregation (for chitosan and sodium alginate) using a crosslinking agent followed by a cysteine neutralizing residual crosslinking agent and stirring at high speed.

B. Drug – excipient compatibility study

These studies are then sought in order to identify significant drug interactions with the degradation of excipients / drugs and are based on standard protocols and / on existing knowledge about the degradation pathways of drugs. Compatibility studies for new chemical substances are always carried out on the basis of existing chemical information. of an active ingredient candidate to identify possible degradation pathways.

Solid dosage forms actually have a low stability compared to their active ingredient. Excipients or reactive impurities in excipients can interact with drugs and often catalyse the breakdown of susceptible active ingredients of the drug with auxiliaries or other active ingredients that cause changes in the chemical, physical and therapeutic properties of the dosage form are referred to as incompatibilities. Drug interactions that occur during formulation or storage can be classified as physical or chemical interactions.

From the IR data it is clear that functionalities of drug have remained unchanged, including intensities of the peak. This suggests that during the process of formulation polymer has not reacted with the drug to give rise to reactant products. So it is only physical mixture and there is no interaction between them which is in favour to proceed for formulation.

C. Zeta potential

The zeta-potential is used in colloid chemistry for observing the behaviour of dispersive systems in liquids. Besides, the zeta-potential characterizes the electrical double

layer on the solid liquid interface, a fact very important in flotation and flocculation processes [21].

The measurement of the zeta potential enables the storage stability of colloidal dispersions to be predicted. In general, charged particle aggregation (i.e., high zeta potential) is less likely to occur due to electrical repulsion. or negative values) lead to more stable nano capsule suspensions, as the repulsion between the particles prevents their aggregation.

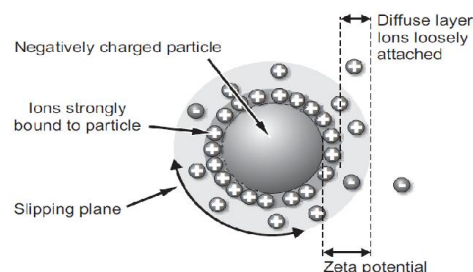


Fig. 3. Diagrammatic representation of Zeta potential of polymeric nanoparticle loaded drug

A decrease in the zeta potential, i.e. electrostatic repulsion, was considered to be the cause of the aggregation process. Its distribution in the body and the degree of uptake by the cells, Since cell membranes are negatively charged, there is a greater electrostatic affinity for positively charged nanoparticles.

Therefore, the surface of the cationic or neutral nanoparticles can be modified to impart a positive charge to improve efficiency. The zeta potential values were in the range of -24.3 ± 25.9 mV, which indicates that the colloidal suspension may not be stable and can lead to aggregation, composition of the polymer and nanoparticle surface, presence or absence of Adsorption. Compounds, composition of the dispersant phase, mainly ionic strength, and pH.

V. CONCLUSION

To conclude that, from the above of the review articles, it is expected that the formulation of prochlorperazine will show a satisfactory result, by evaluating invitro criteria's of the drug like loading efficiency, entrapment efficiency, drug-excipient compatibility studies and also the in-vitro dissolution of drug release as per the specifications.

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FORMULATION AND IN-VITRO EVALUATION OF OSMATIC DRUG DELIVERY SYSTEM OF ACEBUTOLOL

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Abstract: The drug delivery systems are used to supply the healing agent to the chosen target. Because drug release from these systems are loose from pH and different frame parameters on a huge scale and it's far feasible to quantify the release traits with the aid of using enhancing drug properties and system. Patient compliance is once more compromised with the extended frequency of administration. Therefore, the call for has extended for managed transport structures which could acquire particularly regular blood concentrations of drug over a extended length of time. The term controlled release consists of modulated launch structures in addition to zero order release systems. The crucial milestone in oral drug delivery system improvement exist whilst the OSMOTIC DRUG DELIVERY SYSTEM (ODDS) changed into discovered, a brand new and incredibly versatile system. These structures offer real therapeutic control despite now no longer imparting constant drug concentrations. Although now no longer all tablets to be had for treating special sicknesses require such particular launch rates, once-every day. Formulations primarily based totally osmotic concepts are gambling an increasing number of important position in enhancing affected person compliance. Therefore, maximum of the presently advertised products are primarily based totally on tablets utilized in long-time period treatment plans for diabetes, hypertension, attention-deficit disorder, and different persistent disorder states. Besides oral osmotic transport structures, implants that work on osmotic principles are promising for transport of a huge form of molecules with a particular rate over a long period of time.

Keywords—*Acebutolol, osmosis, controlled drug delivery system, osmotic pressure, osmogenes, osmotic pump.*

I. INTRODUCTION

Oral drug delivery is the maximum favored and convenient choice because the oral course offers most active surface area amongst all drug transport device for administration of various drugs. In traditional oral drug transport systems, there's very little control over release of the drug and powerful attention on the target site may be

Finished with the aid of using irregular administration of excessive doses. Uncontrolled fast release of drug may also cause local gastro intestinal or systemic toxicity. Oral osmotic-ally controlled release (CR) delivery systems make the most osmotic pressure for controlled delivery of energetic agents. The key distinguishing function of osmotic drug delivery systems (in comparison with different technology used in controlled-release formulations) is that they release drug at a rate this is independent of the pH and hydrodynamics of the external dissolution medium. The end

result is a strong dosage form for which the in-vivo rate of drug release is comparable to the in-vitro rate, generating an extremely good in-vitro/in-vivo correlation. Another key benefit of the present osmotic systems is that they are applicable to drugs with a large range of aqueous solubility.

II. MATERIALS

A. Semipermeable membrane

Since the membrane in osmotic systems is semipermeable in nature, any polymer this is permeable to water however impermeable to solute may be selected. Cellulose acetate is a usually hired semipermeable polymer for the guidance of osmotic pumps. Apart from cellulose derivatives, a few different polymers together with agar acetate, amylose triacetate, betaglucan acetate, poly(vinyl methyl) ether copolymers, poly(orthoesters), poly acetyls and selectively permeable poly(glycolic acid), poly(lactic acid) derivatives, it could be used as semipermeable film-forming materials. The permeability is the crucial standards for the choice of semipermeable polymers

B. Hydrophilic and Hydrophobic Polymers

The notably water soluble compounds may be co entrapped in hydrophobic matrices and reasonably water soluble compounds may be co entrapped in hydrophilic matrices to attain extra managed release. Generally, combinations of each hydrophilic and hydrophobic polymers were used with inside the improvement of osmotic pumps of water-soluble drugs. The choice is primarily based totally at the solubility of the drug in addition to the quantity and rate of drug to be released from the pump. The polymers are of both swellable and non swellable nature. Mostly, swellable polymers are used for the pumps containing fairly water-soluble drugs.

C. Wicking agent

A wicking agent is described as a material with the capacity to attract water into the porous network of a transport device. The wicking agents are the agents which assist to increase.

Enhance the rate of medicaments released from the opening of the medicament.

D. Solubilizers

An osmotic drug delivery system, especially water-soluble capsules could display an extreme launch charge that might be of zero order. Therefore, numerous capsules with low natural water solubility are negative aspirants for osmotic delivery. Agents that inhibit crystal conformation of the drug or in any other case act through complexation with the drug (e.g., PVP, poly (ethylene glycol) (Cut 8000), and β cyclodextrin).

E. Osmogenes

Osmogenes are an important aspect of osmotic expressions. Upon penetration of organic fluid into the osmotic pump via the semipermeable membrane, osmogenes are dissolved with inside the organic fluid, which creates bibulous strain make up with inside the pump and pushes drug outside the pump via a delivery opening. They correspond of inorganic salts and carbohydrates. Substantially, potassium chloride, sodium chloride, and mannitol are used as osmogenes. Generally, fusions of osmogenes are used to attain the most beneficent osmotic pressure with inside the system.

F. Coating solvents

Solvents applicable for making polymeric result that's used for product the wall of the osmotic tool encompass inert inorganic and natural solvents that do not negatively damage the core and other accoutrements. The typical solvents encompass methylene chloride, acetone, methanol, ethanol, isopropyl alcohol, butyl alcohol, ethyl acetate, cyclohexane, carbon tetrachloride, and water.

III. METHODS

Among the controlled release bias, osmotically controlled hold a stable place because of its dependability to deliver the API at destined zero order rate for prolonged period of time so these are used as the standard drug forms for the constant delivery of contents. Osmotic Pump Controlled Release Preparation is a new medicine delivery system with eternally medicine delivery rate as characteristic and controlled with the osmotic pressure difference between inside and outside of the semipermeable membrane as medicine delivery power. Lately, osmotic tablets have been developed in which the delivery orifice is formed by the objectification of a leachable element in the coating. Once the tablet comes in contact with the waterless terrain, the water- solvable element dissolves, and an osmotic pumping system results. Latterly, water diffuses into the core through the microporous membrane, setting up an osmotic grade and thereby controlling the release of medicine. Osmosis can be defined as the robotic movement of a detergent from a result of lower solute concentration to a result of advanced solute

concentration through an ideal semipermeable membrane, which is passable only to the detergent but impermeable to the solute. The pressure applied to the advanced-concentration side to inhibit solvent inflow is called the osmotic pressure.

A. Delivery orifice

Osmotic delivery systems comprise at least one delivery orifice in the membrane for medicine delivery. The length of the delivery hole should be optimized with the purpose to control the medicine delivery from osmotic systems. On the indispensable hand, the length of delivery orifice must now no longer also be too large, else, solute prolixity from the opening might also take place. However, zero- order shipping could be affected due to the enhancement of hydrostatic strain in the core. If the confines of the delivery opening are just too small. This hydrostatic pressure might not be relieved due to the small opening length and can affect in distortion of the transport system, thereby preceding in changeable drug delivery. The optimum opening radius is in the variety of 0.075 – 0.274 mm.

B. Laser drilling/ primer drilling mechanical drill

This technology is well established for producing sub-millimeter size hole in tablets. Typically, CO₂ ray (with affair wavelength of 10.6 μ) is used for drilling purpose, which compromises excellent trustability characteristics at low costs.

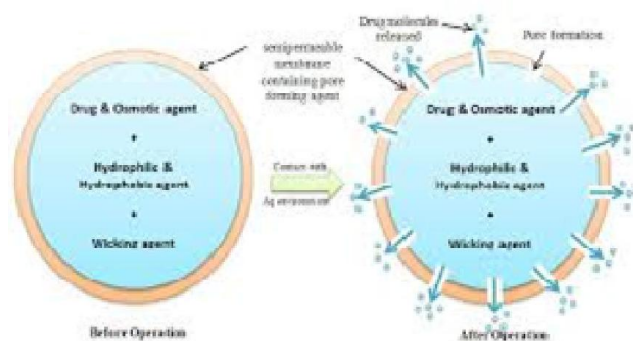


Figure 1: outline view of ODDS

Equations

Osmotic pressure is proportionate to temperature and concentration and the relationship can be described by following equation.

$$\pi = n_2 RT$$

Where, π = osmotic coefficient

n_2 = molar concentration of solute in the solution

R = gas constant

T = Absolute temperature

C. Osmotic pump

Types of oral osmotic pumps,

- Single chamber osmotic pump Elementary osmotic pump
- Multi-chamber osmotic pump Push- pull osmotic pump, Osmotic pump with then on-expanding alternate chamber
- . Specific types Controlled porosity bibulous pump, Bibulous bursting bibulous pump, Liquid OROS, Delayed Delivery Osmotic device, Telescopic capsule, Oros CT (colon targeting), Squeezed oral remedial system, Monolithic osmotic system, and OSMAT.

1) 1) Elementary osmotic pump

Rose-Nelson pump turned into also simplified in the shape of the simple bibulous pump, which made osmotic delivery as a first- rate approach of attaining controlled medicine release. The abecedarian bibulous pump shown in Figure 1 turned into constructed with the aid of using Theseus's in 1974 and it principally incorporates an energetic agent having an applicable osmotic strain; it's far fabricated as a tablet carpeted with a semi-permeable membrane, generally cellulose acetate. A small perforation is drilled through the membrane coating. When this carpeted tablet is exposed to a waterless terrain, the bibulous pressure of the solvable medicine in the tablet attracts water through the semi-permeable coating and a impregnated waterless result of the medicine is shaped in the device.

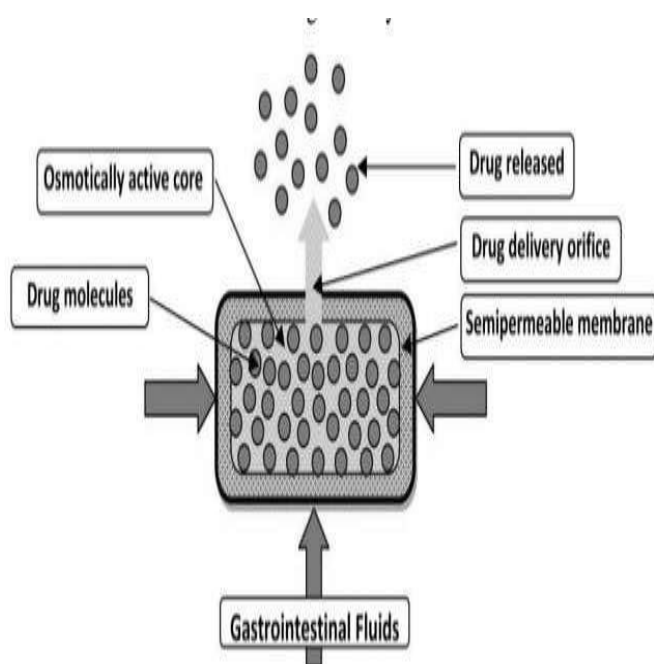


Figure: Elementary osmotic pump

2) Push-pull osmotic pump

The push-pull osmotic pump is added each poorly water-soluble and especially water-soluble pill at a steady rate. This system resembles a preferred bilayer-lined tablet. One layer (the upper layer) incorporates drugs in a formulation of polymeric, osmotic agents, and different tablet excipients. This polymeric osmotic agent has the capacity to form a suspension of the drug in situ. When this tablet later imbibes water, the alternative layer incorporates osmotic and coloring agents, polymer, and tablet excipients. These layers are formed and bonded collectively with the aid of using tablet compression to form a single bilayer center. The tablet core is then lined with a semipermeable membrane. The osmotic appeal in the drug layer pulls water into the compartment to shape in situ a suspension of the drug. The osmotic agent in the nondrug layer simultaneously draws water into that compartment, causing it to enlarge volumetrically, and the enlargement of the nondrug layer pushes the drug suspension out of the delivery orifice.

3) Controlled porosity osmotic pump

It is an osmotic tablet in which the delivery orifices (holes) are formed in situ via leaching of water-soluble pore-forming agents incorporated in the semipermeable membrane (SPM) (e.g., urea, nicotinamide, sorbitol, etc.) It is an osmotic tablet in which the delivery orifices (holes) are formed in situ via leaching of water-soluble pore-forming agents incorporated in the semipermeable membrane (SPM) (e.g., urea, nicotinamide, sorbitol, etc.) Controlled porosity osmotic pump is an osmotic tablet wherein the membrane carries water-soluble leachable pore-forming agents. When CPOP is uncovered to water low levels of water-soluble components are leached from polymer substances that might be permeable to water.

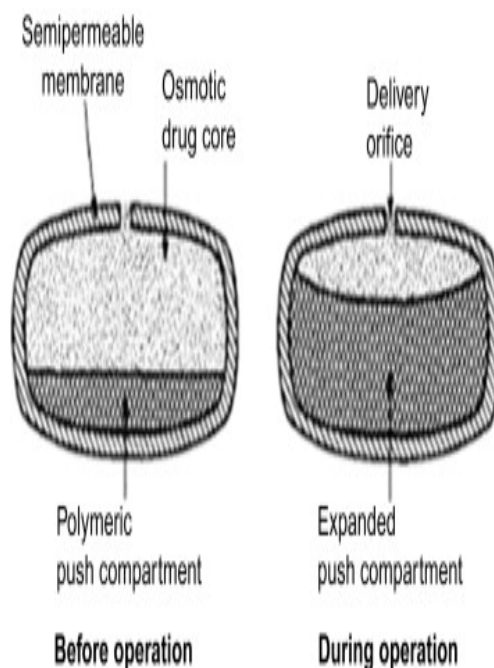


Figure: Push-pull osmotic pump

Table 1. Osmotic pressures of saturated solution of commonly used osmogenes

Compounds of mixture	Osmotic pressure (atm)
Lactose-Fructose	500
Dextrose-Fructose	450
Sucrose-Fructose	430
Mannitol-Fructose	415
Sodium chloride	356
Fructose	335
Lactose-Sucrose	250
Potassium chloride	245
Lactose-Dextrose	225
Mannitol-Dextrose	225
Dextrose-Sucrose	190
Mannitol-Sucrose	170
Sucrose	150
Mannitol-Lactose	130
Dextrose	82
Potassium sulphate	39
Mannitol	38
Sodium phosphate tribasic. 12H ₂ O	36

IV. CONCLUSION

As the system above stated and mentioned has a lot of uses and it's far the first-class approach of turning in drugs. But on the identical hand, there are a few risks to however they may be controlled well if taken right care. There are a lot of additives and pumps used on this method which is used with the right care and expertise can act as soon as this machine of turning in drugs is fantastically accepted and these techniques are very interesting in addition to fruitful in the discipline of the drug.

V. DISCUSSION

Osmotic drug delivery system helps in the way of

Reduction in drug blood level fluctuation: by controlling the rate of drug release, “peaks and valleys” of drug blood levels of eliminated.

Frequency reduction in dosing: by extending release products deliver frequently more than a single dose of medication and thus they may be taken less often than conventional form.

Enhanced patient's convenience and compliance: With less frequency of dose administration, a patient is less apart to neglect taking a dose. There is also a greater patient and

are care giver convenience with dynamic and night time medication administration. Reduction in adverse side effect occur less frequency.

Reduction in overall healthcare cost: Although the initial cost of extended-release dosage forms may be greater than that for conventional dosage forms, the overall cost of treatment may be less due to enhanced therapeutic benefit, fewer side effects, and reduced time required of health care personnel to dispense and administer drugs and monitor patients.

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FORMULATION OF MEDICATED CHEWING GUM WITH SIMVASTATIN FOR HYPERLIPIDAEMIA

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Abstract— The technological advancements for oral drug delivery system were made in research and development. Chewing gum is an oral confectionary product, which is an excellent drug delivery system for self-medication. The medicated chewing gum is the combination of water-insoluble phase which is called as gum base. Unlike chewable tablet, medicated chewing gum should not be swallowed. The condition in which elevated level of lipid in blood is known to be hyperlipidaemia. Hyperlipidaemia is one of the main risk factor of cardiovascular disease. It is caused by defect in lipid metabolism that is defect in activity of lipoprotein lipase. The other reason for hyperlipidaemia includes genetic abnormality and environmental factors. Simvastatin is the hydroxymethylglutaryl CoA [HMG CoA] reductase inhibitor which acts against hyperlipidaemia. Generally, simvastatin was used as tablet for hyperlipidaemia, on introducing simvastatin in medicated chewing gum; the drug delivery in blood gets faster than tablets. The solubility period is comparatively greater than tablet intake. The medicated chewing gum of simvastatin will be formulated with beeswax as base, glycerol, castor oil, dextrose, calcium carbonate, aerosol, peppermint oil, polyvinyl pyrrolidone, magnesium stearate. Direct compression method was used to prepare medicated chewing gum by various compositions of plasticizer, castor oil and dextrose. The average content of drug in developed medicated chewing gum should measure the maximum drug release after a particular time period was expected (approximately 30 minutes).

Keywords— Medicated chewing gum, oral drug delivery, Simvastatin, hyperlipidaemia, direct compression.

I. INTRODUCTION

As evidence by nicotine gum the success impact is provided by its delivery system. The additional patient benefits such as discreet and convenient administration can be achieved by an innovative drug delivery system. New commercial opportunity is provided by medicated chewing gum for the drug whose patent is about to expire. over other oral administration forms drug delivery system by chewing gum has is advantageous result.

Simvastatin is a prodrug which is an hydroxymethylglutaryl-CoA [HMG-CoA] a reductase

inhibitor that reduces lipid content in blood. Simvastatin cause unpleasant effect when consumed as tablets. On interaction with amiodarone, amlodipine, lomitapide, ranolazine for more than 20mg cause kidney problem. Simvastatin cause side effects like headache, nausea or vomiting, abdominal cramping¹.

On introducing simvastatin in chewing gum, better onset of actions can be achieved for acute medications. This dose don't require water hence greater compliance. These medicated chewing gum are advantageous to the patient who has difficulty in swallowing. There was a high acceptance in the market of paediatrics who have inclined that the children accepts to chew than swallow². Greater efficacy on low dose is improved because it doesn't involves first pass liver metabolism so, bioavailability is high comparatively. The release rate and the risk of side effect is controlled as the concentration peak of plasma is neglected³.

A. Systemic Effect

The oral mucosa absorb the active ingredients through gastrointestinal tract when saliva is ingested. Once when the active ingredients reaches the blood systemic effect is achieved.

B. First onset of action

When the active ingredients is absorb through buccal mucosa it passes through jugular veins directly to this systemic circulation.

C. Effect of dry mouth

For many medicaments the major side effect is dry mouth. Since medicated chewing gum stimulates secretion of saliva, the mouth's dryness is minimised⁴.

There are numerous medicated chewing gum available in market which was approved by united state food and drug administration [USFDA].

API	INDICATION	BRAND NAME	MANUFACTURER
Caffeine	Antibacterial	Stay alert ®	Stay alert safety service
Nicotine	Smoking cessation	Niquitin®	Glaxo Smithklim
Dimenhydrinate	Motion sickness	Travvelli®	AstaMedica

D. Advantages ⁵

- It doesn't require water hence it can be taken anywhere.
- Patient who has difficulty to swallow prefer medicated chewing gum
- It is greatly acceptable for children.
- It avoids first pass liver metabolism and thus increase the bioavailability of drugs.
- It has subsequent absorption in systemic circulation and rapid onset due to spontaneous release of active ingredients in buccal cavity.

II. MATERIALS AND METHODS

A. Formulation

A combination of natural gums or synthetic gums sweetening resins, artificial sweeteners, flavourants is chewing gum. medicated chewing typically comprises two parts viz. ⁶

B. Pre-Formulation study

1) ORGANOLEPTIC STUDIES

By visual inspection, the sample of simvastatin for odour, taste, colour were identified.

2) MELTING POINT

It was determined by capillary method with melting point apparatus by pressing the open end gently the capillary tube was filled by simvastatin. The simvastatin was packed at the bottom of the tube and slot behind the eye-piece on melting temperature. The plugged in and set to zero unit was ensured. Turn the apparatus on and its reporting melting point. Adjust the temperature knob downwards.

3) SOLUBILITY STUDIES

The solvent such as water, acetone, methanol, ethanol, chloroform, petroleum ether is used and solubility of the drug has to be tested ⁷.

4) UV SPECTROPHOTOMETER

Absorption spectral measurements were carried out with the UV- visible spectrophotometer with automatic wavelength correction with the pair of 5cm quartz cells.

5) DRUG EXCIPIENT INTERACTION BY THIN LAYER CHROMATOGRAPHY

PREPARATION OF PLATE

Take the glass side and the spread uniformity the mixture of silica gel G and water to form the thin layer on the plate. Then allow the plate for few minutes for air drying and kept into the oven to get activated.

PREPARATION OF SOLVENT

Take the cyclohexane and ethyl acetate as a solvent ratio for 8:2 in the beaker. Put the filter paper in the beaker for saturation of solvent system.

TABLE I -MARKETED BRANDS

PREPARATION OF SAMPLE

Take all the excipients into the different beakers and the dissolve them in acetone in a specific quantity.

PROCEDURE

Take out the activated TLC plate and mark it above the bottom placed the sample on the one mark and drug on the another mark. placed the plate into the beaker and let a solvent to be run. After $\frac{3}{4}$ running of a solvent take out the plate and let it be dry on the air at normal temperature. After drying put into a iodine fumes for identifying a spot. After that note the distance of both and solvent run from a mark of a plate and to calculate the Rf value and check a drug interaction. ⁸

C. Formulation of medicated chewing by DIRECT COMPRESSION METHOD

Weighed quantity of calcium carbonate and polyvinyl pyrrolidone with mixed in separate pestle mortar and the simvastatin drug was mixed the above mixture. The bees wax and castor oil and glycerol were taken and melted. Then all the remaining ingredients dextrose, magnesium, stearate, aerosol, peppermint oil was taken for compression activity on compression machine.

D. Post-Formulation studies

1) WEIGHT VARIATION

In experimental work weight variation of all formulation were done by method. weight of 10 chewing gums were taken in one batch and average weight is calculate from standard deviation was calculated ⁹.

2) HARDNESS

To use the Monsanto type hardness tester for determination of hardness of all MCG formulations, due to absence of any reported method, it was decided. The average values, standard deviation and relative standard deviation was calculated ¹⁰.

3) THICKNESS

It is an important parameter to be controlled to facilitate packaging. Chewing gum should be controlled within the $\pm 5\%$ variation of a standard value. Any variation within the particular lot must not be apparent to the unaided eye of the consumer. Thickness formulation were measured using the vernier calliper ¹¹.

4) FRIABILITY

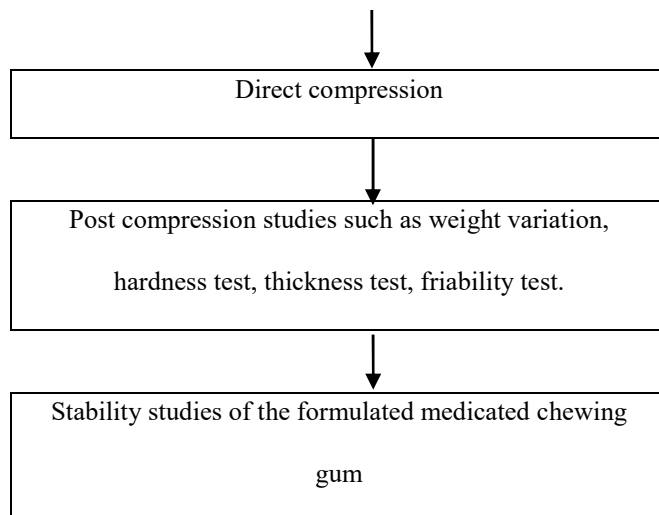
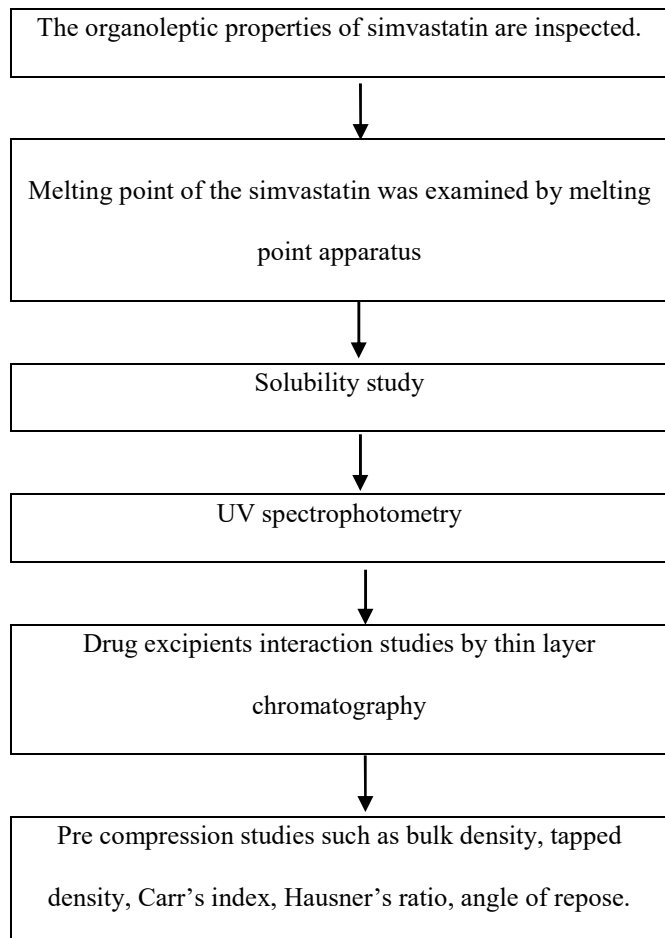
In the Roche's friabilator chewing gums weighted and placed. The chewing gum was placed into a apparatus for four minutes, which were rotating at a speed of 25 revolutions/min. The chewing were removed and de dusted and weighed. The percentage loss in weight were calculated and take as a measure of friability. Ideally there must not be more than 1% variation of weight loss.

5) CONTENT UNIFORMITY

Individual contents of active substances of 10 dosage unit which was taken randomly was determined. The 10 dosage form was crushed in mortar and powder equivalent to 10 mg of simvastatin were taken. The powder were dissolved in 100ml of methanol. The absorbance measurements of these solution was taken by UV- Visible spectrophotometer at 236nm ¹².

III. METHODOLOGY

FLOW CHART



IV. RESULTS AND DISCUSSION

A. ORGANOLEPTIC PROPERTIES

The sample of simvastatin was identified for the taste, colour, odour and compared with the reference standard.

TABLE II: ORGANOLEPTIC PROPERTIES

PARAMETER	RESULT
Colour	Light pink powder
Odour	Fruit like breath
taste	Bitter

B. SOLUBILITY STUDIES

The solubility studies of simvastatin was identified by accurately weighing 10mg was added to 6 following test tubes and then it is introduced to aqueous and non-aqueous solvent and the solution was kept for 24hrs and analyzed in U.V Visible spectrophotometer and the solubility of Simvastatin is found.

TABLE III – SOLUBILITY PROFILE

Solvent	Solubility
Water	Insoluble
Methanol	Sparingly soluble
Ethanol	Highly soluble
Chloroform	Soluble
Ester	Soluble

C. MELTING POINT

The melting point of simvastatin was found to 135-138°C and when compared with the reference and the drug is identified that it is in its pure form.

D. UV-VISIBLE SPECTROPHOTOMETER

The absorbance of simvastatin in its highly soluble solvent i.e, ethanol is performed at different concentration.

Table 3 :absorbance of simvastatin

E. SIMVASTATIN EXCIPIENT INTERACTION

From the table above, it is clear that the drug i.e, Simvastatin doesn't interact with the excipient used.

hence, the efficacy of the drug remains same when the excipients such as beeswax, glycerol, castor oil, peppermint oil, dextrose and aerosil is used.

medicated chewing gum. The average drug content in the developed chewing gum were expected to be desirable

S.NO	COMPONENTS	Rf VALUE		OBSERVATION
		INITIAL	FINAL	
1	Simvastatin(Pure drug)	0.81	0.82	No change.
2	Simvastatin +Bees wax	0.84	0.88	No interaction.
3	Simvastatin +Glycerol	0.89	0.90	No interaction.
4	Simvastatin +castor oil	0.92	0.94	No interaction.
5	Simvastatin +peppermint oil	0.91	0.93	No interaction.
6	Simvastatin + dextrose	0.94	0.95	No interaction.
7	Simvastatin + Aerosil	0.90	0.93	No interaction.

TABLE VI- INTERACTION STUDIES

F. POST-COMPRESSION STUDIES

From the table, it is clear that the medicated chewing gum doesn't stick with each other and the hardness, thickness, friability weight variation results are appropriate to the reference.

TABLE V- ABSORBANCE OF DRUG

Concentration	Absorbance
0.2	0.23
0.4	0.39
0.6	0.42
0.8	0.60
1.0	0.71

V. CONCLUSION

Chewing gum is an excellent drug delivery system for self medication, as it is convenient and it can be administered discretely without water. It offers several advantage compared to the chewable tablets, lozenges and other related formulations. Hence in forth coming year it will become the much more common and popular drug delivery system in present work chewing gum formulation was prepared in the tablet form by using glycerol, castor oil and gum base because it eliminates the possibility of dissolution of gum base in saliva.

It was concluded that synthetic gum base can be used as an excellent agent for formulation of chewing gum. For tablet formulation all studies like stickness, weight variation test has to be performed.

The developed medicated chewing gum of simvastatin were soft with minty flavour because of the addition of peppermint oil. The presence of glycerine at optimized concentration provided the softness for the developed

which confirmed the success of the formulation and a methodology employed for its development. A drug release profile for medicated affected by a chewing frequency, hence a percentage drug release of a developed MCG were measured and the developed medicated chewing gum of simvastatin were able to maintain its physical integrity during a entire duration of stability study.

Medicated chewing gum may be the choice for children as chewing gum is highly accepted in the age group. Medicated chewing gum should of course be considered as the drug delivery system and a same precaution could be taken as for other delivery systems. Children must prepare chewing gum is feasible as a local treatment of disease or various conditions of a oral cavity. From a pharmaceutical and clinical point of view medicated chewing gum must also be an interesting drug delivery system compared to the traditional ways of administration. In the further, new medicated chewing gum are expected and must as the way of drug administration..

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INSILICO INVESTIGATION OF ANTI-BIOFILM ACTIVITY OF CYMBOPOGAN CITRATUS EXTRACT AGAINST METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS

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Abstract— *Cymbopogon citratus* is a tropical, clump forming evergreen grass with richly aromatic lemon fragrance which is referred to as lemongrass. *Staphylococcus aureus*, a bacterial pathogen that causes human infections with produces an encapsulation matrix known as biofilm, which enhances its virulence property by acting as an encapsulation matrix. Screening of phytocomponents from lemon grass will be done using the Lipinski's rule of five. Molecular docking approach can be utilized for the selection of the lead molecules using the Binding Energy scores and by studying the stability of the protein-ligand interactions with the assistance of Autodockvina.

Keywords— *Cymbopogon citratus*, Antibacterial activity, Molecular docking.

I. INTRODUCTION

Cymbopogon citratus is a tropical, clump forming evergreen grass with richly aromatic lemon fragrance. It is available throughout the world, and it is commonly referred to as lemongrass [1]. Freshly cut and partially dried leaves are used medicinally and are the source of the essential oil [2]. Lemongrass is a folk remedy for coughs, gingivitis, ophthalmic and pneumonia[3]. Lemon grass has numerous bioactive phytoconstituents like myrcene, citronellal, citronellol, and geraniol with various pharmacological activities such as cytotoxic and antibacterial activity[4]. *Staphylococcus aureus*, a bacterial pathogen that causes a wide variety of human infections, either through community-driven or hospital-driven. Methicillin resistant *S.aureus* produces an exopolysaccharide matrix known as biofilm, which enhances its virulence property by acting as an encapsulation matrix[5]. The self-assembled biofilm enhances the ability of *S.aureus* to acquire resistance against broad-spectrum of antibiotics including methicillin, thereby making the conventional antibiotic treatment ineffective[6]

The Sortase A (SrtA) enzyme from *S. aureus* is a prototypical member of the sortase family. *S. aureus* strains lacking the SrtA gene are unable to retain and display LPxTG proteins at the cell surface. As a consequence, SrtA mutant strains are defective in the establishment of acute infections [7]. Usage of natural compounds for restraining the activity of Srt A rather than using the multiple drugs helps in reducing the multi-drug resistant[8,9] Screening of phytocomponents from lemon grass will be done using the Lipinski's rule of five [10]. Molecular docking approach can be utilized for the selection of the lead molecules using the Binding Energy scores and by studying the stability of the protein-ligand interactions with the assistance of Autodock vina[11]. The docking studies predicted that the constituent molecules of *C.citratus* possess more capability as inhibitors as compared to established drug in the pharmaceutical industries. Experimental study will also be conducted to validate the significance of SrtA in the anti-biofilm activity using expression studies. As a result of this study, we can develop a novel inhibitor for biofilm producing methicillin resistant *S.aureus*, thus with the help of in-silico models we can decipher the mode of action of the potential lead compounds on SrtA

II. IN SILICO PREDICTION OF BIOACTIVITY AND MOLECULAR DOCKING STUDIES

Bioactivity potential of the major chemical constituent presents in the *Cymbopogon citratus* was predicted with the PASS(Prediction of activity spectra for substances) after prediction of lipinski's rule of 5. Molecular docking studies of the selected phytocompounds was performed with Autodock vina(Version 1.1) using an enzyme srtA with this docking studies we would be able to decode the binding affinity of screened phytocomponents with the target (SrtA). The SrtA proteins were retrieved from protein data bank (<https://www.rcsb.org/>) in PDB format to determine crystal structure of protein. Lipinski's rule (rule of five, RO5) was used to evaluate the drug-likeness property. A molecule to be

Parameter	logP	Molecular weight	H-bonding donor	H-bonding acceptor
Range	<5	<500	<5	<10

developed as an orally active drug candidate should show no more than one violation of the following criteria which mentioned in the table. 1. With the use of Autodock tools, water molecules were removed, polar hydrogen bonds were added, non-polar hydrogen atoms were merged rotatable bonds were defined and partial charges were assigned to the screen phytoconstituents. The admetSAR and Protox-II server were used to predict ADME and toxicity respectively. Before detailed with the help of the binding affinity we can find out the best fit phytoconstituents and based on interaction studies of the docked sites of target proteins and ligands were done by Chimera and LigPlot.

III. RESULTS AND DISCUSSION

Cymbopogon citratus examined many biological potentials and useful natural remedies. From the PASS database and literature review we can curated the total of 68 bioactive phytoconstituents have acquired from the various parts of Cymbopogon citratus and this components are undeniable pharmacological activity. The 28 components have short sighted from 68 components (Table 1) through lipinski's rule. All the 28 components were found to possess molecular weight which is under 500, this demonstrates that this constituents can easily be adsorbed inside the cell. Due to the lower molecular weight components have higher chances to invade Staphylococcus aureus. In order to Lipinski rule of 5 has proceeded to judge the drug likeness of this 28 components (Table 2). Toxicity prediction through admetSAR illustrated that 13 bioactive components out of 28 phytoconstituents as no carcinogenic activity, no hepatotoxicity, human intestinal absorption and no oral toxicity (Table 3). Interestingly, all the 13 components was predicted to have more than 30% of HIA, then more efficacy can be occurred.

Through Autodock vina the binding affinity of all the 13 phytoconstituents were evaluated. Out of these 13 components, Humulene was found to have higher binding affinity for SrtA enzyme fig. 1 and receptor fig. 2 are docked structure fig. 3.

The interaction of compounds with SrtA involved in binding site fit well into the lipophilic pocket with val-166 and Gluto-105. The hydrophobic interaction have good binding affinity and inhibition constant due to the binding conformation within enzyme site of val-166.

Humulene compounds was found to have better fit to the active size of the srtA protein which plays an inevitable role in the biofilm formation. Yong-Bin Eom group has also identified and elucidated that the Humulene compound have antibiofilm activity. Lastly, from our in-silico analysis we hypothesize that the humulene phytoconstituents will be able to inhibits the biofilm formation by inhibiting srtA enzyme in *S.aureus* and thereby ultimately leads to the eradication of multi-drug resistance *S.aureus*.

TABLE I.

Table.1: Represents the molecular weight limit of components

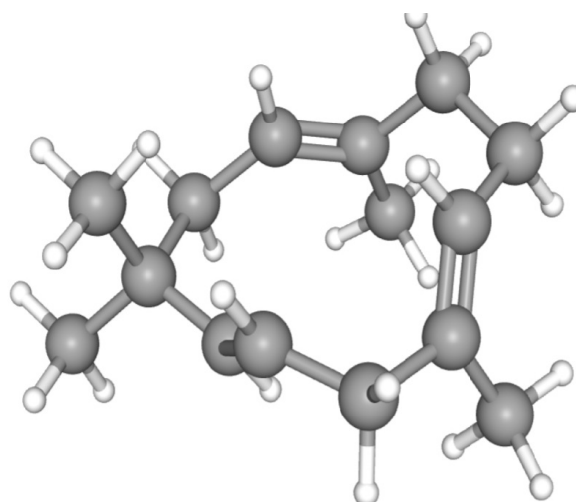


Figure 1: Humulene compound from pubchem

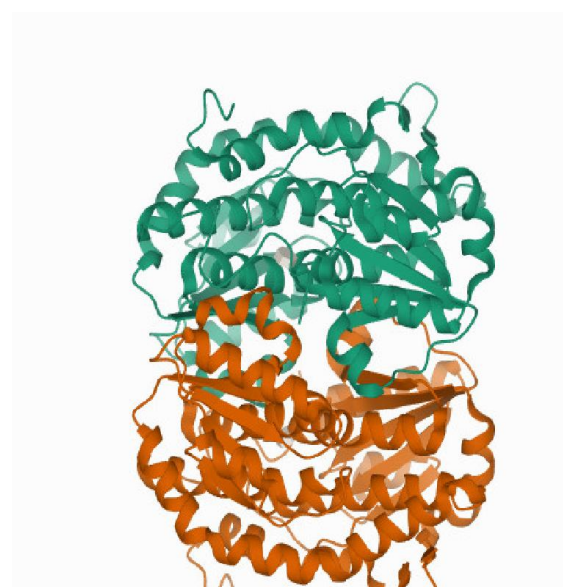


Figure 2: Sortase A (2ZJ3) in ribbon format from RCSBPDB database.

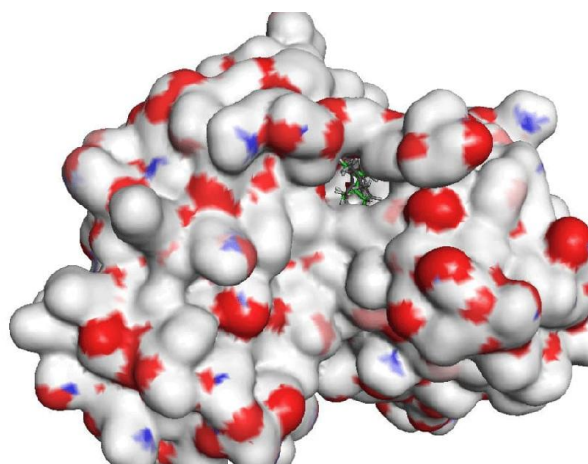


Figure 3: SrtA enzyme binded with Humulene Autodock Vina represented in molecular format.

TABLE II.

S.NO.	COMPONENTS	MOLECULAR WEIGHT	HYDROGEN BONDING DONOR	HYDROGEN BONDING ACCEPTOR	LogP	MOLAR REFRACTIVITY
1.	Geraniol	154.25	1	1	2.74	50.40
2.	Citronellol	156.27	1	1	2.92	50.87
3.	Trans(-)-carveol	152.23	1	1	2.43	48.28
4.	Methyl-n-nonyl-ketone	170.29	0	1	3.48	55.19
5.	Dextro-carvone	150.22	0	1	2.44	47.32
6.	Geranic acid	168.23	1	2	2.48	51.01
7.	Alpha-berbermotene	204.35	0	0	4.70	68.78
8.	Isolongifolene 4-5-9-10-dehydro levo-beta-elemene	200.32	0	0	3.93	65.67
9.	Gamma-murolene	204.35	0	0	4.18	69.04
10.	Alpha-gurjunene	204.35	0	0	4.27	67.14
11.	Alpha-murolene	204.35	0	0	4.08	69.04
12.	Alpha-farnesene	204.35	0	0	4.96	72.32
13.	Alpha-elemol	222.37	0	1	3.77	72.10
14.	Sabinol	152.23	1	1	2.16	46.38
15.	Pinene	136.23	0	0	3.44	45.22
16.	Tricyclene	136.23	0	0	3.14	43.22
17.	Camphene	136.23	0	0	3.43	45.22
18.	3-careen	136.23	0	0	3.42	45.22
19.	Limonene	136.23	0	0	3.37	47.12
20.	Cineole	154.25	0	1	2.67	47.12
21.	Neryl acetate	196.29	0	2	3.21	60.13
22.	Nerolic acid	168.23	1	2	2.48	51.01
23.	Isoeugenol	164.20	1	2	2.41	49.81
24.	D-cadinene	204.35	0	0	4.12	69.04
25.	Humulene	204.35	0	0	4.29	70.72
26.	Alpha-Guanine	204.35	0	0	4.29	69.04
27.	T-Cadinol	222.37	1	1	3.43	70.72
28.	Citral	152.23	0	1	2.71	49.44

Table. 1: 28 components with low molecular weight which follow Lipinski rule of 5.

TABLE III.

S.NO	COMPOUNDS	MOLEECULAR WEIGHT	HYDROGEN BONDING DONOR	HYDROGEN BONDING ACCEPTOR	Log P	MOLAR REFRACTIVITY	LIPINSKI'S RULE
1.	GERANIOL	154.25	1	1	2.74	50.40	YES
2.	CITRONELLAL	156.27	1	1	2.92	50.87	YES
3.	SABINOL	152.23	1	1	2.16	46.38	YES
4.	NEROLIC ACID	168.23	1	2	2.48	51.01	YES
5.	CITRAL	152.23	0	1	2.71	49.44	YES
6.	GERANIOL ACID	168.23	1	2	2.48	51.01	YES
7.	LIMONENE	136.23	0	0	3.37	47.12	YES
8.	TRICYCLENE	136.23	0	0	3.14	43.22	YES
9.	PINENE	136.23	0	0	3.44	45.22	YES
10.	NERYL ACETATE	196.29	0	2	3.21	60.13	YES
11.	CAMPHENE	136.23	0	0	3.43	45.22	YES
12.	HUMULENE	204.35	0	0	4.29	70.72	YES
13.	DEXTRO-CARVONE	150.22	0	1	2.44	47.32	YES

Table.3: Drug-likeness prediction of selected phytochemicals from *C.citrus*.

TABLE IV.

S.NO	COMPONENTS	HUMAN INTESTINAL ABSORPTION	CARCINOGEN	HEPATOTOXICITY	ORAL TOXICITY
1.	GERANIOL	+	-	-	-
2.	CITRONELLAL	+	-	-	-
3.	SABINOL	+	-	-	-
4.	NEROLIC ACID	+	-	-	-
5.	CITRAL	+	-	-	-
6.	GERANIOL ACID	+	-	-	-
7.	LIMONENE	+	-	-	-
8.	TRICYCLEN	+	-	-	-
9.	PINENE	+	-	-	-
10.	NERYL ACETATE	+	-	-	-
11.	CAMPHENE	-	-	-	-
12.	HUMULENE	+	-	-	-
13.	DEXTRO-CARVONE	-	-	-	-

Table.4: ADMET prediction of phytocompounds through admetSAR software.

TABLE V.

LIGANDS	BINDING AFFINITY (kcal/mol)
GERANIOL	-4.8
CITRONELLOL	-4.4
SABINOL	-5.0
NEROLIC ACID	-4.7
CITRAL	-4.8
GERANIOL ACID	-5.0
LIMONENE	-5.7
TRICYCLEN	- 7.3
PINENE	-4.7
NERYL ACETATE	-5.3
CAMPHENE	-5.5
HUMULENE	-7.9
DEXTRO-CARVONE	-6.1

Table.5: Binding affinity values through Autodock vina.

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IN-VITRO STUDY OF RHIZOME ALPINIA CALCARATA IN LUNG CANCER CELL LINES

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Abstract—Plants are the valuable sources of structurally diverse bioactive compounds which have lots of medicinal properties. Some of the significant biologically active constituents of plants are alkaloids, flavonoids, tannins and phenols. Many plants are evaluated for their beneficial biological activities such as anti-inflammatory, anti-oxidative, anti-microbial, anticoagulant, anti-thrombotic, immunological and anti-cancer properties. One of the most important therapeutic provocation all over the globe is lung cancer. Commonly preferred treatment method for lung cancer is surgical resection of the cancerous tissue; resection is supplemented with radiotherapy or chemotherapy, however, being difficult to ensure that all of the cancerous tissue is removed. Although, these treatment methods show poor efficacy leads to several side effects including anemia, nausea, vomiting, and neurotoxicity, and nephrotoxicity. Highly lipophilic molecules with very poor aqueous solubility drugs like paclitaxel, docetaxel, doxorubicin, camptothecins, and quercetin are currently used for treatment of lung cancer. *Alpinia calcarata* belongs to zingiberaceae family. The most important part of *calcarata* is its rhizome. Active ingredient from the root part of *Alpinia calcarata* are utilized in treating of fever, stomach ache, indigestion and throat infection. The present study aims to characterize methanolic extract of rhizomes of *Alpinia calcarata* and to evaluate the effect of bioactive components in anti-microbial, anti-oxidant, anti-proliferative activity.

Keywords— Maceration, Total phenolic compounds (TPC), thin layer chromatography (TLC), Gas chromatography-mass spectroscopy (GC-MS), MTT Assay.

I. INTRODUCTION

Plants are the valuable sources of structurally diverse bioactive compounds which have lots of medicinal properties. Some of the significant biologically active components from plant source are alkaloids, flavonoids, tannins and phenols. Many plants are evaluated for their beneficial biological activities such as anti-inflammatory, anti-oxidative, antimicrobial, anti-coagulant, anti-thrombotic, immunological and anti-cancer properties. Problems with existing treatment methods. A study says that, from the population

Based Cancer Registries (PBCR), bronchial and oral cancers were found to be the leading carcinogenic types among them. All over these cancer types, lung cancer is one of the most significant medical challenges in the world. Commonly prenti-proliferative activity. The main objective of this project is Methanolic extraction of phytochemicals from rhizomes of *Alpinia calcarata*. Identification and quantification of phytochemicals present in the sample. Analysis of anti- microbial, anti-oxidant, anti-proliferative potential of methanolic extract of rhizomes of *Alpinia calcarata*.

II. METHODOLOGY

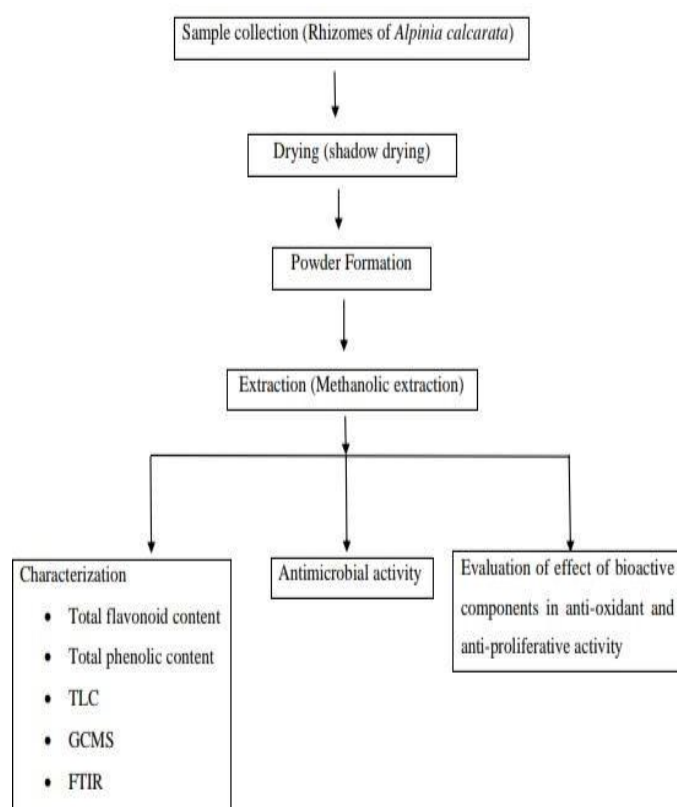




Fig. 1. Rhizomes of *Alpinia calcarata*.

A. Materials and methods

The leaves of *Alpinia calcarata* were collected from the medicinal plant shed of ABS botanical garden, Salem in the month of May, 2021. The plant was identified by Dr. Balasubramaniam, ABS botanical garden, Salem.

B. Preparation of plant extract

The collected leaves has to be rinsed and cut into small pieces and dried under at room temperature for 8 to 10°C. The leaves will be grind into a fine powder using mechanical blender. The powder want to be store in an airtight container and keep in a cool, dark and dry place until required time. 30 gm. sample of ground plant material will be placed in a thimble and extract with 250 mL of methanol in a maceration method for 3 days. The extracts were concentrating under reduced pressure at 40 °C by using a rotary evaporator. The crude extracts was dry in freeze dryer, then weigh and store it in a desiccators until for further use.

C. Qualitative Phytochemical screening

Phytochemical screening on crude extracts of *A. calcarata* rhizome will be carried out to determine the presence of alkaloids, Cardiac glycosides, steroids, saponins and anthraquinones, According to the methods described below methods. The detections are Carrying based on visual observations of colour change or the formation of precipitates after the addition of specific Reagents.

1) Tests for alkaloids

50 mg of *A. calcarata* rhizome extract of plant material will be dissolve in aqueous hydrochloric acid and then filter. The Mayer's reagent were used for test alkaloids.

a) Mayer's reagent

One or two drops of Mayer's Reagent will be added by extract of the side of the test tube. The formation of white or creamy precipitate will shows that is the presence of alkaloid in the sample.

2) Tests for cardiac glycosides (Keller-Killiani test)

A. Calcarata plant rhizome extract will be dissolved in absolute Methanol and this will be followed by the addition of Glacial acetic acid. Then, one drop of ferric chloride Solution and few ml of concentrated sulphuric acid will be added to the plant extract. The appearance of reddish brown ring at the interface and a Bluish green colour in the upper (acetic acid) layer will indicate the presence of a deoxysugar characteristic of cardenolides in the sample.

3) Tests for Steroids

a) Liebermann–Burchard test

Few mg of the plant rhizome extract will be dissolved in, Chloroform that will be followed by the addition of acetic Anhydride. The mixture will be boiled and cooled for few minutes. A few Drops of concentrated sulphuric acid will be added from the one side Of the test tube. The development of greenish transient colour will indicate the presence of steroids in the sample.

4) Test for saponins

A. Calcarata of few mg of the plant rhizome extract will be taken and shake vigorously in a test Tube with distilled water. The formation of Characteristic honeycomb like foam which persisted for ten minutes will indicate the presence of saponins in the sample.

D. Quantitative determination for the phenolic compounds of crude extract

1) Determination of total phenolic content (TPC)

The TPC of the plant rhizome extract will be determined by using the Folin-Ciocalteu method. An aliquot of plant extract will be mixed with few mL of Folin-Ciocalteu reagent and few ml of sodium carbonate will be added. After vortex for the seconds, and then the reaction mixture will incubate at the room temperature in dark for 20 minutes. The absorbance will be measured by using a UV-Visible spectrophotometer. A standard curve will be plotted by using gallic acid as a standard (0-300 ppm). The TPC will be calculated by the use of regression equation from the calibration curve and then, the results will be expressed in mg of Gallic acid/g (GAE) of dry weight of samples of rhizome.

2) Determination of total flavonoid content .

The total flavonoid content will be determined according to the method to describe in a literature. The test samples will be dissolved in methanol and the sample solution will be mixed with few mL methanol, and few mL of aluminum chloride hexahydrate, few ml of potassium acetate and distilled water. After 40 min from the incubate room temperature, the absorbance will be measured by using a UV-visible spectrophotometer. These value will be calculated from the standard calibration by the curve of quercetin in concentration range .

3) Determination of total flavonol content

The total flavonol content were determined by using few mL of aluminium trichloride and sodium acetate solution. Then After the incubation for 2.5 hours at the room temperature, for the absorbance will be measured. At the Quercetin, it will be treated by the same manner as sample. It has been used to produce a standard calibration curve in

by quercetin equivalent (QE) per gram for the dry weight of extract (mg QE/g DW).

E. Antioxidant activities of extracts

1) DPPH radical scavenging activity assay

The DPPH radical scavenging activity of the test samples were carried out according to procedures as it will be described in literature. A solution of DPPH will be prepared by using methanol, and this solution will be added to various concentration of methanolic extracts. After 30 min of incubation at ambient temperature, the absorbance will be measured by using a UV-Visible spectrophotometer. The Ascorbic acid and BHT will be used by the positive controls. The inhibitory concentration (IC) will be calculated according to the following equation:

$$IC\ (%) = (A_0 - A_t)/A_0 \times 100$$

Where A_0 is the absorbance value of blank sample and A_t is the absorbance value of the test samples. Percentage (%) inhibition of both standards and test samples will be calculated for each concentration and graphs of % inhibition against concentration will be plotted.

F. Antimicrobial activities

The disc-diffusion method will be used for evaluation of the antibacterial activity of the methanolic extract of *A. calcarata* rhizomes against Gram-positive and Gram-negative bacteria.

Cell viability assay

Cell viability will be measured by the use of MTT assay, it is based on the conversion of MTT to formazan crystals by mitochondrial dehydrogenases. Briefly, both cell lines were plated at a density in 96-well plates. Cells will be seeded for overnight, and then incubated with various concentrations of galangal rhizome extract. For MTT assay, after the treatment with the galangal extract, 10 μ l MTT will be added in each well. After removing the medium, the cells will be labeled with MTT solution for 4 h and the result of Formosan will be solubilized in dimethyl sulfoxide (DMSO). Then the absorbance will be measured by using automated micro plate reader. The absorption will be measured in an ELISA reader. All experiments will be carried out from the triplicate.

G. Statistical analysis

The Results will be presented as Mean \pm Standard Error. Significance of differences between groups will be assessed with the use of one way ANOVA.

III. CONCLUSION

The result of this study will show the presence of potent phytochemicals such as alkaloids, steroids, saponins and anthraquinones in methanolic extracts of *A. calcarata*. The rhizome extract of *A. calcarata* will possess high content of phenolic compounds. This study will reveal that the rhizome extracts have been moderate as antioxidant activity in comparison with reference standard. With reference to this study, the phytochemicals will present in methanolic extracts of rhizome of *Alpinia calcarata* will be evaluated for anti-microbial, anti-oxidant and anti-proliferative activity. So, the isolation of bioactive constituents from this plant may be a potential alternative for synthetic antioxidant.

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PREPARATION OF DETOXIFYING AND SKIN WHITENING FACE CREAM

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ABSTRACT— Cosmetics are either a mixture of chemical compounds derived from natural sources, or manufactured synthetically. Cosmetics have different purposes. Those designed for personal care and skin care can be used to cleanse or protect the body or skin. Widely used skin whitening agents are hydroquinone and kojic acid which causes skin irritation, burning, itching are the most side effects of using these chemicals. Alternatively we use arbutin derived from *Arctostaphylos uva-ursi* in our project. Arbutin is a compound which is generally safe for all skin types. Arbutin may reduce the degree of darkening of the skin after sun exposure by blocking the production of tyrosinase. While other skin lightening agents can dry and irritate the skin, arbutin is less irritating. Detoxifying our skin involves removing as many impurities, toxins, pollutants and dead skin cells as possible to restore, treat, brighten, hydrate and soothe our skin to its optimum state. To remove toxins from our skin *Camellia sinensis* is used. The alternative natural arbutin are combined with *Camellia sinensis* helps to prevent the skin from impurities. Tensile Strength Tester method is useful for determining the tensile property of the excised stratum corneum of the skin. It provides information on the water content present in stratum corneum and also acts as a screening device for moisturizing ingredients. The stress or strain characteristics of stratum corneum obtained from various sources can be studied by using this instrument (i.e., tensile strength tester), and it also helps in knowing effects on stratum corneum passed through various treatments. Compared to other products, our project focuses on producing chemical free and cost effective detoxifying skin whitening face cream.

Keywords—Arbutin, Green tea extracts, propylene glycol

I. INTRODUCTION

Effective skin whitening agents are derived from plants. Skin color is primarily determined by the content of an epidermal pigment called melanin. It is being secreted by

Melanocyte cells in basal layer of epidermis. Detoxifying our skin involves removing as many impurities, toxins, pollutants and dead skin cells as possible to restore, treat, brighten, hydrate and soothe our skin to its optimum state. Skin whitening cream is formulated with pure herbal and natural components that nourish and protect our skin. White pigmentation and treatment of skin discoloration is mostly based on inhibition of enzyme tyrosinase which is responsible for melanin synthesis. Skin whitening cream has herbal extracts that exhibit potent tyrosinase without any side effects, as it developed with natural control ingredients such as propylene glycol, Arbutin, green tea extract. Melanin as a fungal metabolic product. All these naturally derived ingredients are used to prevent the skin from impurities, toxins, pollutants etc. Green tea extract has been shown to help prevent and treat a number of skin conditions. Arbutin is molecule extracted from bearberry plant that inhibits the formation of melanin. Detoxifying effect and Whitening effects are due to *Camellia sinensis* and are to *Staphylos uva-visa*. This product helps to repair previous superficial damage to skin.

A. Arbutin

Alpha-arbutins (4-hydroxyphenol β -D-glycopyranoside) and beta-arbutins (4-Hydroxyphenol α -D-glycopyranoside) are glycoside derivatives of hydroquinone. Derived compound occurs naturally in many plants of wheat, cranberry and bearberry. It is an efficient agent for the treatment of hyper pigmentation disorders and shows less melanocyte cytotoxicity than hydroquinone. An addition, it is kapha, Beneficial for the treatment of urinary tract infections, Relieves cough, and prevents asthma. In recent years the need for arbutin has led to the development of these variations. Profit fast. Arbutin is a tyrosinase inhibitor, which combines with its important copper ion and thus inhibits the tyrosine enzyme and suppresses tautomerization dopachrome to 5,6-dihydroxyindole-2-carboxylic acid (DHICA). Many analytical methods for the measurement of arbutin in

cosmetics have been published. The most important method is high performance liquid chromatography (HPLC), in addition, HPLC and HPLC combined with micro dialysis sampling with chemiluminescence detection, Gas chromatography-mass spectrometry, micellar electro kinetic capillary chromatography (MEKC), with MEKC amperometric detection, as well as determination of arbutin cosmetics using HPLC and MEKC and disposable after online derivatization electrochemical Sensing. There is no previous study in the literature on decomposition from arbutin to hydroquinone, in creams containing arbutin

B. Procedure.

Sample preparation (skin whitening cream). Each whitening cream had about 0.5 g precisely weighed and transferred to three separate 25 ml volumetric flasks and dissolved in methanol. In each flask, 50 µg.ml⁻¹ resorcinol was added to the internal. Was added as standard. The solution was vigorously sonicated for 30 min, centrifuged at 4,000 rpm. For 30 min and filtered onto Millipore membrane (0.45 µm) to obtain a transparent solution. NS the supernatant is used for liquid chromatographic analysis

C. Extraction of plants.

The medicinal plants were dried and made into powder. Then 6 kg the powder was extracted with two successive parts of 5.0 liters of de-ionized water and the methanol was shaken on a wrist action shaker for 5 h and filtered. Then the solvent of the sieve can be removed using the spray-dry technique (temperature) by either 100 °C and flow rate 1.0 ml.min⁻¹ to give brown powder, or it can be removed by using rotary evaporator to give a dark brown crude residue

D. Preparation of standard solutions.

1,000 µg.ml⁻¹ stock solution of arbutin standard was respectively prepared in methanol. A series of standard solutions each containing 0.5, 1.0, 3.0, 5.0, 10.0 and 30.0 µg.ml⁻¹ were prepared from stock standard solutions.

E. Sample solution preparation.

Three sets of medicinal crude extracts (5 grams) and cosmetic samples (0.5 g) of each set were extracted under reflux with 100 ml of 75% methanol 30 minutes and filtered. The filtrate had evaporated to about 12 ml and was reduced to 250 µL. was transferred to add 50 ml of water followed by the ml separator. Then the mixture was removed with ether (2×30 ml). The combined aqueous layer was extracted with ethyl acetate (3×50 ml). Then the combined ethyl acetate extract was evaporated to dryness and dissolved in 10 ml of methanol.

F. Preliminary investigation

A preliminary investigation was carried out to isolate some chemical constituents by TLC; Crude oil extract with 75% methanol reflux for 30 minutes and then filtered. The filtrate was evaporated to about 12 ml and 250 ml with 50 ml of water transferred to a separation funnel. This was the solution with 50 ml ethyl acetate extracted three times, the combined ethyl acetate extracts were evaporated to dryness and the residue was dissolved in 10% methanol. Sample solution and Standard Solution Silica Gel GF254 (20 × 20 cm) Glass. Were separated on plate using ethyl acetate:

methanol (9:1) as the developing solvent. Raw extract given five well defined spots. The R_f value of each location was exactly the same as obtained from each location of the standard.

Optimization of experimental conditions for RP-HPLC. RP-HPLC was performed under democratic position. All experimental conditions were optimized through univariate the method is as follows;

G. Analytical wavelength.

The optimum absorbance of each standard solution was determined by injection of equal volumes of mixed standard solution (5.0 µg.ml⁻¹) separately the wavelength varies from 200 nm to 400 nm. Mobile was a mixture of water : methanol (80:20 v/v) with flow rate 1.0 ml.min⁻¹. As optimal to get the best Sensitivity, max was chosen.

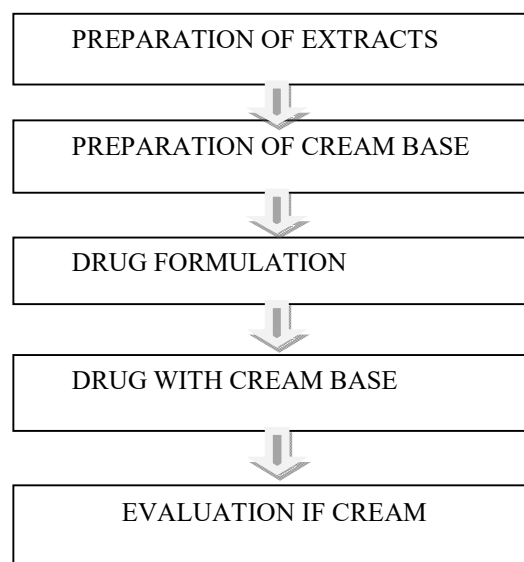
H. Mobile phase.

Various solvent systems were tested as a mobile phase for the separation of Arbutin in the sample e.g. water: acetonitrile: 0.1 M hydrochloric acid (94:5:1, v/v/v), Water: methanol: 0.1 M hydrochloric acid (89:10:1, v/v/v) and methanol: 100 mm phosphate buffer pH 2.1 (10:90, v/v).

I. Green tea Extract:

Using various animal models, several laboratories have shown that green tea extract, taken orally or applied to the skin, prevents skin tumors formation induced by chemical carcinogens or ultra-violet radiation (UVB). The extract also contains Anti-inflammatory activity that is similar to anticancer the forming activity is due to the polyphenolic constituents present in it. Polyphenol is mainly responsible for epigallocatechin-3- is the prevention of cancer formation Gallet (EGCG). When applied to mouse skin, EGCG inhibits UVB-induced oxidative stress and suppression of immune system. Mouse skin model Illustrated Comprehensive Beneficial Effects of Green Tea Extracts and although only a few human skin studies have been done held, several cosmetic and pharmaceutical companies supplementing your skin care products with green tea extract.

II. MATERIALS AND METHODS



A. Preparation of extracts:

1) Arbutin extract from bearberry:

The dried powdered plant material (50 mg) was sonicated with 5 ml of solvent at 25 °C for 10 min, and mix centrifuge at 7600 g for 10 min. was a supernatant analyzed by HPLC to determine arbutin level, mark pulled down four times new solvent, and similar conditions using arbutin material determined after each extraction process.

2) Green tea extract from *camellia sinensis* & *Daucus carota*:

Air dried and coarse powders (500 g) of *Camellia sinensis* leaves and *Daucus carota* were seeded into Soxhlet extractor separately using petroleum ether and then with ethanol. The extracts were then concentrated to dryness under reduced pressure and controlled temperature, respectively, and were preserved in a refrigerator.

B. Preparation of cream base

A water-in-oil (O/W) emulsion-based cream (semisolid formulation) was prepared. The emulsifier (stearic acid) and other oil-soluble components (cetyl alcohol, almond oil) were dissolved in the oil phase and heated to 75 °C. The preservative and other water-soluble components (methyl paraben, propyl paraben, triethanolamine, propylene glycol) were dissolved in the aqueous phase and heated to 75 °C. After heating, the aqueous phase was added in parts to the oil phase, stirring continuously until the emulsifier cooled. The formula for the base is given in Table 1.

TABLE:1 Composition of ingredients

ingredients	Formula% W/W					
	F1	F2	F3	F4	F5	F6
Stearic acid	15	12	12	10	18	15
Almond oil	2	3	4	4	3	4
Glycerol	4	4	4	4	4	4
Methyl paraben	.02	.02	.02	.02	.02	.02
Triethanolamine	qs	qs	qs	qs	qs	qs
Water	qs	qs	qs	qs	qs	qs

C. Drug formulation

A suitable base was selected from the table and the cream was prepared. The emulsifier i.e. stearic acid and other oil-soluble components i.e. cetyl alcohol and almond oil were dissolved in oil phase and heated to 75 °C. Preservatives and other water-soluble components (methyl paraben, propyl paraben, triethanolamine, propylene glycol, all extra) were dissolved in the aqueous phase and heated to 75 °C. After heating, the aqueous phase was added in parts to the oil phase until the emulsifier cooled. The composition of the cream is given in Table 2.

TAB LE 2: pH of cream base:

FORMULATION	pH
F1	6.7
F2	6.8
F3	6.8
F4	6.6
F5	6.5
F6	6.3

D. Evaluation of cream base:

1) pH of the cream:

The pH meter is calibrated using a standard buffer solution. About 0.5 g of cream is weighed and dissolved in 50.0 ml of distilled water and its pH is measured.

2) Viscosity:

The viscosity of the formulation was determined by a Brookfield viscometer using spindle No. 7 at 100 rpm.

3) Dye Test:

Scarlet red dye is mixed with cream. Place a drop of the cream on a microscopic slide, cover it with a cover slip, and examine it under the microscope. If the dispersed globules appear red in colour, the ground becomes colourless. The cream is O/W type. In w/o type cream the opposite situation occurs, i.e. scattered globules appear colorless in red ground.

4) Uniformity:

Formulations were tested for homogeneity by visual form and touch.

5) Appearance:

The appearance of the cream was judged by its colour, pearly and roughness and graded.

6) After feel:

The amount of residue left behind after applying a certain amount of cream is checked for sagging, slippery and residue.

7) Type of smear

: After applying the cream, the type of film or smear formed on the skin is checked.

8) Removal:

Ease of removal of the applied cream was checked by rinsing the applied area with tap water.

9) Acid Value:

Dissolve 10 g of substance in a properly weighed, 50 ml mixture of an equal amount of alcohol and solvent ether, the flask was connected to the reflux condenser and slowly heated, until the sample is completely dissolved. Let's say, 1 ml of phenolphthalein was added to it. And titrated with 0.1N NaOH, until a light pink color appears after mixing for 30 seconds.

$$\text{Acid value} = n \times 5.61/w$$

Where, n = number of ml of NaOH required.

W = weight of the substance.

10) Saponification value:

Introduce about 2 g of the substance with 25 ml of 0.5 N alcoholic KOH for 30 min, add 1 ml of phenolphthalein and immediately titrate with 0.5 N HCl.

Saponification value = $(B-A) \times 28.05/W$

Where, volume in milliliters of titration = a

Volume in milliliters of titration = b

Weight of substance in grams = w

11) Irritability test:

Mark an area of (1sq.cm) on the dorsal surface of left hand. The cream was applied on the specified area and the time was noted. Irritability, erythema, edema, if any, were checked and reported for regular intervals up to 24 hours.

12) Accelerated stability test:

Quick stability test of the prepared formulation was conducted for the 2 most stable formulations at room temperature, studied for 7 days. They were formulation numbers 4 and 5 at $40 \pm 1^\circ\text{C}$ for 20 days. The formulations were kept at both room and elevated temperature and were observed on the 0th, 5th, 10th, 15th and 20th day for the following parameters.

III. RESULT:

A. pH of the cream:

The pH of the cream base was found to be in the range of 6-7 which is good for the pH of the skin. All formulations of the cream base were shown to have a pH close to that of the skin required (Table 2).

B. Viscosity:

The viscosity of the cream was in the range of 27021-27053 cps which indicates the dispersion of the cream. In our study F2, F3 and F4 have been shown to be readily dispersible by small amounts of shear, whereas F1, F5 and F6 were not readily disperseable on the skin. But F3 shows good spreadable property as compared to other formulations.

C. Acid value and saponification value:

The acid value and saponification value results of all formulations of cream base were presented in Table 3, and the satisfactory values were shown.

TABLE 3: Test applied for the acid value and for the saponification value.

PARAMETER	FORMULA					
	F1	F2	F3	F4	F5	F6
ACID VALUE	5.5	5.7	6.0	5.8	5.7	5.9
SAPONIFICATION VALUE	26.4	26.7	26.1	27.9	26.7	26.1

D. Irritation Test:

Formulation F3 showed no redness, edema, swelling and irritation during the irritant study. These formulas are safe to use for the skin (Table 4).

TABLE 4: Type of Adverse effect of formulations

FORMULATION	IRRITANT	ERYTHEMIA	EDEMA
F1	NIL	NIL	NIL
F2	NIL	NIL	NIL
F3	NIL	NIL	NIL
F4	NIL	NIL	NIL
F5	NIL	NIL	NIL
F6	NIL	NIL	NIL

E. Dye Test:

This dye confirms that all formulations were o/w type emulsion creams. But the formulation (F3) shows more stable in o/w type emulsion. So here we select F3 Cream Base for further study.

F. Uniformity:

All formulations produce an even distribution of the extract in the cream. This was confirmed by visual look and touch (Table 5).

G. Appearance:

When the formulation was kept for a long time, there was no change in the color of the cream (Table 5).

H. After-feel:

The amount of crunch, slippage and residue remaining after applying a certain amount of cream was observed (Table 5).

I. Type of smear:

After applying the cream, the smears formed on the skin were non-greasy (Table 5).

J. Removal:

The skin cream is easily removed by washing with tap water (Table 5).

K. Cream:

From the above study, F3 base was selected for the preparation of herbal cream, and the composition of the cream is illustrated on Table 6. The physical evaluation and stability of the herbal is shown in Table 7, and the results were considerable and acceptable.

TABLE 5: Physical parameter of F4 cream base on room and accelerated temperature

DAYS	TEMPERATURE (RT)	PARAMETER				
		pH	X1	X2	X3	X4
0	40°C	6.9	NCC	E	NG	ES
5	40°C	6.5	NCC	E	NG	ES
10	40°C	6.7	NCC	E	NG	ES
15	40°C	6.8	NCC	E	NG	ES
20	40°C	6.7	NCC	E	NG	ES

TABLE 6: Composition of herbal cream

INGREDIENTS	FORMULATION (% W/W)
CAMELLA SINENSIS	1.75
DAUCUS CAROTA	2.63
STEARIC ACID	1.96
CETYL ALCOHOL	4.0
ARBUTIN	3.0
GLYCEROL	3.0
METHYL PARABAN	3.0
TRIETHANOLAMINE	Qs
WATER	Qs

TABLE 7: Evaluation of herbal cream

Formulation	pH	Acid value	Saponification value	Adverse effect
HERBAL CREAM	6.8	5.9	26.1	NIL

IV. CONCLUSION

The findings of present investigation exhibited that the prepared herbal creams containing extracts of *Arctostaphylos uva-ursi*, *Daucus carota* and *Camellia sinensis* were safe to use in skin. Further study required to check synergistic potency of the prepared herbal cream in experimental animals

V. DISCUSSION

Camellia sinensis, *Arctostaphylos uva-ursi*, *D. carota* are well known for their medicinal value in Indian traditional medicine and Ayurvedic preparations. The active components present in various extracts of plant parts will synergistically produce and also enhance the beauty-enhancing properties of the cream. The herbal face cream was O/W type emulsion, so it can be easily washed off with plain water which gives better customer compliance. The demand for herbal cosmetics is increasing in the world market and they are a priceless gift of nature. Therefore, we mixed *Arctostaphylos uva-ursi*, *Camellia sinensis*, *D. carota*. Tried making a herbal face cream containing carota extract. Our study indicated that base F3 was found to be more stable, whereas the rest of the base was not stable and the emulsion broke upon long-term storage. So that the base is suitable for the development of F3 herbal cream, so we prepared herbal cream by mixing all the extracts in this base. The pH of the finished cream was close to the pH of the skin, and the cream produces homogeneous, emollient, non-greasy and easy-to-remove properties after application. The herbal cream was safe with respect to skin irritation and allergic sensitization. The prepared herbal face cream is for cosmetic use instead of other cosmetic. These studies suggest that herbal face creams are more stable and may produce a synergistic action as well.

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STUDY OF PROPHYLACTIC POTENTIALS OF PROBIOTIC BACTERIA IN FISH MODEL

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Abstract— Probiotics are usable remedial adjuvants that have useful effects on the host health by enhancing its intestinal microbial balance via developed feed utilization, enzymatic supplement to the digestion, inhibition of the pathogenic microorganisms, growth - promoting factors and increased immune response. A wide Scope of probiotics will be investigating for use in hydroponics incorporates both Gram-positive and Gram- negative microbes when the utilization of different life forms including microalgae and yeast has also been investigated. The key choice measures for probiotics will incorporate the accompanying: have resistance to gastric corrosiveness and bile harmfulness, are important to withstand and grow in gastrointestinal environment and to consider the significant to guarantee well-being advancing Physiological function. For colonization, they should show great surface hydrophobicity. Consequently, the goal of current will investigation was to seek after the hypothesis that dietary organization of Bacillus species could stimulate the development hematological profile, inborn invulnerability, and articulation of cytokines in lymphoid organs (Kidney, head-kidney, and spleen) of fish common carp and will determine its disease resistance capacity against infection on further studies.

Keywords— Probiotics; Common Carp; Feed; Growth Performance; Immunomodulation.

I. INTRODUCTION

Probiotics are live microorganisms that, when administered in sufficient quantities, improve digestion, growth, and control of fish [1]. They enhance growth by stimulating fish food and production of vitamins, fatty acids and improving digestion. It has been used to study the aquaculture experienced especially with use of bacteria against the infection. Bacillus Species of can also produce toxins and biogenic amines and transfer antibiotic resistance genes and enhance the immune response and how they interaction with phytoplankton by using probiotics. After that we want to more further challenge study of supplement using Pathogen to visualize the fish how long its survive and causes any other side effects. There is accepting proof that probiotics are effective at impede a wide range of fish pathogens. The purpose of this project is to raise awareness

about the role of probiotic culture against harmful Pathogen organisms in aquaculture.

II. ORGANISM STUDIES

For many years, studies focused on microorganism's characteristic from intestinal microbiota, and the term "probiotic" was mainly restricted to gram-positive lactic acid bacteria, mostly representative of the genera is the Lactobacillus, and Streptococcus microorganisms [2]. In contrast view of terrestrial animals, gastrointestinal microbiota of aquatic species especially in fish is particularly dependent on the external environment due to the flow of water passing through the digestive tract. We determine most bacteria will become transient in the intestine, due to constant opening of mouth in fish to intake of water and feed, together with microorganisms will be present. Based on the reference of articles that have been reported in the presence of potentially pathogenic bacteria such as salmonella, listeria, staphylococcus, Escherichia coli and other microorganism are also have been identified in the gastrointestinal tract of aquatic animals[3]. Further studies which includes that might be presence of gram-positive bacteria such as Bacillus, Carnobacterium, Enterococcus, and several species of Lactobacillus; gram-negative, optionally anaerobic such as Vibrio and Pseudomonas, as well as certain fungi, yeasts and algae of the Debaryomyces, Saccharomyces or Tetraselmis respectively. Due to the increasing interest of probiotics in aquaculture to prevent diseases in fish we like to focus on the study of bacillus species to act as a good microbiota in the gastrointestinal tract intestine of aquatic animals.

III. MATERIALS AND METHODS

A. Tolerance of antagonistic strains under different pH and bile condition

we will be test the bacterial strain of PH under different culture condition and expect survival rate in the host of gastrointestinal tract in fish will be based on bile concentration[4]. For the acidic tolerance the bacterial strains

will grow in MRS broth at 37 degree overnight to be adjust for each culture in media at different PH level using laminar air flow by pour plate method through serial dilution process and for bile tolerance the use of bile solution to each culture in media for bacterial growth and the activity of tolerance will be monitor through spectrophotometer based on final observance[5].

B. Hydrophobicity & Antibiotic sensitivity test

Autoaggression capacity, adhesion and antibiotic interaction of bacillus species will be determine through susceptibility test. The microbial adhesion to hydrocarbons (MATH) test was used to evaluate the hydrophobic properties of selected Lactobacillus strains based on the method first described by Rosenber et al [6] with modifications. In this review, each strain is washed twice with PBS by centrifugation and monitor through spectrophotometer. Hydrophobic properties of the strains will be analyzed in three replications, and the cells adhesion to the hydrocarbon was calculated by the formula provided by Chae et al [7]:

$$\text{Hydrophobicity (\%)} = [(A_0 - (A/A_0)) \times 100]$$

IV. IMMUNE PARAMETER ANALYSIS

Based on the reference articles, we will be determining the effects of probiotic bacteria in immune system in fish whether increases or not through respiratory burst activity, antioxidant activity, lysosome activity, immunoglobulin in plasma and DNA will be test in future work. Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses) [8]. Based on the passing over would be the use of English units as descriptive in trade, such as "3.5-inch disk drive".

A. Respiratory burst activity

Based on this review, the metabolic activity of phagocytes was determined by the measurement of the intracellular RBA after stimulation with phorbol myristate acetate (PMA) (Sigma-Aldrich), as described previously [9]. After overnight incubation, the plates were washed to remove non-adherent cells and a PMA solution (Sigma Aldrich) was added to each well. The mixture will incubate for an hour at desired temperature. Afterwards, supernatants will remove spontaneously, and the reaction was stopped by the addition of absolute ethanol and dissolved in dimethyl sulfoxide (DMSO) (POCH, Poland) and the optical density was measure using calorimetrically and it expressed as stimulation index (SI) values, which were calculated by dividing the mean OD of PMA-stimulated cells by the ODs of control, unstimulated cells.[10]

B. Antioxidant activity

Probiotics can produce various metabolites with antioxidant activity, such as glutathione (GSH), butyrate, and folate. Folate could be a vitamin which accepts one-carbon units from donor molecules and is intricate in many metabolic pathways [11]. The efficiency of DNA replication, repair, and methylation is affected by folate availability. Due to possibly antioxidant functions, the capability to yield folate has been effectively reviewed in multiple probiotic strains from a variety of source. The antioxidant mechanisms of probiotics could be assigned to reactive oxygen species

strolling, metal ion chelation, enzyme inhibition, and to the reduction activity and inhibition of ascorbate autoxidation.

C. Lysozyme Activity

Lysozyme activity will be measure using the turbidimetric assay developed by Parry et al. (1965) and the micro plate adaptation method of Hutchinson and Manning (1996) with some minor modifications. Chicken egg lysozyme (Sigma) was used as a standard procedure [12]. It was dissolve in phosphate buffer to make a solution in suspension of lyophilized *Micrococcus lysodeikticus* (Sigma) was prepared as substrate in this article will be reviewed. A sample was added to buffer with substrate (*M. lysodeikticus*) was added to give a final volume. The absorbance was measured in the unit of enzyme activity was defined as a reduction in absorbance.

D. Total Immunoglobulin (Ig) in Plasma

Immunoglobulin levels was estimate and the serum was transferred to a plastic serum vial and the same volume of polyethylene glycol was added and incubate at 37°C for 2h with constant mixing. The supernatant was taken out by centrifugation. The protein concentration in the supernatant was analyzed using the method of Lowry and collaborators. The absolute immunoglobulin level was dictated by taking away the protein content in the supernatant (with PEG treatment) from the complete protein content in the plasma (without PEG treatment) [13]. Total Ig levels will expression as mg/ml.

E. DNase treatment and cDNA synthesis :

Based on reference, a known volume of RNA was incubated with DNase buffer and DNase enzyme at required temperature. The reaction was stopped by adding EDTA and also heat will become inactivated. After that, one microgram of DNase treated RNA was used for cDNA synthesis using a RevertAid cDNA synthesis kit following the instructions of the referenced studies [14]. Keep the RNA sample along with PCR machine. After that, add the RT reaction mixture immediately to the RNA samples. Run RT reaction for inactivate RT.

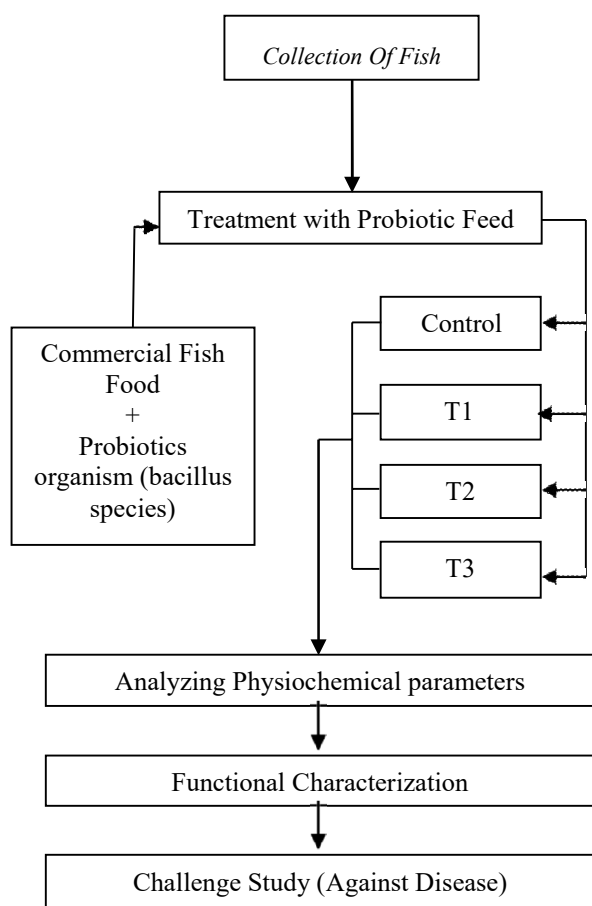
V. PROBIOTICS AS FEED

Probiotic will be feed to fish with binders like cod liver oil and then will encapsulate to prevent from external environment and feed will survive to reach in the gut for each various doses at standard condition under the guidelines by FAO and WHO. Combined utility of probiotics and prebiotics, referred to as synbiotics, is primarily based totally at the precept of supplying a probiont with an aggressive benefit over endogenous populations, enhancing the survival and implantation of the stay microbial nutritional supplement within the gastrointestinal tract of the host[15]. The principal cause for the usage of a symbiotic is that a real probiotic, without its prebiotic food, does now no longer live on nicely in digestive systems; it's going to have a extra intolerance for oxygen, low pH and temperature. As prebiotics offer great help for probiotics to thrive, the populace of those precise microorganism is preserved [16].

VI. MECHANISM ACTION OF PROBIOTICS

Probiotics modulate the growth of the gut microbiota, suppress potentially harmful bacteria and strengthen the body's own defenses in fish, and this inhibit may be antagonistic property to the growth of pathogens in intestine [17]. They can conjointly stimulate the appetency and improve nutrition by the assembly of vitamins, detoxification of compounds within the diet and break- down of indigestible parts.

VII. METHODOLOGY



T1, T2, T3 - Fish with various probiotics concentration
Control - Fish with commercial feed

Fig.1- Study of prophylactic potentials of Probiotic Bacteria-Methodology

VIII. CHALLENGE STUDY AGAINST INFECTION

They also can stimulate the appetite and enhance vitamins through the manufacturing of vitamins, cleansing of compounds withinside the weight loss program and break-down of indigestible components [18]. Challenge study done in the previous studies showed excellent properties of the probiotics used against the disease. The same can be done using *Bacillus* species supplemented as probiotics to the fish model chosen and the results are expected to be effective. Challenge study done in the previous studies showed excellent properties of the probiotics used against the disease. The same can be done using *Bacillus* species

supplemented as probiotics to the fish model chosen and the results are expected to be effective.[19]

IX. CONCLUSION

In aquaculture, probiotics are administered with the aid of using feed and water additives. In aquatic animals, it's miles hard to be positive whether the useful outcomes are because of supplemented exogenous probiotic microorganism or intrinsic microorganism. The direct use of a probiotic in culture water is a unique cognizance of environmental research. They are normally overseas or exogenous traces, and constitute a probable hazard of microorganism pollution, especially with the usage of traces with genetic modification, unique adhesions or colonization niches, antibiotic manufacturing, and synergistic action. An environmental effect evaluation looks at and an appraisal in regard to useful outcomes are high prerequisites to introducing new probiotics into aquaculture. *Bacillus species* are taken as safe probiotic bacteria to enhance the activity of different intestinal enzymes to efficient digestion against pathogenic bacteria.

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A Study on Age assortment among Faculties towards Employee Performance in Engineering College, Namakkal District, Tamilnadu.

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ABSTRACT

The age assortment becomes one of the important dimensions in the assortment. Age assortment in the workplace bring about different experience, expectation, style and perceptive. All these difference can become a source of strength and innovation where addressed and managed the right way. It become an issue because the older worker consistently report experiencing age related discrimination in the workplace, older employee aren't able to change with the times and are therefore incapable of learning new skills, they contribute much less than younger worker of today college. The objective of the study was determining relationship between age assortment and employee performance in engineering college, Namakkal District, Tamil Nadu. The target population is taken from an engineering college were the respondents are around 50 from all department. Assortment is increasingly recognized and utilized as an important organizational resource in regards to whether the goal is to be an employer of choice, to provide excellent customer service, or to maintain a competitive edge. Workplace assortment is a multi-faceted concept that will continue to evolve as more industries move toward a global marketplace. It also has proven to have led to a perception of being fundamental for employee performance. The purpose of this research is to investigate the effect of work force diversify towards employee performance in an organization which focus into air line industry. The research also focuses on workforce assortment which includes the gender, age, ethnic and education background of the employees which is the most critical variables among all the others. The conclusion drawn from the study finding is that the age assortment influences the performance in positively and majority of the employee are positive about the age assortment practices in engineering colleges. It is recommended

that the management has to consider the age discrimination policy into the education sectors.

Key Words: *Performance, Age Assortment, Workforce, Assortment management*

I. INTRODUCTION

Age assortment is defined as the ability of an organization to accept people of various age categories within the organization business environment. It has become a usual factor for the organization to cope up with aging population in all possible ways.

1.1 Advantages of Diverse Ages in the Workplace:

An organization is said to have a healthy workforce only if has employees of various age categories. Having a generational difference in an organization has many advantages in various possible aspects. Age assortment caters to good decision making skills as it will have a group of people with different age groups. Problem solving skills in an organization is very important, and increasing age assortment in the workplace encourages creativity, and adds lot of advantage to it. A work force which has an age diverse will help the environment to be more responsible and cheerful as well. It also enables the organization to thoroughly access benefits of the talented people.

At present, work force is comprised of different age group of people faces many positive things as well negative outcomes too. Trying to balance and cope up with the different age categories, needs more strength and good management skill. Understanding and mutual respect among the age group will leave the organization very productive. Age assortment is very productive but, at the same time very challenging. Assortment in the work place envelops many factors. It has to come up with different

origin, different language speaking people, social status, religion and entire attitudinal change. Here are few advantages of age assortment which contributes to the success of the organization.

1.1.1. Fitting to the environment and more adaptive:

Age assortment trains an employee to be more adaptive, as they meet various cultured people and are exposed to different mindsets. Employees who are from different age groups in the workplace have different mentality and use various strategies to solve issues in the office. Right from the way they think, plan and execute it differs. So, in order to sustain they have become flexible. Hence, this in turn helps them to be adaptive to any kind of environment.

1.1.2. It increases the demand on global basis:

Age assortment plays an important role in meeting the demands of the customer and bringing more productivity. An organization, which has diverse skill, set people and experience helps the organization to meet the demands of all age categories. This helps the organization to meet the demands and render service on a global basis.

1.1.3. Variety of opinions from various age categories:

Age diverse workforce has variety of opinions for a single issue or a decision making point. Their opinions might give the organization with larger scale of ideas and new experiences. The organization can think effectively to meet the business with various suggestions to move further. This makes them meet the customers need more efficiently.

1.1.4. Strength to exhibit newer ideas and fast execution:

Organization with age diversified people will have more courage to do a process as they have more matured experience as well as youthful ability to turn risks into opportunities. This will make the organization produce more profit, widen their business, and as well as faster execution.

1.1.5. Experience counts:

People with good experience will always have matured opinion and will execute any ideas from fresher's in a systematic approach. In this way, all the interesting ideas or opinions will come to execution very faster. So, in this way age assortment will bring up more goodness and will meet the demands of the organization effectively.

1.1.6. Work ethics:

Right from creating work ethics, age assortment is very important. In order to be not too backward or not too out of laws, an organization needs people of various age groups. And hence, an organization will have neat ethics satisfying all the employees of various age groups.

1.1.7. More motivated:

People of same group will have a same thought process sometimes. If in case, there is a difficult time in the organization there should be people who think beyond the troubles. In these cases, different age diversified people will mutually help each other and get motivated. This is one big advantage of age assortment.

1.1.8. Mutually get trained:

When an organization has good age assortment, there is lots of chance of good assortment training between them. For example, there might be things which experienced people might have not been exposed in their career, and vice versa there might be some proper ethics which younger generation does not know. These kinds of things can be easily handled when there is age diversified people. They can handle this situation mutually by helping each other. This is one important advantage of age assortment.

1.1.9. Work life balance:

There might be situations in organizations where senior employees will have a scheduled time to work, and younger generation will also have a comfortable time for working. Hence, in these kind of situations both of them can mutually help each other and work in respective time limits. Age assortment is one big advantage for good work life balance.

1.2. Disadvantages of Age Assortment in the Workplace:

There are too many advantages of age assortment. But as all know, there are equally some disadvantages of assortment in the workplace related to age. First very thing which hinders is the lack of mutual interests, lack of communication, and egoistic approach because of the age difference. Because of these things many disadvantages of assortment pop up having this as a base issue. There are lot many issues where different age group think in different manner. For example, one single issue might have different ways to approach. Problem rises if both the people stick to their decision.

For present younger generation, job might be a career goal, but in case of matured and experienced people, job might be a livelihood. Their way of approaching a job life will start the conflict and tension rises when it becomes

ego related issue. It is the duty of the organization to approach these kinds of assortment issues and have a culture that respects each other with dignity and integrity without breaking the laws. Some of the basic hindrance to age assortment is,

1.2.1. Lack of proper communication:

One of the most common challenge which age assortment faces is lack of communication. When employees don't mutually communicate, the first issue arises. This happens because of ego and less teamwork. People of different age groups have a mindset that why they have to bend for people, who are of not up to their standards. When a manager is of younger in age due to his education, senior employees might react making them low by comparing. Another form of miscommunication is language which creates a trouble. People tend not to talk in common language like English rather, forms groups and speak mother tongue. This will make age assortment difficult to survive.

1.2.2. Resistance to not adopting new culture:

There are employees who do not want to change their way of working style according to the newer environment. They refuse to accept the reality that technology is taking over. That too when new systems are taught by younger generation. There comes the riff, and which resists them to adopt. Unwilling to adopt newer things is a big disadvantage.

1.2.3. Forming groups inside teams:

This is a very common disadvantage, as it is seen in most age diversified environment. Employees in the same team, when find people of their age category start getting comfortable due to language, religion or social status. This largely hinders the growth of the company.

1.2.4. not very comfortable with each other's attitude or behavior:

It is a basic human nature, to get adapted to people who only go along with their opinions or nature. This cannot be good for office ethics. Also same gender of same age group gets along into a group and avoids meeting others in professional journey.

1.2.5. Attached only to particular style and no social mingling:

For example, employees of same age category tend to be only with their age groups and never encourage or try to be others during the informal hours. Sometimes it is healthy to have a common chat informally during break hours to break the ice. But this does not happen at all. Due

to this, employees might miss knowledge sharing, or exposure to newer things happening in higher level. This might affect the productivity of the organization.

II. OBJECTIVE

1. To measure the relationship between age assortment and employee's performance in engineering colleges at Namakkal District.

III. REVIEW OF LITERATURE

Christian Pfeifer et al (2013) explored the relationship between the composition of a firm's workforce (with a special focus on age and gender) and its performance (productivity and profitability) for a large employee sample of enterprises from manufacturing industries in Germany using newly available, unique data. The study found concave age-productivity profiles and a negative correlation of age on firms' profitability.

Ram Kumar Mishra et al (2013) analyzed age assortment—toward a balanced board. The age of directors plays an important role in the way they think and respond to challenges. Young directors are tech savvy and familiar with new concepts; older directors, by comparison, bring experience and wisdom to the board. Younger directors tend to be more active and energetic in taking up executive roles. Non-executive and independent directors are older.

Dejun Tony Kong et al (2016) identified a positive relationship between age and generalized trust, which is not moderated by socio political factors such as the Gini coefficient, the Human Development Index, and individualism, raising the question whether the age–trust relationship is free from socio political influence.

Oleksandr Talavera et al (2018) investigated why age-diverse boards influence bank performance, the study decomposed board age assortment into assortment of directors' personal values, utilizing the World Values Survey. The study found that heterogeneity among directors' views on risk, prudence, and wealth is more likely to spark intergroup conflicts in the decision-making process. This prevents the board from functioning effectively and ultimately weakens bank profitability.

Martie-Louise Verreyne et al (2019) examines innovation assortment, and its relationship with small and medium enterprise (SME) performance. It then considers the role of uncertainty and dependence on tourism markets in this relationship.

IV. RESEARCH METHODOLOGY

The study employed both qualitative and quantitative methodologies. Data were collected by questionnaires in structured format. Secondary sources like college handbooks and ethical codes were also reviewed to

complement data obtained through questionnaires and interviews. The data are collected by using standard questionnaire. The researcher used the convenience sampling for this research. The sample size is 25 and tools used to measure are simple percentage, standard deviation and weighted average. Chi square and Correlation Analysis.

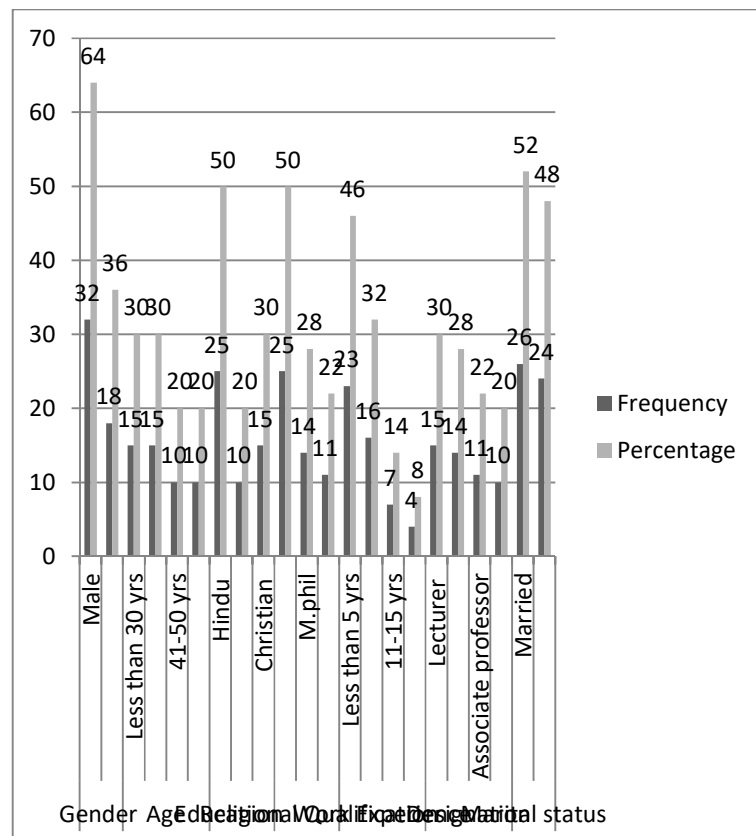
V. DATA ANALYSIS AND INTERPRETATION

5.1 DESCRIPTIVE ANALYSIS

5.1.1. PERCENTAGE ANALYSIS

		Frequency	Percentage
Gender	Male	32	64
	Female	18	36
Age	Less than 30 yrs	15	30
	31-40 yrs	15	30
	41-50 yrs	10	20
	Above 50 yrs	10	20
Religion	Hindu	25	50
	Muslim	10	20
	Christian	15	30
Educational Qualification	PG	25	50
	M.phil	14	28
	Ph.d	11	22
Work Experience	Less than 5 yrs	23	46
	5-10 yrs	16	32
	11-15 yrs	7	14
	Above 15 yrs	4	8
Designation	Lecturer	15	30
	Assistant professor	14	28
	Associate professor	11	22
	Professor	10	20
Marital status	Married	26	52
	Unmarried	24	48

5.1.1 CHART SHOWING THE DESCRIPTIVE ANALYSIS – PERCENTAGE ANALYSIS



5.2 DESCRIPTIVE ANALYSIS

Central Tendencies Measurement of Constructs: Age on employee performance

Attribu tes	Stro ngly Agree	Ag ree	Neu tral	Disa gree	Stron gly Disa gree	Me an	S. D
Proper mix of employ ee	24%	24 %	8%	30%	14%	2.8 6	1.4 43
Recruit Fresher	40%	16 %	14%	20%	10%	2.4 4	1.4 45
Allow post retirem ent age employ ee	32%	26 %	12%	20%	10%	2.5 0	1.3 89
All age group employ ee involve d in decisio n	30%	18 %	16%	26%	10%	2.6 8	1.4 06

making							
Bonding well among staff	34%	24%	10%	22%	30%	2.50	1.418
Easy to adjust with different age group	26%	32%	4%	24%	14%	2.68	1.449
Increase the performance	22%	34%	20%	20%	4%	2.50	1.165
Age difference causes conflict	30%	26%	8%	24%	12%	2.62	1.441
Mentoring by aged to younger staff	26%	36%	12%	18%	8%	2.46	1.28
Positive about the age assortment	32%	30%	12%	20%	6%	2.38	1.292

The above table shows that the mean and standard deviation of the workforce age assortment among the employee performance, the mean (2.86) there is a proper mix of the employee from all the age group, the mean of (2.68) that all age group employee involved in the decision making and they find easy to adjust with the different age group of employee. The mean of 2.62 shows that there will be age difference causes the conflict among the colleague, (2.50) mean value shows that there is a bonding well among the employee and it increase the performance of employee, (2.46) there is a good sign of monitoring by the aged the younger staff members., (2.44) mean inculcate there is every year of fresher recruiting in the college, the least mean of (2.38) show that there is a positive about the age assortment in the workplace..

5.3 CORRELATION OF AGE ASSORTMENT AND EMPLOYEE'S PERFORMANCE

H₀: There is no significant relationship between age assortment and employee's performance in engineering colleges at Namakkal District.

H₁: There is a significant relationship between age assortment and employee's performance in engineering colleges at Namakkal District.

Correlations			
		Age	Performance
Age	Pearson Correlation	1	.061
	Sig. (2-tailed)		.675
	N	50	50
Performance	Pearson Correlation	.061	1
	Sig. (2-tailed)	.675	
	N	50	50

From the correlation table it can be seen that the correlation coefficient (r) equals 0.061, indicating a positive correlation at the same time no significant relationship between age assortment and employee's performance. Since p-value (0.675) > 0.05, we accept the null hypothesis. It can be concluded that there is no statistically significant correlation between age assortment and employee's performance

5.4 CHI SQUARE TEST AGE WITH EMPLOYEE PERFORMANCE

Age with the Enjoy the Task

H₀: There is a significant difference in workforce assortment among the different age group of employee and enjoy the task

H₁: There is no significant difference in workforce assortment among the different age group of employee and enjoy the task

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.489 ^a	12	.488
The Likelihood Ratio	14.128	12	.293
Linear-by-Linear Association	.202	1	.653
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .60.

From the above table its show that the calculated value is 11.489, the p value is .488. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and enjoy the task.

5.4.1 AGE WITH THE COMMITTED TO MISSION

H: There is a significant difference in workforce assortment among age group of employee and committed to mission

H0: There is no significant difference in workforce assortment among the different age group of employee and committed to mission

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.139 ^a	12	.292
Likelihood Ratio	17.629	12	.127
Linear-by-Linear Association	1.640	1	.200
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .40.

From the above table it shows that the calculated value is 14.139, the p value is .292. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and committed to task

5.4.2 AGE WITH THE MOTIVATED TO COMPLETE THE TASK

H1: There is significant difference in workforce assortment among the different age group of employee and motivated to complete the task

H0: There is no significant difference in workforce assortment among the different age group of employee and motivated to complete the task

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.783 ^a	12	.548
Likelihood Ratio	10.798	12	.546
Linear-by-Linear Association	.149	1	.700
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .20.

From the above table it shows that the calculated value is 10.783, the p value is .548. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment

among the different age group of employee and motivated to complete the task.

5.4.3 AGE WITH THE COOPERATE WELL WITH MY COLLEAGUE

H: There is significant difference in workforce assortment among the different age group of employee and cooperate well with my colleague

H0: There is no significant difference in workforce assortment among the different age group of employee and cooperate well with my colleague

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.534 ^a	12	.569
Likelihood Ratio	12.336	12	.419
Linear-by-Linear Association	1.750	1	.186
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .20.

From the above table it shows that the calculated value is 10.534, the p value is .569. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and cooperate with my colleague

5.4.4 AGE WITH THE GIVEN CHANCE TO TRY MY OWN

H1: There is significant difference in workforce assortment among the different age group of employee and given chance to try my own

H0: There is no significant difference in workforce assortment among the different age group of employee and given chance to try my own

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.820 ^a	12	.200
Likelihood Ratio	18.168	12	.111
Linear-by-Linear Association	1.032	1	.310
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is 1.00.

From the above table its show that the calculated value is 15.820 the p value is .200. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and they are given chance to try their own

5.4.5 AGE WITH THE PERFORMANCE BETTER THAN WHAT CAN BE ACCEPTABLE PERFORMANCE

H1: There is significant difference in workforce assortment among the different age group of employee and perform better than what can be acceptable performance

H0: There is no significant difference in workforce assortment among the different age group of employee and perform better enhance what can be acceptable performance

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.783 ^a	12	.548
Likelihood Ratio	10.798	12	.546
Linear-by-Linear Association	.149	1	.700
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .20.

From the above table its show that the calculated value is 10.783, the p value is .548. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and their performance better than what can be acceptable performance

5.4.5 AGE WITH THE CONSIDERING THE PERFORMANCE BETTER THAN AVERAGE PERFORMANCE

H1: There is significant difference in workforce assortment among the different age group of employee and consider the performance better than average employee

H0: There is no significant difference in workforce assortment among the different age group of employee and consider the performance better than average employee

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.201 ^a	12	.951
Likelihood Ratio	4.949	12	.960
Linear-by-Linear Association	.021	1	.886
N of Valid Cases	50		

a. 20 cells (100.0%) have expected count less than 5. The minimum expected count is 1.00.

From the above table its show that the calculated value is 5.201, the p value is .951. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and they are considering the performance better than average performance.

5.4.6 AGE WITH THE ADDING VALUE TO MY DEPARTMENT AND ORGANIZATION

H1: There is significant difference in workforce assortment among the different age group of employee and add value to my department and organization

H0: There is no significant difference in workforce assortment among the different age group of employee and add value to my department and organization

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.893 ^a	12	.454
Likelihood Ratio	11.988	12	.447
Linear-by-Linear Association	.493	1	.483
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .40.

From the above table its show that the calculated value is 11.893, the p value is .454. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and motivated to complete the task.

5.4.7 AGE WITH THE PERFORMANCE REFLECT MY ABILITY

H1: There is significant difference in workforce assortment among the different age group of employee and performance reflect my ability

H0: There is no significant difference in workforce assortment among the different age group of employee and performance reflect my ability

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.919 ^a	12	.623
Likelihood Ratio	11.137	12	.517
Linear-by-Linear Association	.130	1	.718
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .40.

From the above table its show that the calculated value is 9.919 the p value is .623. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and their performance reflects their ability.

5.4.8 AGE WITH THE OFTEN MET THE TARGET

H1: There is significant difference in workforce assortment among the different age group of employee and often met the target

H0: There is no significant difference in workforce assortment among the different age group of employee and often met the target

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.760 ^a	12	.255
Likelihood Ratio	17.456	12	.133
Linear-by-Linear Association	.000	1	.992
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .80.

From the above table its show that the calculated value is 14.760, the p value is .255 in this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and often met their target.

5.4.9 AGE WITH THE WORKING IN DIVERSE GROUP INCREASE THE PRODUCTIVITY

H1: There is significant difference in workforce assortment among the different age group of employee and working in diverse group increase the productivity

H0: There is no significant difference in workforce assortment among the different age group of employee and working in diverse group increase the productivity

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.320 ^a	12	.760
Likelihood Ratio	9.814	12	.632
Linear-by-Linear Association	1.106	1	.293
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .40.

From the above table its show that the calculated value is 8.320, the p value is .760. In this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment among the different age group of employee and increase the productivity

5.4.10 AGE WITH THE WORKING IN DIVERSE GROUP ENHANCE CREATIVITY

H1: There is significant difference in workforce assortment among the different age group of employee and working in diverse group enhance creativity

H0: There is no significant difference in workforce assortment among the different age group of employee and working in diverse group enhance creativity

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.181 ^a	12	.600
Likelihood Ratio	13.563	12	.329
Linear-by-Linear Association	.497	1	.481
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .60.

From the above table its show that the calculated value is 10.181 the p value is .600 in this the p value is smaller than the calculated value, so we reject the null hypothesis and accept the alternative hypothesis. There is no significant relationship between the workforce assortment

among the different age group of employee and it enhance the creativity

VI FINDING AND SUGGESTION

The major finding from this research is that it show that major of the attributes relating to the employee performance towards the age factor show that are positively correlated and only the management of the engineering college has to focus on the proper mix of recruiting the all age group of employee and while taking decision they have consider all the age group employee opinion. From this research found that the engineering college are strong in the attributes like recruiting the fresher, allowing the post retire age employee, bonding well among others, easy to adjust with different age group and its also increase their performance when all age group of employee involved and while mentoring the age by the younger group of employee

The suggestion towards the management of engineering college is to avoid the age discrimination, by providing the orientation programmed to the entire employee from all age group and a separate motivation program to the younger and the senior towards the achievement of their target without considering the age as one of the factors. Since its depends upon the experience of the senior and the knowledge and smart work of the younger employee.

VII CONCLUSION

The objectives of the research are fulfilled with the results acceptance excepted for age. Since the Workforce assortment is becomes one of most popular ways to evaluate employee performance in an organization in recent year, the research tends to provide the evidence to support future research related to this field. Employee aged above the 50 yrs are likely to less participating in training or to have been offered it. Older employee is less likely than younger or mid life worker to take up any opportunity for training that are offered by the management of engineering college. These barrier can be rectify by including the policy of assortment equality, crafting an age diverse and inclusive talent strategy that develop all employee to avoid the discrimination while recruiting practices are inclusive of age blind.

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A STUDY ON JOB STRESS OF RAILWAY EMPLOYEES WITH SPECIAL REFERENCE TO ERODE DISTRICT

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ABSTRACT

The Indian railway is one of the largest sources for economic development. It has the world's biggest human resources in work atmosphere. The success of the industry is based on its efficient staff. The employee's job satisfaction and morale is very essential one to achieve both organizational and individual goals. But sometimes most of the grievances are raised in workforce. It will affect the individuals and as well as organizations. The one main problem which affects each and every individual and work place is stress. The study helps to analyze the job stress faced by the Railway employees with special reference to Erode district with 100 employees.

INTRODUCTION

Stress creates frequent physical and mental tension, affecting each individual, based on the situational factors in different ways. According to National Institute for Occupational Safety and Health, job stress can be defined as "the harmful physical and emotional responses that occur when the requirements of the job do not match the

capabilities, resources, or needs of the worker". Simply speaking, the primary source of job stress comes from the working environment due to job insecurity, poor communication with superiors, long working hours, heavy work load, insufficient pay and benefits, lack of workers participation in decision making, urgent deadlines, environmental conditions, lack of family friendly policies, rapid technological changes, risk to health and safety work conditions, etc. These are all creating both psychological and physical stress to everyone, leading to distrust,

depression and anger. At the same time, the workers are affected by headaches, sleep disturbances, lack of concentration, short temper, stomach upset and blood pressure, due to stress. These stress factors affect every person both internally and externally.

OBJECTIVES OF THE STUDY

- ❖ To analyze the stress level of the respondents based on their demographic characteristics.
- ❖ To find out the major causes of stress.
- ❖ To analyze the techniques to reduce stress.

RESEARCH METHODOLOGY

This is a Descriptive research study. Both primary and secondary data were collected for the study. The primary data was collected through observations and through use of a questionnaire. The second hand data was collected from journals, newspapers, magazines, previous records, etc. The simple random sampling technique was used for data collection from the respondents in Erode Railway junction and in Diesel Loco Shed. Data was collected from 100 sample respondents. The statistical tools used for analysis of the data collected were simple percentage analysis and chi-square test.

DATA ANALYSIS AND INTERPRETATION

1. Age Vs Job Stress level of the respondents

Table 1 (Two-way Table)

Level of job stress	High level of job stress	Medium level of job stress	Low level of job stress	Total
Age (in years)				
20-30	2(5.31)	7(3.6)	0(0)	9
30-40	17(16.32)	11(11.2)	0(0)	28
40-50	8(8.26)	6(5.6)	0(0)	14
Above 50	32(28.91)	16(19.6)	1(0.49)	49
Total	59	40	1	100

It is inferred from the above table that the majority of 32 respondents belonging to the age group of above 50 years and the least of 2 respondents belonging to the age group of below 20 years are having high level of job stress. The majority of 16 respondents belonging to the age group of above 50 years and the least of 6 respondents belonging to the age group of 40-50 years are having medium level of job stress and only one respondent belonging to the age group of above 50 years are having low level of job stress.

Chi-Square Test

H₀₁: There is no significant relationship between the age and the level of job stress faced by the respondents.

H_{a1}: There is significant relationship between the age and the level of job stress faced by the respondents.

Table 2 (Chi-Square Test)

Factor	Calculated value	Table value	Degrees of freedom	Result
Age	18.591	12.592	6	Rejected

It is found from the above table that the calculated value is greater than the table value at 5% of level of significance. Therefore the hypothesis is rejected. Hence it can be concluded that there is significant relationship between the age and job stress level of the respondents.

2. Gender Vs Job Stress level of the Respondents

Table 3 (Two-way table)

Level of job stress	High level of job stress	Medium level of job stress	Low level of job stress	Total
Gender				
Male	57(54.28)	34(36.8)	1(0.92)	92
Female	2(4.72)	6(3.2)	0(0)	8
Total	59	40	1	100

It is inferred that a majority of 57 male respondents and 2 female respondents are having high level of job stress. A majority of 34 male respondents and 6 female respondents are having medium level of job stress and only one male respondent is having low level of job stress.

Chi-Square Test:

H₀₂: There is no significant relationship between the gender and the level of job stress.

H_{a2}: There is significant relationship between the gender and the level of job stress.

Table 4 (Chi – Square Test)

Factor	Calculated value	Table value	Degrees of freedom	Result
Gender	11.322	5.991	2	Rejected

The above table shows that the calculated value is greater than the table value at 5% level of significance. So the null hypothesis is rejected. Hence, it can be concluded that there is significant relationship between the gender and the level of job stress faced by the Railway Employees.

3. Monthly Income Vs Job Stress level of respondents

Table 5 (Two-way Table)

Level of job stress	High level of job stress	Medium level of job stress	Low level of job stress	Total
Monthly income (in Rs.)				
Below 5000	1 (0.59)	0(0)	0(0)	1
5000-10000	0(0)	3 (12)	0(0)	3

10000-20000	17 (21.81)	20 (14.8)	0(0)	37
Above 20000	41 (34.81)	17 (23.6)	1 (0.59)	59
Total	59	40	1	100

It is clear that the majority of 41 respondents belonging to the income group of above Rs.20000 and the least of 1 respondent belonging to the income group of below Rs.5000 are having high level of job stress. The majority of 20 respondents belonging to the income group of Rs.10000- Rs.20000 and the least of 3 respondents belonging to the income group of Rs.5000- Rs.10000 are having medium level of job stress. Only one respondent belonging to the income group of above Rs.20000 is having low level of job stress.

Chi-Square Test:

Ho₃: There is no significant relationship between monthly income and the level of job stress.

Ha₃: There is significant relationship between monthly income and the level of job stress.

Table 6 (Chi-Square Test)

Factor	Calculated value	Table value	Degrees of freedom	Result
Monthly income	9.108	12.592	6	Accepted

From the above table it is deducted that, the calculated value is less than the table value at 5% level of significance. Therefore, the null hypothesis is accepted. Hence, it can be concluded that there is no significant relationship between the monthly income and the level of job stress faced by the Railway employees.

4. Service in Years Vs Job Stress Level of Respondents

Table 7 (Two-way Table)

Level of job stress	High level of job stress	Medium level of job stress	Low level of job stress	Total
Service in years				
Below 5 years	0(0)	2 (0.8)	0(0)	2
5-10	11	8 (8.76)	0(0)	19

years	(11.21)			
11-20 years	8 (11.8)	12 (8)	0(0)	20
Above 20 years	40 (34.81)	18 (23.6)	1 (0.59)	59
Total	59	40	1	100

It is inferred from the above that the majority of 40 respondents belonging to the service of above 20 years and the least of 8 respondents belonging to the service of below 11-20 years are having high level of job stress. The majority of 18 respondents belonging to the service of above 20 years and the least at 2 respondents belonging to the service of below 5 years are having medium level of job stress. Only one respondent belonging to the service of above 20 years is having low level of job stress.

Chi-Square Test:

Ho₄: There is no significant relationship between the years of service and level of job stress.

Ha₄: There is no significant relationship between the years of service and level of job stress.

Table 8 (Chi-Square Test)

Factor	Calculated value	Table value	Degree of freedom	Result
Service in years	9.862	12.592	6	Accepted

In the above table it is seen that, the calculated value is less than the table value at 5% level of significance. Therefore, the null hypothesis is accepted. Hence, it can be concluded that there is no significant relationship between service in years and job stress faced by the Railway Employees.

5. Level of Job Stress of the Respondents

Table 9

S.No	Level of job stress	No. of respondents
1	High	60
2	Medium	39
3	Low	1
	Total	100

The above table shows that 60% of the respondents are having high level of job stress, 39%

of the respondents are having medium level of job stress, 1% of the respondent is having low level of job stress. It is clear that the majority (60%) of the respondents are having high level of job stress.

6. Causes of Job Stress

Table 10

S.NO	Causes	No. of Respondents
1	Work environment	29
2	Lack of worker participation in decision making	18
3	Long working hours	22
4	Hectic and Routine task	19
5	Infrequent rest breaks	12
	Total	100

The above table depicts the causes of job stress of the respondents - 29% due to work environment, 18% of the respondents due to lack of workers participation in decision making, 22% of the respondents due to long working hours, 19% of the respondents due to hectic and routine task and 12% of the respondents due to infrequent rest break. It is clear that, for majority of the respondents work environment is the major causes of stress.

7. Symptoms of Stress

Table 11

S.No	Symptoms	No. of Respondents
1	Headaches	23
2	Sleep disturbances	31
3	Low morale	18
4	Job dissatisfaction	17
5	Increased absenteeism	11
	Total	100

The above table shows that 23% of the respondents have headaches, 31% of the respondents have sleep disturbances, 18% of the respondents suffer due to low morale, 17% of the respondents face job dissatisfaction and 11% of the respondents have increased absenteeism. Thus it is clear that majority of the respondents suffer from sleep disturbance which is the main symptom of stress.

8. Techniques to Reduce the Stress Level

Table 12

S.No	Techniques	No. of Respondents
1	Organize the time	12
2	Share a problem	13
3	Yoga	15
4	Spending time with family and friends	16
5	Sleep	32
6	Muscle relaxation techniques	7
7	Organize the work space	5
	Total	100

The above table shows that 12% of the respondents organize their time to avoid stress, 13% of the respondents share their problem with others, 15% of the respondents practice yoga, 16% of the respondents are spending their time with family and friends, 31% of the respondents Sleep well to reduce their stress, 7% of the respondents follow muscle relaxation techniques and 5% of the respondents do organize the work space. It is clear that majority of the respondents agree that sound sleep is the main technique to reduce the stress.

FINDINGS

Majority (49%) of the respondents are belonging to the age group of above 50 years facing high level of job stress. There is a significant relationship between the age and level of job stress faced by the railway employees.

Majority (59%) of the respondents are having 20 years of service and the majority of 40 respondents having service of above 20 years are facing high level of job stress. There is no significant relationship between the service and the level of the job stress faced by the Railway Employees.

Majority (60%) of the respondents are having high level of job stress.

Majority (29%) of the respondents are agreeing that work environment is the main cause of stress.

Majority (31%) of the respondents feel that 'sleep disturbance' is the major symptom of stress.

Majority (32%) of the respondents agree that sound sleep is the major technique to reduce stress.

CONCLUSION

Stress is the common problem among the workforce. The organization should make changes to reduce the stress. They should assign the work load based on the workers capabilities and resources, define the worker roles and responsibility properly, develop communications, create opportunity for social interaction with subordinates, prepare work schedules and create opportunities for workers to utilize their skills. Management should conduct stress management programs to create more awareness about stress. The techniques to be followed to reduce stress are deep breathing, muscle relaxation techniques, exercising, taking a walk, good sleep, listening to relaxing music, mediating and yoga, organizing the time, organizing the work space, taking breaks, sharing a problem, etc. Thus, this research study shall help the railway administration to maintain a peaceful work environment for its employees.

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An Experimental Study on Flexural Behaviour of Fiber Reinforced Geopolymer Concrete Slabs

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Abstract- This paper deals with experimental investigation to understand the structural performance as a flexural member of Geo polymer concrete. A comparative analysis has been carried out for normal conventional concrete to that of the Steel fiber reinforced geopolymer concrete under ambient curing in relation to compressive, split tensile, flexural strengths. For the experimental work, 70% flyash and 30% GGBS as a replacement of cement and a combination of sodium silicate solution (with water content 55.9%) and sodium hydroxide flakes (with 98% purity) were used. The Alkaline solution was prepared by mixing flakes in the sodium silicate solution together one day prior to use. The ratio of sodium silicate to sodium hydroxide solution was fixed as 2.5 and the molarity of NaOH was kept as 8. Steel fiber of 1.5% of total volume of geopolymer concrete is the optimum dosage with an aspect ratio 71. As the fiber content increases compressive, split tensile and flexural strengths are proportionally increases. It is also found that with addition of fibers the load deflection is reduced by 30%.

Keywords: Fiber reinforced concrete, Steel fiber, Alkaline solution, Flexural Strength, Slab.

I. INTRODUCTION

Concrete is a widely used construction material for various types of structures due to its structural ability and strength. Its total consumption is around twenty billions tones, which is equivalent to two tones for every living human being. In India, most of the construction activities are made with concrete, as it is easily available and the moulding can be done even by unskilled labour. Thus, concrete is becoming a very important material for every human.

GEOPOLYMER is an alternative cementitious material which has ceramic-like properties. As oppose to OPC, the manufacturer of fly ash-slag (GGBS) based geo-polymer does not consume high levels of energy, as fly ash and slag are already an industrial by-product. Geo-polymers have also been shown to have good bond strength to cement concrete. Hence it is a good repair material with superior abrasion resistance.

The motivation for using fly ash and slag as the main raw material is driven by various factors:

- It is cheap and available in bulk quantities.
- It is currently under utilized accept for its use as an additive in OPC.
- It requires less water (or solution) for activation.
- Fly ash and GGBS based geo polymer also provides superior performance and gives better resistance to

aggressive environmental condition compared to normal concrete.

The compressive strength of geopolymer concrete increases with the optimum NaOH molarity,

binder/alkaline activator ratio, $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio used, and curing process handled. Fibers are mainly used to prevent the prolongation of cracks. The steel fiber used in this work is hook ended type HK0750 having aspect ratios 71. The addition of fiber content reduces the deflection.

II. MATERIALS AND MIX SPECIFICATIONS

A. *Flyash* : The chemical and physical composition of the fly ash was determined as per IS: 3812-2003.

Sl No	Description	Values	Requirement as per IS:3812:2003
1	Specific gravity	2.2	-----
2	Fineness (Blain's air permeability- m^2/kg)	522	320
3	Residue on 45 micron sieve, percent (max)	24.4	34

Table 1: Physical properties (Class F)

Sl No	Description (Requirement as per IS:3812:2003)	Values
1	Silicon dioxide (SiO_2), percent by mass, (min)	61.9
2	Aluminium oxide (Al_2O_3), percent by mass	26.06
3	Iron oxide (Fe_2O_3), percent by mass	6.21
4	Magnesium oxide (MgO), percent by mass, (Max)	0.79
5	Calcium oxide (CaO), percent by mass	3.05

Table 2: Chemical properties (Class F)

B. *GGBS*

Sl no	Description	Values
1	Specific gravity	2.62
2	Fineness by Blaine's air permeability (m^2/kg)	321
3	Wet sieve analysis % retained on (45 μ)	2.90

Table 3: Physical properties

Sl no	Description	Values
1	Silicon dioxide(SiO ₂)	33.78
2	Aluminum oxide(Al ₂ O ₃)	17.08
3	CaO (Calcium oxide)	39.87
4	MgO (Magnesium oxide)	7.10

Table 4: Chemical properties

C. Alkaline solution: A combination of sodium silicate solution and sodium hydroxide solution were used to initiate the aluminium and the silica in the binder (fly ash & GGBS). The sodium hydroxide is in the form of flakes with 98% purity. Sodium hydroxide solution was prepared by dissolving flakes in the water. For the experimental work the concentration of sodium hydroxide solution used was 8 molar. In order to yield this concentration, one liter of the water contained 8X40=320 grams of flakes, Commercially available sodium silicate was used for this experimental work with water content 55.9%. The ratio of sodium silicate to sodium hydroxide solution was fixed as 2.5. The alkaline solution was prepared by mixing both sodium silicate solution and sodium hydroxide solution together at least one day prior to use.

D. Steel Fibers: The steel fiber used is the hook ended type HK0750 having aspect ratios 71. The dosage of fibers was fixed as 1.5% of the total volume of the geopolymer concrete. The length of dividing fiber is 50mm and the diameter of fiber is 0.7.

E. Design Parameters: The details of ingredients for the experimental work are as follows:

Sl no.	Design parameters	Values	Quantity (kg/m ³)
1	The wet density of geopolymer concrete	2400	2400
2	Fly ash	70%	286
3	GGBS	30%	122
4	Steel fiber	1.5%	36
5	Molarity	8M	-
6	Coarse and fine agg	77%	554+1294=1848
7	Ratio of Sodium silicate to Sodium Hydroxide solution	2.5:1	-
8	Sodium silicate	-	103
9	NaOH(30kgwater+11kg NaOH)	-	41

Table 5: Design parameters

III. EXPERIMENTAL PROGRAM AND RESULTS

A. Tests on Geopolymer Concrete Cubes And Cylinders:

The basic test as per the Indian standard code IS: 516-1959 (reaffirmed 1999) was conducted for concrete mix with and without the addition of fibers on 2000kN capacity UTM to study the behavior of the concrete. The specimens used for this test are 150X150X150 mm cubes and 150 mm dia, 300 mm length cylinders for compressive strength test and split tensile strength test respectively.

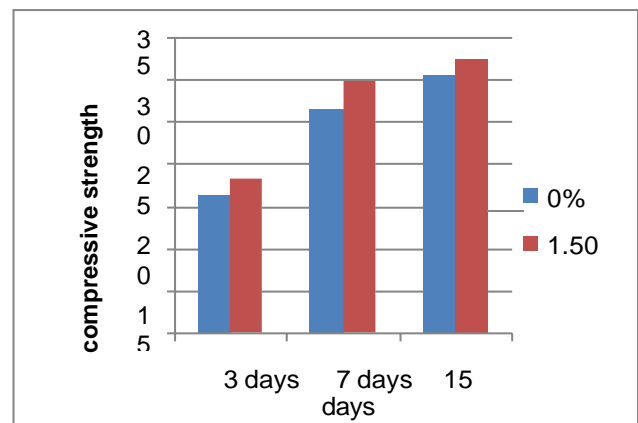
• Compressive Strength Test:



Figure 1: Test set up for compression

Sl. No	Fiber added(%)	Days of curing	Load at failure(KN)	Compressive strength(Mpa)
1	0	3	367	16.31
2	1.5	3	410.85	18.26
3	0	7	596.4	26.51
4	1.5	7	670.5	29.8
5	0	15	687.6	30.56
6	1.5	15	726.75	32.3

Table 6: Compressive strength test for steel fiber reinforced geo polymer concrete



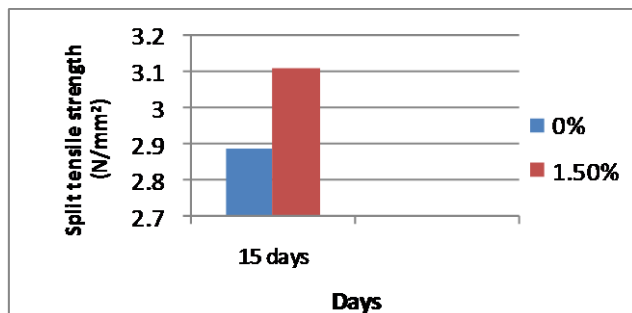
Graph 1: Compressive strength v/s Days

From the above table it is clear that the compressive strength of concrete at 3 days, 7 days and 28 days is increasing with the fiber content when compared to that of conventional concrete and also observed that 15% gain is seen in the compressive strength on adding fiber content.

• Split Tensile Strength Test:

Sl. No	Type of specimen	Load P(kN)	Split tensile strength $f_{ct}=2P/\pi ld$ (N/mm ²)
1	Without Fiber	205	2.89
2	Steel Fiber	220	3.11

Table 7: Split tensile strength test for steel fiber reinforced geo polymer concrete



Graph 2: Split tensile strength v/s days

From the above graph it is observed that split tensile strength of concrete with fiber content is more when it is compared with that of conventional concrete at 15 days. It is found that 1.5% addition of steel fibers in the weight of concrete is the optimum dosage. Also 15% increase in the tensile strength of fiber reinforced geopolymer concrete is seen at this optimum dosage.

B. Tests on Geopolymer Concrete Slabs

• Flexural Test:

This paper discuss with the casting of reinforced geopolymer concrete slab specimens with detailed test program. In order achieve the required tensile reinforcement HYSD bars having yield strength 500 N/mm² were used for the production of reinforced geopolymer concrete slabs with fiber (steel fiber) and without fiber. Totally three reinforced geopolymer concrete slabs were casted and tested, among that one was conventional geopolymer concrete slab(S1), and the other two were steel fiber reinforced geopolymer concrete slab(S2, S3). The behaviour of load deflection characteristics are presented in this paper.

Slab Details:

The dimensions of a member was selected based on the, practical limitations, such as size of the loading frame and its capacity, capacity of the hydraulic jack used for loading the slabs. Accordingly, dimensions of the slab are as follows Overall Length = 1000mm, Overall Breadth = 1000mm, Overall Depth = 60mm

Geometry and reinforcement arrangement:

All three slabs were 1000mm x 1000mm x 60mm. The clear cover to reinforcement was 10mm on all faces. The geometry and reinforcement arrangement of slabs were presented in table.

Slab	Slab Dimension	Reinforcement	
		Main Reinforcement	Distribution Reinforcement
S1	1000X1000X60	8Φ @ 100 c/c	8 Φ @ 100mm c/c
S2, S3	1000X1000X60	8Φ @ 90 c/c	8 Φ @ 90 mm c/c

Table 8:Slab details

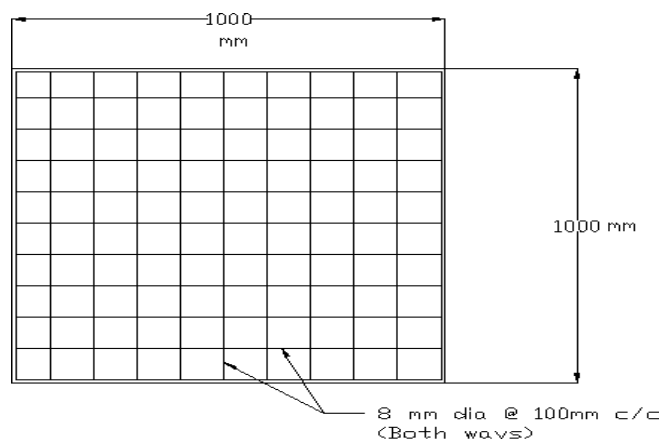


Figure 2: Slab Reinforcement

Test Setup And Instrumentation:

All the slabs are simply supported and tested in 500 kN capacity loading frame for uniformly distributed load, one dial gauge of least count 0.001 mm was placed on the center of tension face of the slab to measure the deflection along the length.

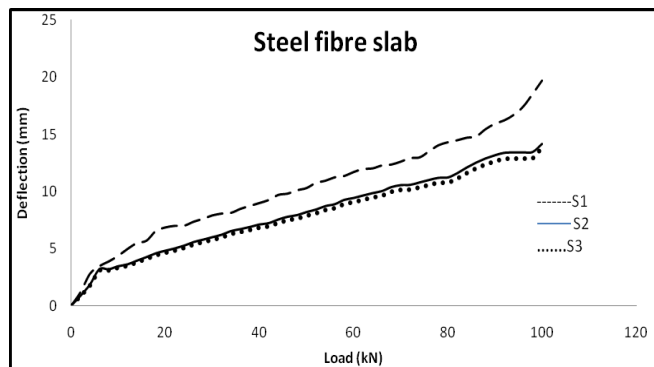
Before placing the slab specimens on the loading frame, all the specimens were white washed in order to facilitate marking of cracks. After white wash the slab specimens were placed on the loading frame with all the arrangement load is applied in an interval of 2kN using hydraulic jack at the same time deflection is noted down with the help of digital dial gauges, and also Demec gauge reading is also noted. Crack load and ultimate load is recorded also the cracking patterns are marked to study the crack patterns of the specimens. The loading is continued until the failure of slab specimens.

Experimental Results:

The test set up was done for the first specimen (control slab S1), Digital dial gauges was fixed at the bottom centre of slab. Initial adjustments were done before the experiment. The first signs of distress in control slab specimens was hairline cracks at the flexure zone. Additional cracks emerged and the existing cracks widened and propagated towards the edges of slab as the load was increased. The first crack was observed at 48 kN. The load – deflection graphs is plotted for the specimen.

The other two slabs were tested with steel fiber (S2,S3) which showed the first crack at 50 KN.

As the load increases slab starts to deflect at the center in the direction of load and cracks are developed along the tension face of the slab specimens, eventually all the slab specimens failed in a typical flexure mode.



Graph 3: Load-deflection curve for GPC slab and Steel fiber reinforced slab

From the above graph 3, it could be seen that the deflection of slab reduces with the addition of fibers when compared to the slab without fiber. From the results it is observed that the first crack occurs in the slab at almost the same load for all specimens considered. But in steel fiber reinforced slabs (steel) the prolongation of the crack is restricted due to the presence of fibers thus the second and third cracks appear later compare to the slab without fiber.

CONCLUSION

1. It was noticed that 70% fly ash and 30% GGBS combination works similar to OPC from the experiments.
2. The mix design was done by assuming the density of GPC as same as RCC that is 2400kg/m^3 the total mass of the aggregate was taken as 77% of the entire concrete mix by mass.
 - Mass of GPC source material was taken as 408 kg and total mass of alkaline liquid was $(\text{NaOH} + \text{Na}_2\text{SiO}_3) = 144\text{ kg}$
 - Molarity of NaOH was considered as 8M and ratio of chemical solution was fixed as 2.5 throughout the work.
3. If the proper quality control is exercised, then the cost of production of cubic meter GPC concrete can be reduced to that of ordinary Portland cement concrete.
4. The deflection of slab reduces with the addition of fibers to it when compared to the slab without fiber.
5. The first crack occurs in the slab at almost the same load for specimens with or without fiber.
6. In steel fiber reinforced slabs the prolongation of the crack is restricted due to the presence of fibers thus the second and third cracks appear later compare to the slab without fiber.

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Development of light weight and Light Transmitting Concrete using Waste Scrap Materials

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Abstract-Concrete is a composite material composed of fine and coarse aggregate bonded together with fluid cement that hardens over time. Now days mostly the construction researchers have been trying to improve the quality and reduced dead weight of the structure and enhance its performance. In this current situation there is a demand in natural sand so engineers are using manufactured sand. The aim of our project is to reduce the dead weight of the structure as well increase the strength of the concrete. So we developed light weight aggregate and sand by using waste plastic and glass materials. We developed a concrete by using crushed glass bottles and melted plastic which is considered as light weight concrete. Glass is an ideal material for recycling use of recycled glass helps in energy saving. This indicate that glass can be effectively used as a fine aggregate replacement without substantial change in strength and also we used aluminum metal powder for reducing the member weight by introduced air in concrete. For the innovative and aesthetic purpose we made the concrete to glow using plastic optical fiber which acts as a transmitting agent which also called as translucent concrete in which the optical fiber is inserted in parallel way. We used epoxy to harden the optical fiber (0.75mm) and M20 grade concrete.

Keywords — *fine and coarse aggregate, bracing, plastic optical fiber*

Introduction

Now days power generation and saving the current is major worldwide problems. the power generation department meet the lot of problems everyday due to some natural resources and industrial. power consumption is more day by day increased due to automobile industry, machine manufacturing of industry, software field and increased population , same time we loss the natural sourses.in this project report discuss about the power generation from the concrete panel in structures. light transmitting concrete developed.

This paper contributes to the determination of new alternatives for sustainable construction around the world. LT.C. can help to reduce power consumption in buildings by allowing natural light to shine into the building interior through external walls.

Recently nowadays light transmitting concrete is developed by the light weight and same times developed the strength of the concrete. In India and worldwide, variety of

waste is generated in different forms, shape and texture. These industrial wastes mostly possess threat to the environment and the society living nearby. Various researches has been done on this waste material to either degrade or to utilize it in some or the other way.

the main aim of the project is to develop the strength of the concrete and light transmission of concrete by reinforcing optical fibers. In this report conclusion conventional concrete and translucent concrete strength is more or less same. We can develop modern architecture structures using reinforcing optical fibers. Light weight concrete is developed by light weight aggregate. The light weight aggregate is made from the recycled plastic (high density polyethylene), the compressive strength , split tensile strength and flexural strength is obtained from the (0% to 40%) recycling of plastic aggregate .

Nowadays waste materials mostly develop the light weight materials in construction field example for plastic aggregate made from burning of plastic materials, glass sand made from the crushing of waste glass materials. The partially replacement of glass powder by cement. The main aim of the project is to developed the green environment and the concept of green building. The focus of this investigation to evaluate the possibility of using waste glass powders in concrete .using the partially replacement of waste glass powder in cement, we can reduced the density of concrete & emission of carbon-di oxide.

The compressive strength, tensile, flexural strength and light weight concrete is developed by partially replacement of platic waste aggregate. various percentage of plastic aggregate used in concrete such as 1% 2.5% ,5% 10% .the optimum compressive strength, tensile strength and flexural obtained at 2.5% of partially replacement of plastic aggregate and workability also increased by plastic aggregate. we can reduce the land pollution by recycling of plastic aggregate.

The partially replacement of glass powder by river sand. The main aim of the project is to developed the compressive strength, tensile strength , flexural strength and water absorption in various grade of concrete and replacing in various percentage of glass powder. The compressive strength, split tensile strength and flexural strength gradually increase upto 30% addition of waste glass powder and for 40% and 50% replacements the strength values are comparable with that of the control specimens. Highly reduced chlorid contant in concrete by waste glass powder. The chloride penetration test is done by RCPT. In this paper mainly focused develop light transmitting concrete developed by light weight plastic aggregate, glass sand and optical fibres glass.

Aim of the Product

The main purpose of this light transmitting concrete panel is of saving energy using natural light and making it as a green building material.

Due to shortage in coarse aggregate and fine aggregate in the present situation so we replaced with waste glass bottles and waste plastics which is found abundantly in the ground.

The main objective of the project to reduce the member weight and light transmitting of concrete by eco friendly waste materials and optical fiber.

We product the light weight concrete elements and light transmitting concrete for marketing purpose.

II EXPERIMENTAL INVESTIGATION

A. Materials and Investigation

a. Cement:

Ordinary Portland cement of 53 grade available in the local market is used in the investigation. the cement used has been tested for various properties as Table 1 Properties of OPC Cement

Physical properties of cement	
Initial setting time(minutes)	53 mins
Final setting time(minutes)	257 mins
Standard consistency	31.0%
Specific gravity	3.15
Fineness of cement	10%
Chemical properties of cement	
S	20 -21
A	5.3 -5.6
F	4.4 -4.8
C	62 -63
M	0.5 -0.7
S	2.4 -2.8
Loss on ignition(LOI)	1.5 -2.5

per IS: 12269-1987 having high specific gravity of 3.0. The properties of cement given in Table.1.

Glass sand (fine aggregate)

In our investigation we have used the waste glass bottle which is thrown in the ground. We collected all the waste glass bottles from the various places and crushed the bottles using compressive machine and impact testing machine in our lab. After crushing all the bottles we got fine particles of glass powder where we used sieve of 2.56 microns to get finer particles as like fine aggregate.

Glass aggregate can replace part or all of the sand and gravel in concrete, for effects that range from colorful terrazzo, to granite- or marble-like finishes, to concrete that reflects light like a mirror. Glass aggregate can even be used to produce concrete that literally glows. The properties of glass sand given in Table-2 and Figure1.

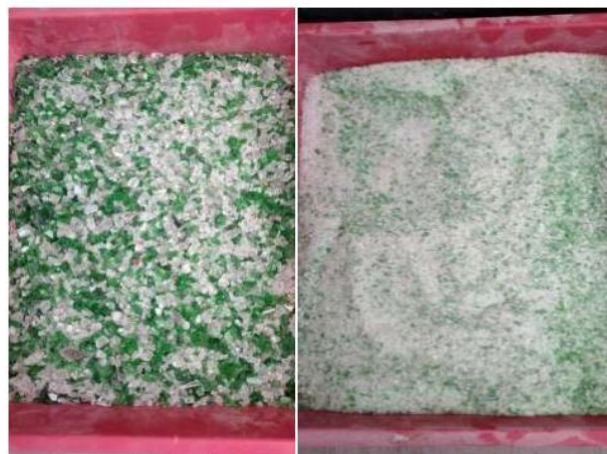


Figure 1 Glass sand

b. Plastic aggregate:

The coarse aggregate is the strongest and porous component of the concrete. Presence of coarse aggregate reduces the drying shrinkage and other dimensional changes occurring on the account of movement of moisture. In our investigation we had used the aggregate passing through 20mm IS-sieve and retaining on 12.5mm sieve. In replace we melted plastic bottles and made like coarse aggregate (20mm). Whereas the plastic coarse aggregate can lower the concrete slab weight. So in our project we used plastic aggregate. The physical and chemical properties of plastic aggregate given in Table 3 and Figure. 2



.Figure 2 Plastic Aggregate

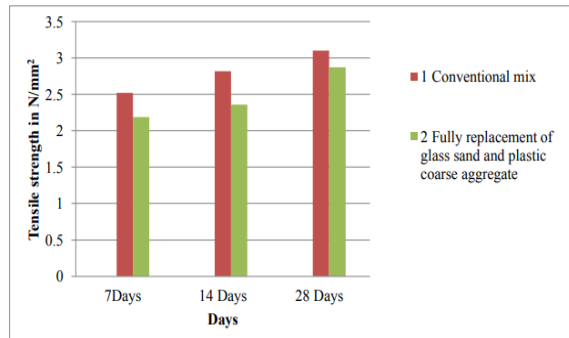
Characteristics plastic aggregate:

Plastics can be used to replace some of the aggregates in a concrete mixture. This contributes to reducing the unit weight of the concrete. This is useful in applications requiring nonbearing lightweight concrete, such as concrete panels used in facades.

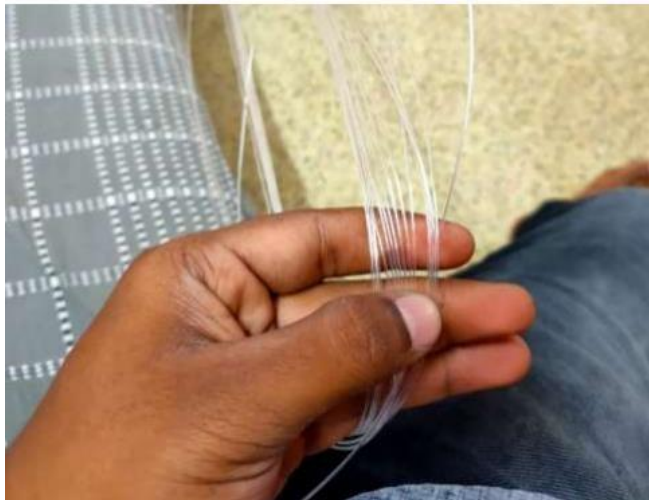
The use of plastics in the mix lowers the density, compressive strength and tensile strength of concrete. The effect of water-cement ratio of strength development is not prominent in the case of plastic concrete. It is because of the fact that the plastic aggregates reduce the bond strength of concrete. Therefore, the failure of concrete occurs due to failure of bond between the cement paste and plastic aggregates.

Plastic optical fiber:

Plastic optical fiber (POF) or polymer is an optical fiber that it made out of polymer. Similar to glass optical fiber POF transmit light (for illumination or data) through the core of the fiber. Its chief advantage over the glass product, other aspect being equal, is its robustness under bending and stretching. Optical fiber used in the telecommunications is governed by European standards EN60793-2011.size of the fiber 0.75mm The physical and chemical



properties of plastic aggregate given in Figure.3.



7,14 & 28 Days compressive strength of concrete in N/mm²

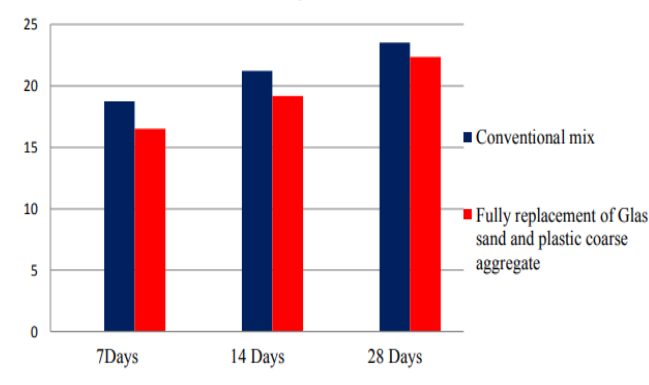


Figure.3.

III. Experimental Procedure

The mix ratio is prepared for M25 grade concrete for both conventional concrete and Bottom ash & lateritic Sand mix concrete. The Cube size of (150 x 150 x 150) mm Specimen is prepared for compressive strength. The cylinder of height 30 cm and 15 cm diameter is prepared

for tensile strength. The specimens are tested for 7 days, 14 days and 28 days with each proportion of waste glass sand, waste plastic materials coarse aggregate and optical fiber mix. Totally there are 18 cubes and 18 cylinders are casted. The panel size of (0.5 x 0.5 x 0.1) m is used for light transmitting concrete panel board. All the specimens are demoulded after 24 hours, and curing is done in water for 7 days, 14 days and 28 days.

IV Result and Discussion

5.1. Compressive strength of concrete. The test is carried out conforming to IS 516 -1959 to obtain compressive strength of concrete at the 7 days, 14 days and 28 days. The cubes are tested using 1400 tonne capacity HELICO compressive testing machine (CTM). The results are presented in Figure.4 and Table 5. The 7, 14 and 28 days compressive strength of waste material concrete (waste material glass sand + waste materials plastic aggregate) is 13.65 %, 10.53% and of 5.09 % of compressive strength is reduced when compared to the conventional concrete. Figure 4 Compressive strength of concrete in N/ mm2

5.3 Preparation of Light transmitting concrete

Preparing of glass fine aggregate:

Waste glass bottles collect from various processes and as a first step we crushed with compressive test machine and sieved with 2.36 IS sieve and in the impact machine impacted to get finer particles sieved with 1.36 IS sieve.

Making of plastic aggregate:

Waste plastic bottles collected from the thrown field and chemical treatment has been done to clean the bottle. For melting purpose we used microwave oven and gas stone to make irregular shape jelly (20mm). The plastic bottles has melted with more than 200 degree Celsius whereas to get hard, rough surface and irregular shape

Inserting of optical fibre Optical fiber has placed vertically over the card board sheet. This is set ready for casting Mixing and casting of light transmitting concrete board: Thus the mixing and casting done m25 mix, with the mixture of cement, glass powder, plastic aggregate and water. The light weight and light transmitting concrete board

Advantages of Light transmitting concrete panel

Translucent concrete inserts on front doors of homes, allowing the resident to see when there is a person standing outside.

Translucent concrete walls on restaurants, clubs, and other establishments to reveal how many patrons are inside.

Ceilings of any large office building or commercial structure incorporating translucent concrete would reduce lighting costs during daylight hours.

Sidewalks poured with translucent concrete could be made with lighting underneath, creating lit walkways which would enhance safety, and also encourage foot travel where previously avoided at night.

ISBN: 978-81-963200-9-7
The use of concrete in an outer wall of an indoor stairwell would provide illumination in a power outage, resulting in enhanced safety.

Dis advantages of Light transmitting concrete panel

It is precision material and the correct procedure need to be followed.

It is extremely important to ensure the integrity of optic strands if they break within the product property would almost be neglected.

Costing of this material is difficult as the techniques are just start to develop.

VI Conclusion

1. Recycling of waste scrap glass materials and waste plastic materials
2. To reduced all types of pollution such as marine pollution, water pollution, land Pollution, etc.....
3. The full replacement of waste scrap glass sand instead of river sand and waste materials plastic aggregate instead of coarse aggregate.
4. The waste materials concrete, compressive strength concrete is more or less is the same compare to the conventional concrete specimen.
5. Lane markers in roadways could incorporate various colors in the translucent concrete, allowing for dynamic adjustments when required by traffic fluctuations. Subways using this material could be illuminated in daylight.
6. Speed bumps in parking lots and driveways could be illuminated from below, making them more visible and therefore more effective.

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An Experimental Investigation on Self Healing of High Performance Concrete

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ABSTRACT—Proper curing of concrete structures is important to ensure that they meet their intended performance and durability requirements. Therefore an effective in-situ curing is necessary to cracking problems due to drying shrinkage.

Traditional external curing could not achieve a desired effect due to the very low permeability of high performance concrete, so some researchers shifted their attention to internal curing, a new curing method that may greatly enhance the curing effect on high performance concrete.

The low water-cement ratio (below ~0.4) of HPC, which is necessary for the enhancement of strength and durability, leads to a self-desiccation of concrete, as a result of the cement hydration process. This causes considerable volume changes known as autogenous shrinkage, which in turn lead to concrete cracking. The internal curing (IC) of concrete using small, well distributed water reservoirs seems to be able to solve this problem.

IC is the process by which water is provided throughout the concrete to enhance the cement hydration. IC refers to the process by which the hydration of cement occurs because of the availability of additional internal water that is not part of mixing water. Internal curing can be achieved in two

different ways. (i) By partially replacing fine aggregates by light weight saturated aggregates, (ii) By adding Super Absorbent Polymers.

Super Absorbent Polymers (SAP) is a group of polymeric materials that have the ability to absorb and retain a significant amount of liquid from their surroundings and to retain the liquid within their structure without dissolving.

In this study, the effect of super absorbent polymer (SAP) as agent for internal curing on free autogenous shrinkage and compressive strength of concrete with low w/c ratios is investigated. The effectiveness of the SAP is inversely proportional to w/c ratio. This implies that the SAP is effective mainly at low w/c ratios.

Keywords: Internal Curing, Super Absorbent Polymer, High performance concrete, Autogenous shrinkage.

I. INTRODUCTION

The Excessive evaporation of water (internal or external) from fresh concrete should be avoided; otherwise, the degree of cement hydration would get lowered and thereby concrete may develop unsatisfactory properties. Curing operations should ensure that adequate amount of water is available for cement hydration to occur.

A. DEFINITION OF INTERNAL CURING (IC)

The ACI-308 Code states that “internal curing refers to the process by which the hydration of cement occurs because of the availability of additional internal water that is not part of the mixing Water.” Conventionally, curing concrete means creating

Conditions such that water is not lost from the surface i.e., curing is taken to happen ‘from the outside to inside’. In contrast, ‘internal curing’ is allowing for curing ‘from the inside to outside’ through the internal reservoirs (in the form of saturated lightweight fine aggregates, superabsorbent polymers, or saturated wood fibers) Created. ‘Internal curing’ is often also referred as ‘Self-curing or self-healing.’

B. CONCRETE DEFICIENCIES THAT IC CAN ADDRESS:

The benefit from IC can be expected when

- Cracking of concrete provides passageways resulting in deterioration of reinforcing steel,
- low early-age strength is a problem,
- permeability or durability must be improved,
- Rheology of concrete mixture, modulus of elasticity of the finished product or durability of high fly-ash concretes are considerations.
- Need for: reduced construction time, quicker turnaround time in precast plants, lower maintenance cost, greater performance and predictability.

C. IMPROVEMENTS TO CONCRETE DUE TO INTERNAL CURING:

- Reduces autogenous cracking,
- largely eliminates autogenous shrinkage,
- Reduces permeability,
- Protects reinforcing steel,
- Increases mortar strength,
- Increases early age strength sufficient to withstand strain,
- Provides greater durability,
- Higher early age (say 3 day) flexural strength
- Higher early age (say 3 day) compressive strength,
- Lower turnaround time,
- Improved rheology
- Greater utilization of cement,
- Lower maintenance,
- use of higher levels of flyash,
- higher modulus of elasticity, or
- through mixture designs, lower modulus
- sharper edges,
- greater curing predictability,
- improves contact zone,
- does not adversely affect finishability,
- does not adversely affect pumpability,

II. EXPERIMENTAL PROGRAM

Within the experimental research program concerning the development of mechanical properties of a high performance concrete of grade M60 was considered with the following composition, according to Table 1. The w/c ratio is 0.32. The w/b ratio is 0.30. The Super plasticizer is based on Sulphonated Naphthalene Polymers and supplied as a brown liquid instantly dispersible in water. Coarse Aggregates were chosen, having a particle size of 12.5mm downgraded.

The SAP used, is a suspension polymerized, covalently cross linked acrylamide/acrylic acid copolymer. The particle density is 785 kg/m³ and has a water absorption capacity of 45g/g after 5min (the approximate mixing time). Based on this absorption level, the amount of SAP to be added to the concrete is estimated, aiming for an amount of internal curing water equal to 45 kg/m³ (SAP45), 67.5 kg/m³ (SAP67.5) and 90 kg/m³ (SAP90).

Concrete mixes are made using a planetary mixer according to the following mixing procedure: first the dry components (Cement, Fine & Coarse aggregates, SAP) are mixed for 1 min, and afterwards the water and super plasticizer are added and mixing continues for another 4min. An intensive experimental program is performed to

study the effect of internal curing on different types of concrete properties. (i) Fresh properties (Slump and density); (ii) Mechanical properties such as compressive strength, flexural strength and split tensile strength.

The quantity of internal curing water needed to achieve maximum hydration in concrete was estimated from calculations based on the chemical shrinkage and maximum degree of hydration theoretically achievable in normal cement paste as per powder model, as follows:

$$(w/c)_{ic} = (w/c) \times 0.18$$

Table 1 Mix Proportion (all in kg)

Cement	FA	CA	SF	SP	Water
620	520	902	25	5	215

III. MATERIALS:

Silica Fume is a by-product of electric arc furnace used for the production of silicon metal or alloy. Because the silica fume is of highly reactive pozzolans and pozzolanic additives, it can be used to improve early strength and durability of concrete. It is noticeable that the silica fume is commercially available in considerable amounts worldwide, and the use of the material has advantages to environmental protection.

Some effects of silica fume on properties of hardened concrete are Reduce permeability, Increase the strength of concrete, Improve chemical attack resistance and Durability to thermal cracking.

Table 2 Properties of Silica fume

Properties	Limits
SiO ₂ content %	85-97
Al ₂ O ₃ content %	Nil
Fe ₂ O ₃ content %	Nil
CaO content	<1
Bulk Density	480-720 kg/m ³
Particle Size	1mm
Specific Gravity	2.2
Fineness as Surface area	15000-30000 m ² /kg
General Use in Concrete	Property enhancer

Aggregates locally available aggregates 12.5mm and river sand was used throughout the tests. The specific gravity of fine and coarse aggregates is 2.7 and 2.63. The Bulk density of coarse and fine aggregate is 1875 kg/m³ and 1785 kg/m³.

Super plasticizer- Conplast® SP430 Standards compliance Conplast SP430 complies with IS: 9103:1999 and BS: 5075 Part 3. Conplast SP430 conforms to ASTM-C-494 Type 'F' and Type 'A' depending on the dosages used.

Conplast SP430 is based on Sulphonated Naphthalene Polymers and supplied as a brown liquid instantly dispersible in water. Conplast SP430 has been specially formulated to give high water reductions up to 25% without loss of workability.

Properties:

- Specific gravity 1.220 to 1.225 at 300°C
- Chloride content : Nil to IS:456-2000
- Air entrainment : Approx. 1% additional air is entrained
- Compatibility: Can be used with all types of cements except high aluminacement.

IV. FRESH CONCRETE PROPERTIES

The fresh concrete properties and thus the consistency of the concrete mixture can be determined by means of the slump test and the flow test. Also the density of the fresh concrete can be easily determined by measuring the net weight of a reservoir with a known volume filled with compacted HPC.

Table 3 Fresh properties of concrete

Test	Unit	CC	SAP45	SAP67.5	SAP90
Slump	mm	48	69	42	63
Density(F)*	kg/m ³	2488	2396	2354	2337
Density(H)**	kg/m ³	2423	2379	2328	2300

F* - Fresh Concrete

H** - Hardened Concrete

V. MECHANICAL PROPERTIES:

Compressive Strength

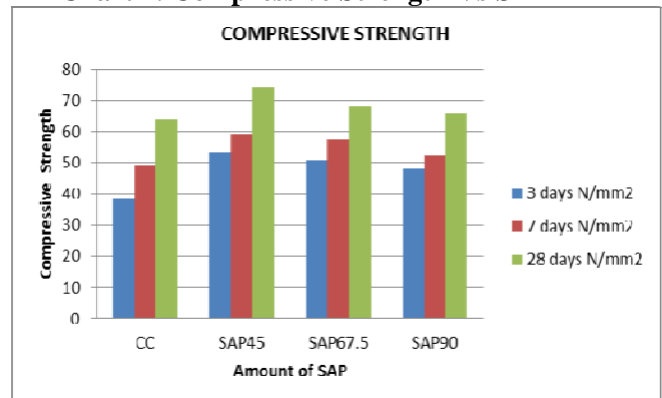
Cube specimens with a side of 150mm are produced and stored immediately after mixing in a climate room. At the age of 3 days, 7 days and 28 days the compressive strength tests are performed.

Table 4 Compressive strength

Mix	3 days N/mm ²	7 days N/mm ²	28 days N/mm ²	% Increase
CC	38.46	49.25	63.87	-

SAP45	53.36	59.31	74.26	23.76
SAP67.5	50.87	57.23	68.13	13.55
SAP90	47.95	52.63	65.93	9.88

Chart 1. Compressive Strength Vs SAP



Split Tensile Strength

Tensile splitting tests are carried out on cylinders (dis 150mm, height 300mm) also stored immediately after mixing in a climate room and tested at the age of 3 days, 7 days and 28 days.

Table 5 Split tensile Strength

Mix	3 days N/mm ²	7 days N/mm ²	28 days N/mm ²	% Increase
CC	2.80	3.32	4.482	-
SAP45	3.92	4.05	5.346	19.28
SAP67.5	3.51	3.90	5.265	17.47
SAP90	2.96	3.59	4.882	8.92

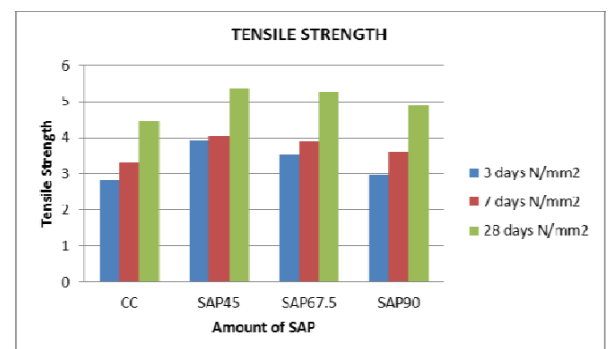


Chart 2. Tensile Strength Vs SAP

Flexural Strength

For each composition, the flexural strength is also determined on prism specimens at the age of 3 days, 7 days and 28 days.

Table 6 Flexural Strength

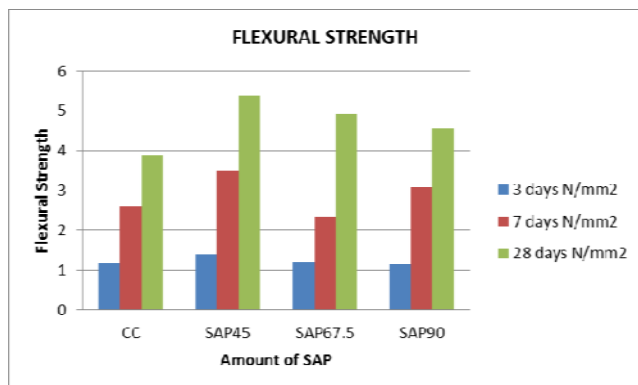
Mix	3 days N/mm ²	7 days N/mm ²	28 days N/mm ²	% Increase
CC	1.19	2.60	3.88	-

SAP45	1.39	3.49	5.4	39.18
SAP67.5	1.21	2.33	4.91	26.55
SAP90	1.15	3.08	4.55	17.27

Chart 3. Flexural Strength Vs SAP

VI. RESULTS AND DISCUSSION:

In the fresh properties, the slump values obtained are tabulated in table 2. The densities of the fresh concrete compositions decrease with increasing amount of curing water. This can be explained by the partial replacement of sand of the conventional concrete by the internal curing water, in order to obtain 1m^3 of concrete. For hardened concrete, the decreased density with successively increased amount of SAP is also found.



VII. CONCLUSION:

High performance concrete with low w/b ratio experiences high autogenous deformation at early age and thereby strength reduction at early ages. By adding super absorbing polymers (SAP) into the HPC as an internal curing agent, and by adding additional curing water to the concrete mixture, the autogenous shrinkage of the HPC can be significantly reduced and hence the strength properties can be increased.

Several mechanical tests were performed to evaluate the effect of internal curing on HPC properties and cracking behavior. Therefore one conventional concrete properties was compared to three compositions with additional amount of SAP, partially replacing the sand of the effectiveness of super absorbing polymers (SAP) as an internal curing agent to prevent early age cracking of HPC.

The main conclusions of this study are listed below:

- ✓ By adding SAP, the autogenous shrinkage is reduced.

- ✓ Addition of SAP also leads to a significant increase of mechanical strength.
- ✓ A higher and earlier heat production rate due to hydration is found for higher amounts of SAP added to the reference concrete.
- ✓ The effectiveness of internal curing by means of SAP applied to a HPC is the highest if 45kg/m^3 water is added by means of 1kg/m^3 SAP.

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PERFORMANCE ANALYSIS OF THE FIBROUS PERVIOUS CONCRETE BY THE PARTIAL REPLACEMENT OF CEMENT WITH SILICA FUME

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Abstract—Pervious concrete is also known as no-fine aggregate concrete. The addition of fine powder will increase the function of pervious concrete pavements for drainage purpose. This study discusses the effect of the partial replacement of cement with the silica fume and the addition of polypropylene fiber in pervious concrete. The silica fume was used to replace the cement by weight from 5% to 15% in steps of 5% with a fiber volume fraction of 1%, 1.5% and 2%. The compressive strength of the pervious concrete was increased up to 10% of partial replacement of cement with fiber volume fraction of 1.5% and then it was decreased. The permeability of pervious concrete was also decreased by increasing the silica fume content and the fiber volume fraction.

Keywords—pervious concrete, silica fume, fibrous pervious concrete, fiber volume fraction, permeability of pervious concrete.

I. INTRODUCTION

Pervious concrete comprises of cement, coarse aggregate with low or without fine aggregates. Due to porous structure of pervious concrete, water can transit into it. Pervious concrete pavement is used in recharging groundwater and reducing storm water runoff. This pavement technology creates more efficient land use by eliminating the need for retention ponds, swales, and other storm water management devices. Pervious concrete also naturally filters water from rainfall or storm and can reduce pollutant loads entering into the streams, pond and river. Due to its lower durability and strength compared to ordinary ones, its application is limited in regions with low traffic congestion such as parking lots, road shoulders, streets and local roads [1,2]. Since fine aggregate amount is low or nil in pervious concrete, cement paste helps coarse aggregate to connect the voids [3]. The application of fibers in pervious concrete is to reduce the micro-cracks and cracks due to tensile strength weakness of concrete [7]. The fibrous pervious concrete has a better performance in energy absorption, flexibility and impact resistance that control the concrete failure in regions under repeated loading. The transition zone between the cement paste and aggregates or fiber has a significant effect in permeability, durability and strength of concrete. In this experimental study, silica fume, a pozzolanic material was used to improve the transition zone. Silica fume is the non-crystalline polymorph of silicon dioxide. It is a by-product of the silicon and ferrosilicon alloy production industries. Silica fume replacement improves fresh and hardened properties of concrete [6]. Khayat told that finer material such as silica fume develop fresh properties of SCC [5]. The application of fiber such as polyvinyl alcohol, polypropylene and steel fibers have been commonly used to reinforce the concrete. Al-Hadithi and Hilal [4] reported that waste plastic fiber at volume fraction of 0-2% and concluded that the optimum

performance of pervious concrete was achieved by using 1.5% fiber volume fraction.

In this study, the performance analysis of fibrous pervious concrete was discussed by the partial replacement of cement with the silica fume by weight of 5%, 10%, and 15% with a polypropylene fiber volume fraction of 1%, 1.5%, and 2%. This study examined the compressive strength, split tensile strength, flexural strength and permeability of pervious concrete for the above-mentioned replacement.

II. MATERIAL PROPERTIES

A. Cement

The Portland pozzolana cement of 53 grade was used in this study which is used confirming to IS 1489-1991 to bind the materials in concrete. The silica fume is used as a pozzolanic material. The physical properties of cement are given in Table 1.

B. Coarse aggregate

Coarse aggregate gives body to the pervious concrete. The use of small sized aggregate will result in better bonding with cement. The coarse aggregate had 100% passing through 12mm sieve and 100% retained on 4.75mm is used confirming to IS 393-1970. Physical properties of coarse aggregate are listed Table 2.

C. Polypropylene fiber

It is a 100% synthetic fiber which is transformed from 85% propylene. Monofilament polypropylene fiber is used properties of polypropylene fiber are listed in Table 3.

D. Super plasticizers

These are used for the high range of water reducing. Here, PERMA PLAST EX super plasticiser is used.

Table 1 Properties of Cement

Properties	Value
Type of Cement	Portland pozzolana cement
Grade of Cement	53 grade
Specific gravity of Cement	3.14
Fineness	6.25%
Consistency of Cement	36%
Initial setting time	30 mins

Table 2 Properties of Coarse aggregate

Properties	Value
Specific gravity	2.71
Fineness modulus	5.792
Water absorption	0.5%

Table 3 Properties of Monofilament Polypropylene fiber

Parameter	Value
Melting point	162°C
Specific gravity	0.91
Length	12mm
Diameter	0.018mm
Aspect ratio	670
Colour	White
Acid and Alkali resistance	Nil
Water absorption	Nil

III EXPERIMENTAL STUDY

A. Mix design

The mix proportion of cement and coarse aggregate ratio for pervious concrete is chosen as 1:5. The silica fume was replaced for cement by weight of 5%, 10%, and 15% with a fiber volume fraction of 1%, 1.5% and 2% with a water cement ratio of 36%.

B. Experimental Investigation

The present study includes 4 specimens. The proportions of the specimens were named as S1, S2, S3, and S4 with a fiber volume fraction of 1%, 1.5%, and 2%. Specimen S1 is control concrete without any replacement and addition of fiber. S2, S3, S4 are 5%, 10%, 15% replacement of silica fume respectively. To determine the compressive strength of the pervious concrete, cubes of size 150mm x 150mm x 150mm were casted and cured for 28 days. To determine the flexural strength of pervious concrete, beams of size 500mm x 10mm x 15mm were casted and cured for 28 days. To determine the split tensile strength and permeability of pervious concrete, cylinders of size 150mm diameter and 300mm were casted and cured for 28 days. The compressive strength and tensile strength of the pervious concrete were conducted as per IS:516 – 1959. For compressive strength the load shall be applied without shock and increased continuously at a rate of approximately 140 kg/cm²/min, until the resistance of the specimen to the increasing load breaks done and no greater load can be sustained. For split tensile strength, the load shall be applied without shock and increase it continuously at the rate to produce a split tensile stress of approximately 1.4 to 2.1 N/mm²/min, until no greater load can be sustained.

IV RESULTS AND DISCUSSIONS

A. Compressive strength

The compressive strength of above-mentioned samples was determined. The compressive strength was increased with a increased percentage of silica fume by weight for the partial replacement of cement. The strength was increased for 10% of silica fume by weight with a fiber volume fraction of 1.5%. The high flexibility and length of polypropylene fibers makes better interlocking among the fiber and cement paste. Due to the fiber proper placement and their distribution in the concrete mixture, the lateral strain is delayed and consequently the compressive strength increases. The further increase in the amount of silica fume and the fiber volume decrease the compressive strength of the pervious concrete. The compressive strength of the various samples of pervious concrete was shown in **Figure 1**.

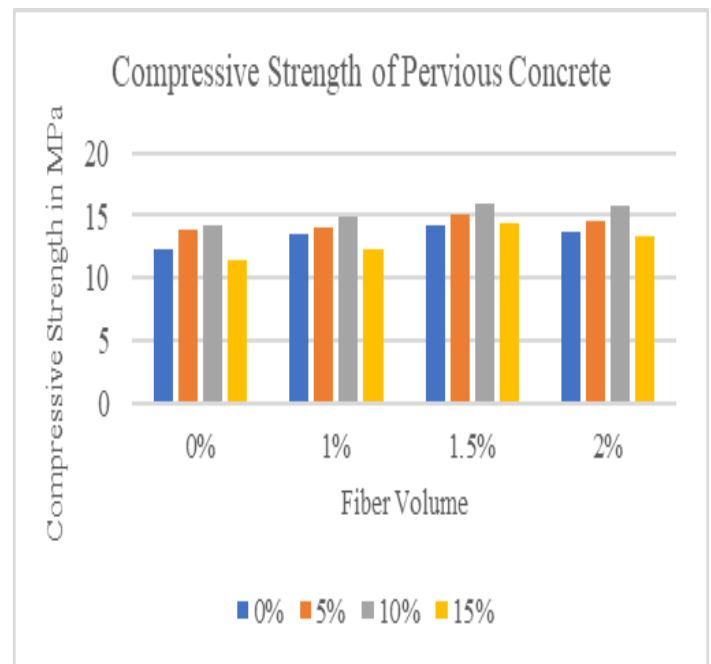


Fig. 1. Compressive strength of pervious concrete

B. Flexural Strength

The flexural strength of above-mentioned samples was determined. The flexural strength of pervious concrete was increased with addition of silica fume and fiber volume fraction for 10% replacement of cement by silica fume with 1.5% of fiber volume fraction. Further addition of silica fume and fiber volume fraction beyond the 10% and 1.5% respectively reduce the concrete workability and hence flexural strength of the concrete get reduced. Similarly, the split tensile strength of the concrete was determined which gives the same effect like flexural behaviour. The flexural strength of various samples of pervious concrete was shown in **Figure 2**.

C. Permeability test.

Permeability is defined as the ability structure to transmit the water thorough in it. The permeability of pervious concrete depends on the porosity of structure, area of sample, and head causing the flow. It can be measured as a function of coefficient of permeability. It can be measured by constant head method. The permeability of pervious concrete of above-mentioned samples were determined. The permeability decreases when the silica fume and the fiber

volume fraction increases. The addition of silica fume and fiber decrease the porous nature of pervious concrete and so the coefficient of permeability was decreased. The permeability of pervious concrete is shown in **Figure 3** for different fiber volume fraction

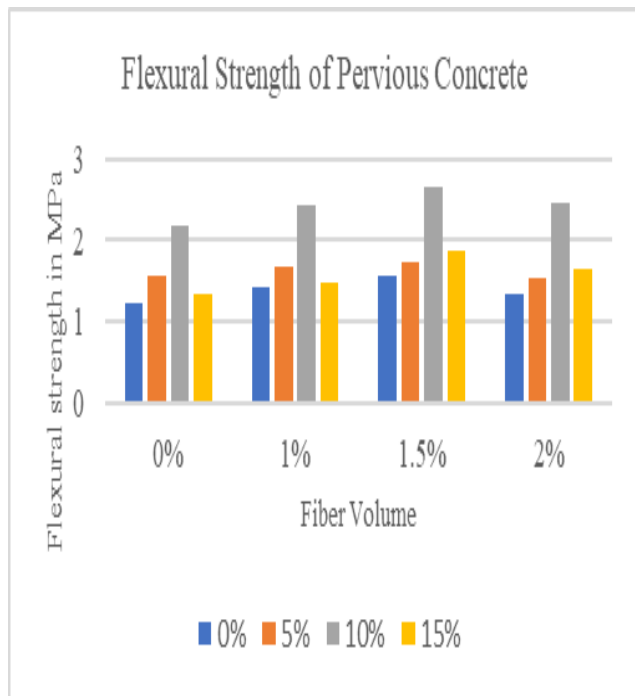


Fig. 2. Flexural Strength of pervious concrete.

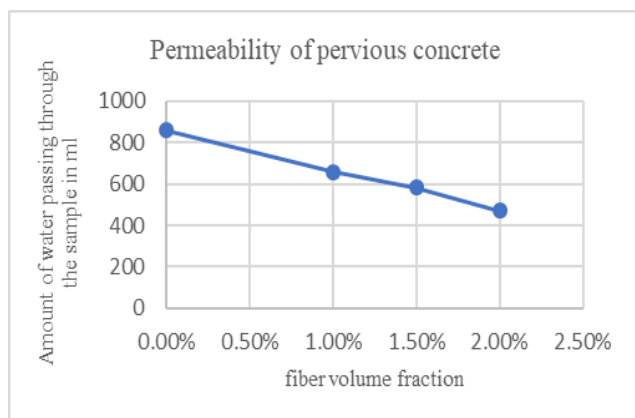


Fig. 3. Permeability of pervious concrete.

V CONCLUSIONS

The fibrous pervious concrete's structural behaviour was determined by the partial replacement of cement with silica fume by weight in 5%, 10%, and 15% with a fiber volume fraction of 1%, 1.5%, and 2%. The following conclusions are made from the experimental studies.

- The compressive strength of the pervious concrete was increased by 30.77% with a replacement of silica fume by 10% and fiber volume fraction of 1.5%. Further increment of fiber and the silica fume affect the compressive strength of the concrete.

- The flexural strength of pervious concrete was increased by 53.5% with a replacement of silica fume by 10% and fiber volume fraction of 1.5%. Further increment of fiber and the silica fume affect the flexural of the concrete.
- The permeability of pervious concrete is decreased with addition of fiber which enhances the better interlocking of aggregate and cement paste of concrete. There by the permeability of concrete decreases.

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EXPERIMENTAL STUDY ON CONCRETE WITH ADDITION OF POLYPROPYLENE FIBER

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Abstract-

Concrete is a fundamental unit for the infrastructural development of an entire world and is a most commonly used building material for its sustainability, versatility, durability and economy. Concrete is a mixture of cement, sand and aggregate with water. To meet the requirements for new construction, the current trend in concrete technology is to increase the strength and durability of concrete. Research is very concerned with laboratory work to see

how including polypropylene fibers improves material durability. Polypropylene fibres will be adding in various proportions (0.75% and 1.5% by weight of cement) the increase compressive strength, Tensile strength for M30 grade of concrete. With the inclusion of a limited number of polypropylene threads aged 7, 14, and 28 days, our project demonstrates the proven strength results of the FRC.

1. INTRODUCTION

Concrete creates small cracks in the treatment and this crack spreads rapidly under the applied pressure resulting in decreased strength of concrete. Thus the addition of fibers improves the strength of concrete and these problems can be overcome by the use of Polypropylene cables in concrete. Use of polypropylene

fibers provide strength to the concrete while the matrix protects the fibers. The main role of cables in cementitious bonding is to control cracks, increase strength, durability and improve the properties of the bonding structure. FRC performance depends on the type of wires used. The insertion of polypropylene fibers reduces water penetration, increases flexural strength due to its high-strength module. In the cracking phase, as the fibers are removed, the force enters and the crack is reduced.

1.2 OBJECTIVE OF PRESENT STUDY

1. To determine the optimum percentage of polypropylene fiber.
2. The main objective of present investigation is to study the properties of concrete with addition of polypropylene fibres. The study was carried out on M30 grade concrete.
3. To compare the strength of concrete cube containing polypropylene fiber with 1.5% proportions of volume of the cement and normal concrete.

2. LITERATURE COLLECTION

Nivedhan et al Normal or conventional concrete uses more of the raw material like sand, gravels, fly ash etc. its usage has been increased to an enormous amount where there are likely chances of meeting with the demand of such construction materials. It may also lead to increase the cost of the materials drastically. Other building materials were built to deal with those problems. This study was conducted in an effort to improve the state of the art by building with recycled materials. Weld slag and fibers, which are

readily available, were chosen to insert a concrete component. Weld slag, which is a residual product, is used in concrete in various quantities to incorporate the dreaded component into 10%, 20%, and 30% by weight.

Prabhakaran et al The use of Fiber-reinforced concrete (FRC) in many engineering applications is undeniable. Reinforced fiber concrete was previously used to build slabs, bridges, industrial buildings, footings, hydraulic structures, and various other structures. This paper provides a state-of-the-art review of experimental studies performed with a reinforced polypropylene fiber machine instead of cement with silica smoke, rice straw, and fly ash, including compression, strength and durability. The effect of different concentrations of polypropylene fibers with mineral admixtures is studied in this system, which uses M30 grade concrete. The various types of concrete have been tested on mechanical properties in various years, as well as the testing of cement, fine-grained, composite, and mineral mixing to learn more about their properties.

ChaitraPatil et al Concrete is a fundamental unit for the infrastructural development of an entire world and is a most commonly used building material for its sustainability, versatility, durability and economy. Concrete is a mixture of cement, sand and aggregate with water. In present situation the availability of natural sand is being decreasing day by day due to its high consumption. Scarcity of natural sand has uplifted the need for its substitute. Manufactured sand is one such excellent alternative material to replace natural sand. Manufactured sand is purpose made crushed aggregate processed by separation, washing, crushing and scrubbing. Polypropylene fibres are used in a concrete to enrich the resistance against cracks and to strengthen the concrete. This paper enhances the experimental results of compressive strength, split tensile strength and flexural strength of fiber reinforced concrete

with a partial replacement of manufactured sand with variant proportions (0%, 20%, 40%, 60%, 80% and 100%) and addition of fixed proportion (1% of weight of cement) of polypropylene fibers.

Baswa Raghav Reddy et al In the following experiment, the study of influence of polypropylene fibers in reinforced High-Performance concrete (HPC) beams was done. 200 * 300 * 2100mm were the dimensions of the sample beam specimens cast in this study. The beam was loaded with two points under the loading frame 28 days after it was cured. Curve of deflection, flexural stiffness, and energy absorption are all investigated. HPC and PFRC had stiffness features of 9.55×10^{-3} and 11.79×10^{-3} , respectively. High-performance concrete (HPC), reinforced polypropylene fiber (PFRC), load deviation, flexural strength, and energy absorption capacity are some of the terms used in this study.

Syed Zaheer Ahmed et al In this experimental study to effort using polypropylene fiber with different mix proportion of fusion ratio to form the fusion reinforced concrete. Polypropylene fibers have modified properties, which will improve flexural concrete strength, break strength, and compression strength. By this strength parameter also increases. In this effort has been approved for M30 and M40 grade concrete according to IS 10262:2009 with five various proportions are added with concrete ingredient. The proportion of polypropylene fiber is varying with different fusion fiber amount varies from i.e. 0% 0.5%, 1.0 %, 1.5% 2.0%. Polypropylene fiber is added by the weight of cement. These tests were done to analyze the hardened properties of concrete for - & 28-days curing specimens. Investigation of strength parameter on different tests is evaluated and results are tabulated. From experimental study and results it can be notify that the sample of added polypropylene fiber 1% & 1.5% determined better results.

4. MATERIAL COLLECTION

3.1CEMENT

Ordinary Portland cement has been used in this project (OPC 53). IS 12269 - 1987 used to inspect all concrete structures. Cement has a gravitational force of 3.15. 55 minutes and 258 minutes were considered the first and last times, respectively. The cement has an average accuracy of 30%.

Cement is one of the binding products of the project. In today's world of construction, cement is one of the most important building materials. Ordinary Portland Cement (OPC) grade 53, according to IS: 8112-1989. Table 3.1 gives the cement structures used.

S.No	Description of test	Test results obtained
1	Initial setting time	65 minutes
2	Final setting time	270 minutes
3	Fineness (specific surface by Blaine's air permeability test)	412.92 m ² /kg

Table 3.1 Properties of cement

3.2COARSE AGGREGATE

Weighed 20mm large sized granular aggregates, with a gravitational force of 2.78 and 7 modulus of fineness. Sources for the collection area were available. The stones compliant with IS: 383 - 1970 is compacted with a scale of 20 mm.

Both specimens will be cast with aggregate with a maximum strength of 2.77 and passed through a filter of 4.75 mm. Many studies have concluded that the total size of coarse aggregate in composite should be limited. The composite form, in addition to the adhesive rate of the cement, has a significant impact on the consistency of the concrete surface.

S.NO	Description	V a l u e s
1	Specific gravity	2 . 6 8

2	Bulk density	1 6 4 2 . 4 5
3	Surface moisture	0 . 0 8 %
4	Water absorption	1 %
5	Fineness modulus	6 . 9 8

Table 3.2 Test results of coarse aggregate

3.3FINE AGGREGATE

Sand was used locally and passed through a 4.75mm IS filter. Fine aggregate had a gravitational force of 2.60. Local river sand meets IS: 383 –1970 Grading Zone I can be used to obtain clean and dry river sand. All types will be cast with sand past with an IS 4.75mm filter.

S . N O	P R O P E R T I E S	V A L U E
1	Specific Gravity	2 . 6 5
2	Fineness Modulus	2 . 2 5
3	Water absorption	1 . 5 %

Table 3.3 Property of Fine Aggregate

3.4 POLYPROPYLENE FIBRES

Monofilament fibers and film fibers are two types of polypropylene. The insertion into the orifices in the spinneret produces the strands of the monofilament, and is then cut to the desired value. After that each film is made in the same way, except that the polypropylene is removed from the sofa, resulting in a corrugated or flat film. The video is then cut to tapes and expanded separately. These tapes are then extended over specially designed roller pin systems, resulting in longitudinal cracks that can be cut or bent to create a variety of shapes.

P r o p e r t i e s	T e s t d a t a
Diameter(D).mm	0 . 0 4 4 5
L e n g t h (l) . m m	6 . 2
Aspect Ratio(l/D)	1 3 9 . 3 3
Tensile strength Mpa	3 0 8
Specific gravity	1 . 3 3

Table 3.4 Properties Of Polypropylene Fibres

4. EXPERIMENTAL SETUP

4.1 COMPRESSIVE STRENGTH TEST

When a specimen of material is loaded in such a way that it extends it is said to be in tension. The content, on the other hand, is said to be in compression if it compresses and shortens. When molecules or atoms are in tension, they are pulled apart, and when they are in confinement, they are forced together. Since atoms in solids are constantly trying to reach an equilibrium position and distance from other atoms, stress and compression forces emerge in the substance. As a result, the processes at the atomic level are similar. All types must be stored on an integrated testing machine during the testing process. The maximum load on which a concrete block can break will be registered. The compression strength can be determined using the formula below according to the recognized values.

Load / Area = Compression Capacity of the sample
sample is 150mm x 150mm x 150mm in size.



Fig 4.1 Compression Test

4.2 SPLIT TENSILE TEST

The diameter of the cylinders, the cubes are cast through a process of 300 mm long and 150 mm wide, and the load is added to the opposite side of the cubes. The load can be felt before the sample template breaks after proper alignment. The formula used in the measurement.

$$\text{Split tensile strength} = 2P / \mu dl$$



Fig 4.2 Split Tensile Test

The tensile strength is one of the basic and important properties of the concrete. Because of their strong durability and bold appearance, concrete often cannot withstand direct tension pressure. The strength of the concrete, on the other hand, should be determined in order to determine which pressure the concrete members can break from. The cracking happens through failure posed by tension.

4.3 FLEXURAL STRENGTH TEST

During the experiment, 7000mmx150mmx150mm testing pieces were used. Specimens dried in the open air after 7 days of healing and tested for flexural test strength under flexural test assembly. Load with a scale that always increases the pressure until it explodes. The fragmentation indicates an inconsistency of the space within a third of the length of the space. Flexural strength is obtained using the formula (R).

$$R = Pl/bd^2$$

Where,

R = Modulus of rupture (N/mm²)

P = Maximum applied load (N/mm²)

l = Length of specimen (mm)

b = Width of specimen (mm)

d = Depth of specimen (mm)



Fig 4.3 Flexural Strength Test

Flexural force, also known as the modulus of rupture, bending force, or force of fracture, the optical device parameter, is defined as the ability of an object to withstand a load under external pressure. Flexural force represents the maximum pressure that occurs within an object during its rupture. Flexural force would be the same as tensile force if that content were the same. In fact, many things have a small or large defect in them that creates a pressure point in the area, which effectively creates local weakness. When the tool is bent only the excess fibers are still under the greatest pressure, therefore, if those fibers have no defects, the flexural strength will be controlled by the strength of those strong 'fibers'.

5. RESULTS & DISCUSSION

5.1 COMPRESSIVE STRENGTH OF CUBE

Days	% replacement	Compressive strength in N/mm ²			Average Strength
		S 1	S 2	S 3	
7	0	17.50	17.4	17.30	17.4
	0 . 7 5	18.50	18.6	18.70	18.6
	1 . 5 0	20.20	20.4	20.50	20.3
28	0	24.5	24.2	23.8	24.2
	0 . 7 5	26.2	25.8	26.5	26.2
	1 . 5 0	28.3	27.9	28.6	28.3

Table 5.1 Compression Test Result

5.1.1 Model Calculation

$$\begin{aligned}\text{STRENGTH} &= \frac{\text{Load}}{\text{Area}} \text{ N/mm}^2 \\ &= 393.75 \times 10^3 / 150 \times 150 \\ &= 17.5 \text{ N/mm}^2\end{aligned}$$

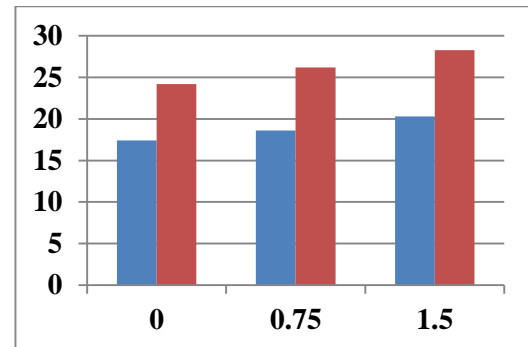


Fig 5.1 Compression Test Graph Result

5.2 SPLIT TENSILE TEST FOR CYLINDER

Curing Days	% replacement	Split Tensile strength in N/mm ²			Average Strength
		S 1	S 2	S 3	
7	0	2.92	2.91	2.91	2.91
	0 . 7 5	3.01	3.01	3.02	3.01
	1 . 5 0	3.14	3.16	3.16	3.15
28	0	3.52	3.48	3.5	3.5
	0 . 7 5	3.78	3.68	3.7	3.72
	1 . 5 0	4.4	4.2	4.15	4.25

Table 5.2 Split Tensile Test Result

5.2.1 Model Calculation

$$\begin{aligned}\text{STRENGTH} &= \frac{2P}{\pi dl} \text{ N/mm}^2 \\ &= 2 \times 206.20 \times 10^3 / (\pi \times 150 \times 300) \\ &= 2.92 \text{ N/mm}^2\end{aligned}$$

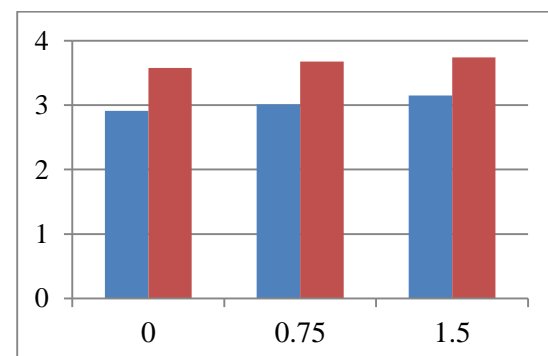


Fig 5.2 Split Tensile Graph Result

5.3 FLEXURAL STRENGTH TEST FOR BEAM

Curing Days	% replacement	Flexural strength in N/mm ²			Average Strength
		S 1	S 2	S 3	
7	0	2.45	2.43	2.42	2.43
	0.75	2.77	2.79	2.80	2.78
	1.50	2.82	2.85	2.87	2.84
28	0	3.8	3.75	3.86	3.80
	0.75	4.2	4.26	4.30	4.25
	1.50	4.85	4.90	4.82	4.85

Table 5.3 Flexural Strength Test Result

5.3.1 Model Calculation

$$\begin{aligned}\text{Flexural strength } R &= Pl/bd^2 \\ &= 11800 \times 700 / (150 \times 150^2) \\ &= 2.45 \text{ N/mm}^2\end{aligned}$$

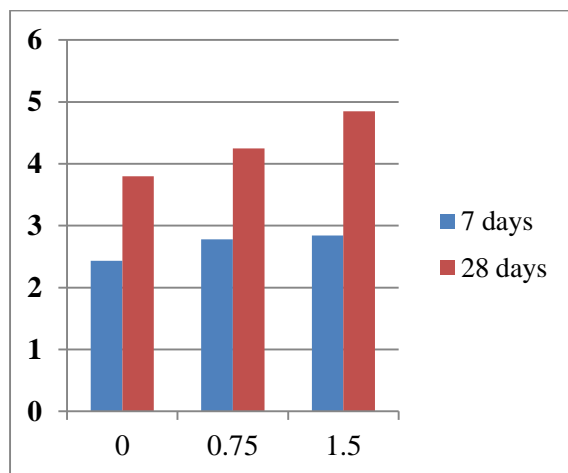


Fig 5.3 Flexural Strength Graph Result

6. CONCLUSION

From the above investigations, the following conclusions are made from the experimental results indicated following: By using of polypropylene fibre the specimens will be cast in different volume i.e. 0%, 0.75% and 1.5% in concrete.

- The compressive strength is increases with increase in quantity of polypropylene fibre.
- The compressive strength of the concrete with 1.5% polypropylene fibre is attaining 28.3N/mm² at 28 days curing.
- The split tensile strength of the concrete with polypropylene fibre is high when compared to conventional concrete.

- The flexural strength of conventional concrete is 4.85 N/mm². It is high when comparing to conventional concrete.
- Addition of polypropylene fibre increases the split tensile strength increasing when comparing to conventional concrete results.
- Therefore, the PP 1.5% gives maximum compressive strength, split tensile strength and flexural strength.
- Finally conclude the result of experimental work proves that addition of polypropylene fibres to increase the strength and mechanical characteristics of concrete.

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EXPERIMENTAL INVESTIGATION ON SIGNIFICANCE OF ENERGY EFFICIENT MATERIALS IN ENHANCING COMPRESSIVE STRENGTH PROPERTY OF CONCRETE

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ABSTRACT-The generation of waste materials have increased, which has to dispose these materials into landfills. The disposal of such waste materials causing scarcity of land and also increases health-related issues for the surrounding residents. Alternative and sustainable solution is the utilization of these waste materials as the construction materials. New effective waste management methods need to be considered especially on recycling concepts and to reduce energy consumption in construction. In this work, the energy efficient material chosen was rice husk ash replaced for cement, GGBS for fine aggregate and demolished waste replaced for coarse aggregate. The mix was designed by IS code method. The work was conducted on M30 grade of concrete. The fresh concrete test were conducted. The compressive strength were found at 7days and 28days for the normal concrete and for various percentage of rice husk in the range of 10%,15%,20% by weight of cement and optimum dosage was found. In the optimum percentage of RHA added concrete, GGBS is partially replaced by fine aggregate in the various percentage of 5%,10% and 15% and optimum percentage of RHA and GGBS added concrete was found. Finally, the coarse aggregate is partially replaced by demolished waste in the range of 10%,15% and 20% in the optimum percentage of RHA and GGBS added concrete. In the above investigation

it is found that the use of energy efficient material resulting in reuse in concrete which gives a good approach to reduce scarcity, cost of materials and also provide a solution for disposal of problems posed by ricehusk ash, GGBS and demolished waste.

Key words:*Energy efficient, Rice husk ash(RHA), Ground Granulated blast furnace slag (GGBS),Demolished waste*

1.INTRODUCTION

1.1 GENERAL

As in increasing demands in development and advancement energy is the necessity for regulating the life style in planet. Because rapid growth in urbanization and population, a huge demanded comes in the real-estate. Building is both, the higher consumption of resources and well the greater cause for environment depletion. A requirement of energy is everywhere and the dependency is belongs to non-renewable resource like fossil fuel. Fossil fuels are most responsible for the environmental depletion as they are major factors for emission of greenhouse gasses in environment. Emission of green gas will increase by 52% in the duration from 2005 to 2050. On other hand emission of carbon dioxide (CO₂) are expected to climb by 78%. In present situation there is 95% of total world energy is made by resources like fossil fuels, coal, oil, and natural gas. For energy generation, process of

combustion take place by several techniques and energy is release major by products are carbon dioxide and residual like fly ash. Environment contamination, specially air, global climate change and resource depletion are the greatest drawback of those heavy fossil fuels. High sulfur coal found with sulfur leaves sulfur dioxide causes acid rain and large amount of particulates form of fly or bottom ash which must be disposed of or recycled.

So, need for research in the way that getting the approach toward energy production by natural resources, proper conservation and smart utilization. Thus, providing a better way for generate the energy without effecting the ecosystem. Most using non-renewable energy source are oil, coal, natural gas and atomic or nuclear energy. There are limits to those energies if we used to much they all can used up, there were none left. Also, the effect of using resources is most responsible for environment depletion through various by-products, as well high cost and dense availability. Make sure should not use as much. Whereas the renewable energy resources like sunshine, wind, water and planets, flow of energy from those resources never stop. So approach is to use more as natural resources as possible.

Building and construction sector itself consume about 35-40% of total energy consumption. Therefore utilizing the better remedy for environment degradation and step toward to creating energy efficient buildings. A building that uses much lower resources and energy through construction to maintenance till removal without compromising to comfort and reliability, gives the equal output or more with same resource consumption also provides much better quality of living with environment. Understanding various benefits of energy efficient

buildings with respect to environment and health, investment, waste reduction water and energy conservations. Mostly that, it is cost effective over conventional buildings through its complete life. Various energy innovative concepts like practicing with design, architect and proper orientation of building shows potential to conserve energy by using of more sky light at day, and passive solar helps to maintain temperature inside the building and reduce the energy required for cooling and heating the structure. Energy efficient buildings also concern with waste reduction, water savings, types of material used and follows the recycle-reuse-reduce pattern shows great resources saving object.

1.2 ENERGY EFFICIENT MATERIAL

Energy efficiency, is the goal to reduce the amount of energy required to provide products and services. For example, insulating a home allows a building to use less heating and cooling energy to achieve and maintain a comfortable temperature.

The materials are fly ash, rice husk, crushed glass, ferrock (slag produced from Manufacturing unit), silica fumes, surkhi, metakaolin. The energy efficient materials are recycled steel, insulating concrete foam, plant base, polyurethane foam, straw bales, cool roof, structural insulated panel, expanded polystyrene (EPS).

1.3 ENVIRONMENTAL IMPACT

Cement manufacture contributes greenhouse gases both directly through the production of carbon dioxide when calcium carbonate is thermally decomposed, producing lime and carbon dioxide, and also through the use of energy, particularly from the contribution of fossil fuels. Average of 927 kg of CO₂ are emitted for every 1000 kg of Portland

cement. The remaining CO₂ emitted is a result of burning fossil fuels such as coal and natural gas to heat the raw materials in the kiln. The demolition wastes are causes the environmental as well as the health problems due to dumping and disposal. waste can be used as admixtures so that natural resources are used more efficiently and the environment is protected from waste. The manufacturing industries are disposing the waste materials directly into the rivers, sea, pond and open space areas so it's not only pollute the land and the air, but it mainly affects the humans and environment.

2.SCOPE OF INVESTIGATION

Due to depletion of raw materials and its long-term socio economic impacts the replacement material is needed for raw material with same properties as raw material. The new replacement material to be used by product from various industries, there is huge problem for disposing these by product because scarcity of land storage, an increased concern about environmental quality and newer waste treatment method are desired while developing a successful diversion strategy, it must be based on its economic sustainability, technical feasibility and a realistic level of social support from the society. Using of by-products recyclable or reusable material in construction industry is one of the environmentally friendly aspects. Selection and hence the current study is aimed at utilization of the energy efficient material in concrete, for understanding some of the mechanical properties of energy efficient material added concrete. Especially to compare the mechanical properties of M30 grade of concrete mix with energy efficient material added concrete.

3.MATERIAL PROPERTIES

3.1 INTRODUCTION

The experimental program consists of selection and collection of energy efficient material, investigation of material properties, designing the mix proportion for M30 grade concrete, specimen casting with various percentage of material to determine the optimum percentage of material added in concrete. This chapter deals with the study of the properties of the materials used in this experimental investigation.

3.2 PROPERTIES OF MATERIALS USED

3.2.1 CEMENT

Portland pozzolana cement (PPC) was used for making concrete mixes. Test of cement was conforming to IS: 8112 – 1989.

Table 3.1 Properties of Cement

DESCRIPTION OF TEST	TEST RESULT	RESULT
Specific gravity	3.15	3.15
Normal consistency	30%	26 to 33%
Initial setting time	32 minutes	Min. 30 minutes
Final setting time	372 minutes	Max. 600 minutes
Fineness	8%	Should be less than 10%

3.2.2 M SAND

The manufactured sand (M sand) used was clean dry sand. The M sand was sieved in 4.75mm Sieve to remove all pebbles. Properties of M sand used in experimental work are discussed below.

Table 3.2 Properties of M sand

S.NO	DESCRIPTION	RESULT
1	Specific gravity	2.56
2	Grading of zone	Zone II
3	Fineness modulus	3.2

3.2.3 COARSE AGGREGATE

Hard stones of size less than 20mm were used as coarse aggregate. The results of specific gravity, fineness modulus and bulk density of the coarse aggregate were discussed below.

Table 3.3 Properties of coarse aggregate

S.NO	DESCRIPTION	RESULT
1	Specific gravity	2.67
2	Fineness modulus	5.6
3	Water absorption	1.2%

3.2.4 RICE HUSK ASH

Rice husks are the hard protective coverings of rice grains which are separated from the grains during milling process. The main parameter investigated in this study M30 grade concrete with partial replacement of cement by Rice husk ash 5%.

Table 3.4 Properties of Rice husk ash

S.NO	DESCRIPTION	TEST RESULT
1	Specific gravity	2.11
2	Burning temperature	400-700°C
3	Grinding time	90 minutes
4	fineness	Passing #200

3.2.5 GROUND GRANULATED BLAST FURNACE SLAG (GGBS)

Ground granulated blast furnace slag which is a by-product of iron manufacturing industry is an accepted mineral admixture for use in concrete. This granulated material when further ground to less than 45micron is called ground granulated blast furnace slag (GGBS).

Table 3.5 Properties of GGBS

S.NO	DESCRIPTION	RESULT
1	Specific gravity	2.7
2	Grading of zone	Zone II
3	Fineness modulus	3.8

3.2.6 DEMOLITION WASTE

The demolition wastes are causes the environmental as well as the health problems due to dumping and disposal. Waste can be used as construction material so that natural resources are used more efficiently and the environment is protected from waste dumping.

Table 3.6 Properties of demolition waste

S.NO	DESCRIPTION	RESULT
1	Specific gravity	2.57
2	Fineness modulus	6.3
3	Water absorption	1.1%

4. TESTING OF CONCRETE

4.1 COMPRESSIVE STRENGTH

The testing of specimens was done using CTM which can apply upto 1000 kN for testing of specimens. Cubes were placed one after the other properly in the compression testing machine in such a way that load will be applied uniformly over them. Loading was given at the rate of 140 kg /cm²/ min for cubes under compression and load at failure was noted for calculating the cube compressive strength.

The cubes were tested after 7 days and 28 days curing and the compressive strength results are given in table 4.1

Table 4.1 COMPRESSIVE STRENGTH AT 7 DAYS AND 28 DAYS

S.no	Specimen (cube)	Compressive strength at 7 days (N/mm ²)	Average compressive strength at 7 days (N/mm ²)	Compressive strength at 28 days (N/mm ²)	Average compressive strength at 28 days (N/mm ²)
1	Specimen 1	26.6	28.51	39.55	39.59
2	Specimen 2	29.25		38.24	
3	Specimen 3	29.70		41	

Rice husk ash was added in M30 concrete (control mix) as replacement for cement in the percentages of 10, 15 and 20. The Compressive strength results for various percentages of addition of rice husk ash as replacement for cement is shown in table 4.2.

Table 4.2 Determination of optimum % of ricehusk ash added concrete

S.no	% of partial replacement of ricehusk ash	Compressive strength at 7 days (N/mm ²)	Average compressive strength at 7 days (N/mm ²)	Compressive strength at 28 days (N/mm ²)	Average compressive strength at 28 days (N/mm ²)
1	10%	29.33	26.75	30.50	34.54
		24.25		36.65	
		27.10		35.71	
2	15%	30.75	28.50	38.20	37.16
		25.48		32.27	
		28.75		41.58	
3	20%	22.03	24.25	32.50	31.70
		27.00		27.71	
		24.06		32.52	

The value of compressive strength obtained for M30 grade concrete with various percentages of rice husk ash shows an increase in strength for 15% replacement of M30 grade concrete.

In the 15% replaced rice husk ash concrete, GGBS was added as replacement for fine aggregate in the

percentages of 5,10 and 15. The Compressive strength results for various percentages of addition of GGBS replacement for fine aggregate in the optimum % rice husk ash concrete is shown in table 4.3.

Table 4.3 Determination of optimum % of GGBS in the optimum % of ricehusk ash added concrete

S.no	% of partial replacement of GGBS in the optimum % ricehusk ash	Compressive strength at 7 days (N/mm ²)	Average compressive strength at 7 days (N/mm ²)	Compressive strength at 28 days (N/mm ²)	Average compressive strength at 28 days (N/mm ²)
1	5%	23.01	23.66	35.02	37.28
		22.50		37.15	
		25.71		39.97	
2	10%	25.56	28.33	43.71	42.65
		31.02		39.32	
		28.34		44.45	
3	15%	26.77	25.33	37.92	35.36
		23.68		36.22	
		25.32		32.25	

The value of compressive strength with various percentages of GGBS in optimum percentage rice husk ash added concrete shows a decrease in strength for 15% which is slightly lower than conventional concrete.

In the optimum percentage of rice husk ash and GGBS added concrete, the demolished waste was

added in the percentage of 10,15 and 20 as replacement for coarse aggregate. The Compressive strength results for various percentages of demolished waste replacement for coarse aggregate in the optimum % rice husk ash and GGBS added concrete is shown in table 4.4.

Table 4.4 Determination of optimum % of demolition waste in optimum % of GGBS and ricehusk ash added concrete

S.no	% of partial replacement of demolition waste optimum % GGBS in the optimum % ricehusk ash	Compressive strength at 7 days (N/mm ²)	Average compressive strength at 7 days (N/mm ²)	Compressive strength at 28 days (N/mm ²)	Average compressive strength at 28 days (N/mm ²)
1	10%	29.9	30.4	39.1	39.3
		30.1		39.2	
		30.5		39.7	
2	15%	32.5	32.5	41.8	41.80
		31.4		41.2	
		33.6		41.5	
3	20%	32.9	33.8	42.1	43.40
		33.9		43.9	
		34.3		44.0	

5.DISCUSSION

An analysis was made on the test results of various strengths obtained on energy efficient material mixed concrete. The 7days and 28days compressive strength results of M30 grade concrete with various percentages of partial replacement of rice husk ash for cement, GGBS for fine aggregate and demolished waste for coarse aggregate are shown in table 4.1,4.2,4.3 and 4.4. The comparison of the test results are shown in Fig.5.1,5.2 and 5.3.

It is observed that compressive strength for M30 grade concrete with the mix proportion 1:1.603:2.84:0.45 shows strength of partial replacement of rice husk ash slightly nearer to the strength of conventional concrete for upto 15%. Similarly the compressive strength of GGBS added concrete in optimum % of RHA added concrete shows more strength in 10% replacement of GGBS and other percentage of replacement shows value nearer to conventional concrete.

In the optimum % of RHA and GGBS added concrete with demolished waste shows compressive strength increase rate in all various percentage of replacement.

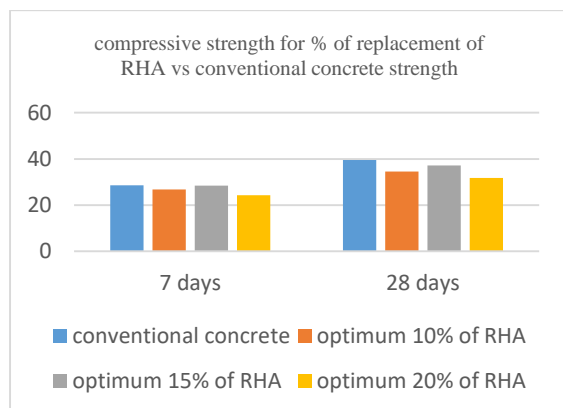


Figure 5.1. Compressive strength for various % of partial replacement of RHA Vs conventional concrete strength

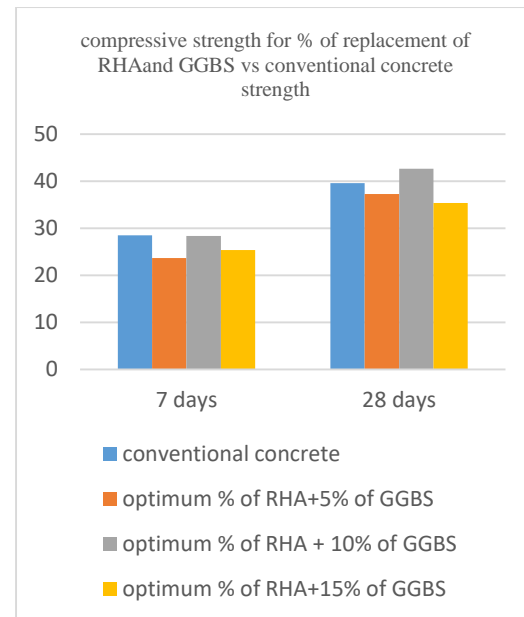


Figure 5.2. Compressive strength for various % of GGBS in optimum % of RHA added concrete Vs conventional concrete

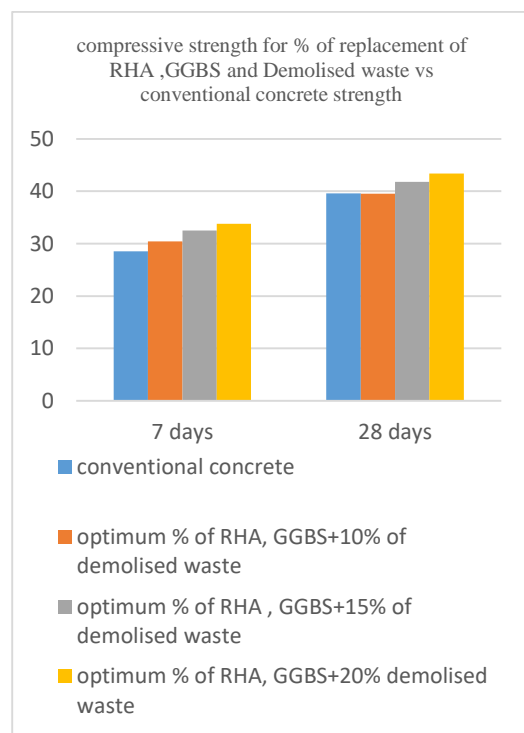


Figure 5.2. Compressive strength for various % of demolished waste in optimum % of RHA and GGBS added concrete Vs conventional concrete

6.CONCLUSION

A detailed experimental study was performed to study the addition of energy efficient material as partial replacement of cement, fine aggregate and coarse aggregate in M30 grade concrete. This study was intended to find the effective ways to reutilize the waste material in concrete. Analysis of the results of the strength of concrete leads to the following conclusions.

1. It is identified that rice husk ash, GGBS and demolished waste can be effectively used as construction material.
2. The use of Energy efficient material in concrete is possible to improve its mechanical properties and can be one of the best and economical ways for their disposal in eco-friendly manner.
3. The optimum percentage of Rice husk ash can be used as replacement for cement in M30 grade concrete was found to be 15%.
4. Due to depletion, scarcity and higher cost of fine aggregate the optimum % of GGBS is chosen as 15% and its shows nearby value to conventional concrete.
5. The optimum % of replacement of demolished waste is taken as 20% and it achieved better performance of concrete mixes.
6. The energy consumption for making this concrete is lesser than the energy consumption for making conventional concrete and the cost also less.

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EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF M-SAND BY CERAMIC WASTE & COARSE AGGREGATE BY E-WASTE IN CONCRETE

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ABSTRACT: Manufacturing of concrete using natural resources like sand aggregate & stone aggregate is a challenging issue.

Scarcity of these materials has made concrete as burning topic worldwide. Every corner of this universe is extending its hands to develop its infrastructure.

So it is necessary to find Non-conventional materials to make concrete and fulfill the needs of every hands both economically and eco-friendly.

This project aims in replacing the conventional aggregates with ceramic waste (as partial replacement to fine aggregate) & E-waste (as partial replacement to coarse aggregate) disposal of these waste poses serious environmental issues & health issues, thus by using this material in M20 grade mix of concrete, the mechanical properties of concrete such as compressive, split tensile strength are determined.

The samples were casted with 5% ,10%, 15%, 20% replacement of M-sand using ceramic waste and coarse aggregate using E-waste and tested for different periods of curing like 7days and 28days.

The reuse of ceramic waste & E-waste aims in sustainable development and conservation of natural resources.

I. INTRODUCTION

Concrete is a composite material composed of gravels or crushed stones (coarse aggregate), sand (fine aggregate) and hydrated cement (binded). Here we replacing M sand and coarse aggregate by ceramic waste and E-Waste. The concrete cube of size 150x150x150 mm, cylinders of 150x300mm size and beams of 500x100x100mm size were cast. The cast specimens are removed after 24 hours and these are immersed in a water tank for a curing period of 28 days and are tested for compression, split tensile and flexural strength test.

A. DEFINITION OF MATERIALS USED

Cement

A cement is a binder, substances used for construction that sets, hardens and adheres to other material, binding them together. Cement is used on its own, but rather to bind sand and gravels together. Cement is used with fine aggregate to produces mortar for masonry, or with sand and gravel aggregate to produces concrete.

Ceramic waste

The usage of ceramic waste as replacement to fine aggregate in concrete has the benefits in the aspects of cost and reduction of pollution from construction industry. The cost of concrete manufacturing will reduce considerably over conventional concrete by including ceramic waste since it is readily available at very low cost and there-by reducing the construction pollution or effective usage of construction waste. Electronic wastes or E-wastes describes discarded electrical or electronic devices.

E-Waste

The E-wastes like printed circuit board, computers, television, etc., These wastes were crushed and considered as partial replacement of coarse aggregate with different ratio.

II. EXPERIMENTAL PROGRAM

Grade designation	: M20
Maximum nominal size	: 20mm of aggregate
Maximum cement content	: 320 kg/m ³
Maximum water cement ratio	: 0.5
Workability	: 75 mm (slump)
Exposure condition	: Mild
Degree of supervision	: Good
Type of aggregate	: Crushed angular aggregate
Maximum cement content	: 450 kg /m ³

The mix adopted to this project is M20 (1:1.5:3) & w/c ratio is 0.5

Mix	% of replacement	Cement	Fine Aggregate	Coarse Aggregate	Ceramic waste	E-waste	W/C
M1	5%	1	1.425	2.85	0.075	0.15	0.5
M2	10%	1	1.35	2.7	0.15	0.3	0.5
M3	15%	1	1.275	2.55	0.225	0.45	0.5
M4	20%	1	1.2	2.4	0.3	0.6	0.5

Table 1 Mix Proportion (all in kg)

III. FRESH CONCRETE PROPERTIES

The fresh concrete properties and thus the consistency of the concrete mixture can be determined by means of the slump test and the flow test. Also the density of the fresh concrete can be easily determined by measuring the net weight of a reservoir with a known volume filled with compacted HPC.

TEST	CONVENTIONAL	5%	10%	15%	20%
SLUMP	75	78	82	85	88
COMPACTION FACTOR	0.89	0.905	0.92	0.935	0.94
Vee Bee consistometer test value	23sec	21sec	19sec	18sec	16sec

Table 2 fresh concrete properties

IV. MECHANICAL PROPERTIES:

Compressive Strength

The Compressive strength of concrete is one of the most important properties of concrete. Compressive strength of M20 grade of concrete for the partial replacement of Msand by ceramic waste and coarse aggregate by E-waste was found. In this test 150x 150 x 150mm concrete cubes were cast, by using 20N/mm² concrete. The mixing was done and cubes were casted and demoulded and placed under water cured for 28 days. Then the cubes were tested for their crushing strength at 7 and 28 days.

As per IS: 10262:2009, load was applied on it.

Compressive strength (N/mm²) = Ultimate load/cross sectional area of the cube.

S. No	Mix proportion	7 days			28 days		
		Load (KN)	Area mm ²	Average	Load (KN)	Area mm ²	Average
1	0%	320	(150 x 150)	14.1	480	(150 x 150)	20.1
2	5%	350		15.3	520		23.5
3	10%	400		17	575		25.6
4	15%	445		19.5	670		30
5	20%	420		18.20	630		28

Table 3 compressive Strength

Flexural Strength

For each composition, the flexural strength is also determined on prism specimens at the age of 3 days, 7 days and 28 days.

S.No	Mix Proportion	Flexural Strength (N/mm ²)	
		7 Days	28 Days
1	0%	2.11	3.09
2	5%	2.30	3.13
3	10%	2.91	3.62
4	15%	3.15	4.20
5	20%	2.90	3.92

Table 4 Flexural Strength

V. RESULTS AND DISCUSSION:

The optimum 7 and 28 days compressive strength and flexural strength have been obtained in the range of 15% ceramic waste and e-waste replacement level when compared to conventional concrete 15% replacement of coarse aggregate with e-waste a 15% replacement of m-sand with ceramic waste has increase compressive strength and flexural strength.

VII. CONCLUSION:

Based on the result the optimum percentage of e-waste and ceramic waste for M20 grade concrete will be arrived. This study intended to find the effective ways to reutilize the e-waste particles and ceramic waste particles as coarse aggregate and fine aggregate respectively. Analysis of the strength characteristic like compressive strength with workability of concrete containing recycled waste (e-waste) and also with ceramic waste. Following conclusions are derived from the current study. It is identified that e-waste and ceramic waste can be disposed by using them as construction materials and can be used as a coarse and fine aggregate in concrete. When e-waste and ceramic waste are introduced in the concrete it has been observed that workability of the concrete is increases when percentage of the e-waste and ceramic waste increase in concrete. Compressive strength and flexural strength of the concrete decreases with increase in the percentage of the e-waste. It has been observed that when we replace m-sand by powdered ceramic waste in concrete along with the e-waste as coarse aggregate compressive and flexural strength increases. The optimum 7 and 28 days compressive strength, split tensile strength and flexural strength have been obtained in the range of 15% ceramic waste and e-waste replacement level when compared to conventional concrete 15% replacement of coarse aggregate with e-waste a 15% replacement of m-sand with ceramic waste has increase compressive strength and flexural strength.

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Abstract— Improving the characteristics of concrete have been focus on study by many researchers over past few decades. Combination of two or more types of fibers for getting high quality hybrid fiber concrete (HFC) is a topic of interest amongst researchers. Use of small, discrete, randomly oriented basalt fibers improves the strength and resistance against deformation characteristics of concrete members. Aloe vera fibers improve shear strength, tensile strength, crack resistance, and energy absorption of concrete. The combination of these two fibers in predefined proportions in the concrete and its effect on strength characteristics of HFC beams. Conventional concrete is weak in tension, which results in low tensile strength and brittle failure of concrete elements. In order to overcome this weakness of concrete, we use of combination of different types of suitable fibers is practiced in these days. Experimental test results of M30 Grade concrete mix by inclusion of basalt fiber and aloe vera fibers.

Keywords— Hybrid Fiber Concrete (HFC), Conventional concrete, Basalt fiber, Aloe vera fibers.

I. INTRODUCTION

Fiber reinforced concrete (FRC) is a composite material consisting of cement, sand, coarse aggregate, water and fibers. In this composite material, short discrete fibers are randomly distributed throughout the concrete mass. The behavioral efficiency of this composite material is far superior to that of plain concrete and many other construction materials of equal cost. Due to this benefit, the use of FRC has steadily increased during the last two decades and its current field of application includes: airport and highway pavements, earthquake-resistant and explosive-resistant structures, mine and tunnel linings, bridge deck objectives.

II. LITERATURE STUDY

Selina Ruby G., Geethanjali C., Jaison Varghese, P. Muthu Priya et al [1], investigated that ,Hybrid Fiber Reinforced Concrete (HFRC) is formed from a combination of different types of fibres, which differ in material properties, remain bonded together when added in concrete and retain their identities and properties. The combining of fibres, often called

hybridization, is investigated for a M40 grade concrete at a volume fraction of 0.5% in this paper. Control and three hybrid fiber composites were cast using different fiber proportions of steel and polypropylene. Compressive strength, split tensile strength and flexural strength test were performed and results were analysed to associate with above fiber combinations. Based on experimental studies, the paper identifies fiber combinations that demonstrate maximum compressive, split tensile and flexural strength of concrete. The increased fibre availability of PP fibres, combined with the high stiffness of steel fibres, resulted in a significant enhancement of the split tensile strength for this combination.

Navilesh J, Rahul B K, Shankar B K, Shiva kumar Patil, Vivekanand A Gutted et al [2]: Hybrid fiber reinforced concrete can be defined as concrete that reinforced by two or more types of fibers. This study aims to study the mechanical properties of hybrid fiber reinforced concrete where the fibers used were consists of steel fiber and coconut (coir) fiber. For this purpose, five mixes, one normal control mix and four hybrid fiber reinforced concrete mixes were prepared. The volume of steel fiber is kept content as 1% and the volume of coconut fiber varied as 1%, 3%, 5% and 7% Slump Test was carried out for each mix in the fresh state in order to determine the workability of the hybrid fiber reinforced concrete. The brittle mode of failure is changed by the addition of steel fibre& coconut fiber into a more ductile one and such fibres were observed to improve the ductility of the concrete, its post-cracking load carrying capacity, and its energy absorption capacity.

Rooban Chakravarthy Srikanth Venkatesan et al [3], this paper investigates the provision of three different fibres; steel, polypropylene and basalt in individual and in hybrid form. Analysis shows that performance enhancement can be obtained by using fibres in hybrid form from the above literature review, it is clear that steel fiber (high modulus fiber) which is stronger and stiffer, improves the concrete strength, while polypropylene fiber(low modulus fiber), has the capacity to strengthen brittle cementitious materials and is more flexible and has the property to retain heat for a prolonged time which leads to improved toughness, and strain capacity in the post cracking section and retard early cracks. Basalt fiber which is high in oxidation resistance and radiation resistance, fracture energy and abrasion resistance leads to increase in the flexural strength.

S. Eswari, P.N. Raghunath, K. Suguna et al [4], This study presents an investigation on the ductility performance of hybrid fibre reinforced concrete. The influence of fibre content on the ductility performance of hybrid fibre reinforced concrete specimens having different fibre volume fractions was investigated. The parameters of investigation included modulus of rupture, ultimate load, service load, ultimate and service load deflection, crack width, energy ductility and deflection ductility. The hybrid fibre reinforced concrete specimens exhibit reduced crack width at all load levels, the maximum reduction in crack width was found to be 80% compared to that of plain concrete. The hybrid fibre reinforcement appreciably enhances the ductility of concrete specimens. The increase in ductility was found to be 98% and 83% in terms of energy and deflection respectively.

Sachin, Yadav, Gourav Gupta, Ravi Bhatnagar et al [5] states that Natural fibres are very fast replacing the traditional manmade fibres as reinforcements they have several advantages over manmade fibres. The abundant availability of natural fibre in India such as Jute, Coir, Sisal, Pineapple, Ramie, Bamboo, Banana, Bagasse etc. gives attention on the development of natural fibre composites primarily to explore value-added application avenues. Thousands of tons different crops are produced but most of their wastes do not have useful utilization. These different crops waste can be used with polymer to form natural fiber polymer composites for many applications. The wastage is used to prepare fiber reinforced polymer composites for commercial use. Natural fiber is used as an alternative resource to synthetic fibres as well as reinforcement for polymer composite materials and the manufacturing is inexpensive, renewable and environment friendly. Natural fibres have low cost, low density and low durability as compare to synthetic fibres but with the help of fiber treatments, mechanical properties of natural fibres are improved. This review discusses about the use of bagasse fibre and its current status of research. Bagasse fiber is a residue of a sugarcane milling process. The present use of bagasse is mainly as a fuel in the sugar cane mill furnaces.

III. HYBRID FIBRE REINFORCED CONCRETE

It is a type of fiber reinforced concrete characterized by its composition and also known to the interaction and/or co-operation of the two or more fibers that acts as a secondary reinforcement in the concrete in which synergy effect is implemented to produce a combined effect. When two different fibers are mixed in a common matrix, we call it hybrid fiber reinforced concrete. The combination two fibers used in this project work are as follows;

A. Basalt Fiber

Basalt fiber (solidified volcanic lava) is known for its resistance to high temperature, strength & durability.

Basalt fiber is extruded from molten basalt rock at diameter generally in between 13-20 μm BFRP fibers products are available in various forms such as bars, mesh, cages, spirals, fabric & chopped fibers, it used as reinforcement in concrete structures.



Fig.1 Basalt fiber

B. Aloe vera Fiber

Most damaging is the enormous amount of energy required to produce Portland cement as well as large amount of carbon dioxide released in the ambience. The nonconventional concrete means adding or replacement of some waste materials or fibres in the normal concrete is called non-conventional concrete. We have been conceived with an objective of determining a new non-conventional concrete which should be easily available and accessible materials presented in this concrete system. The Aloe vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. Today, the Aloe vera plant has been used for various purposes in dermatology.



Fig.2 Aloe vera

IV. OBJECTIVES

- This study attempts to compare the strength parameters of HFRC with conventional concrete.
- To perform the experiments on the time-dependent compressive strength, split tensile strength of concrete containing mixed basalt fibre and aloe vera fibre and its strength were measured at the age of 7 and 28 days curing period.
- To study the crack arresting ability of fibers in concrete.

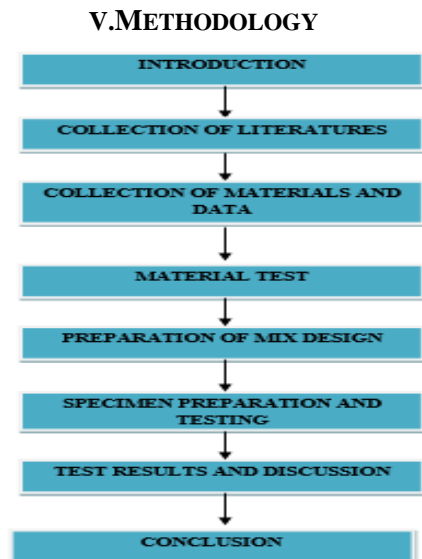


Fig.3 Flowchart for methodology

VI.COLLECTION OF MATERIAL

A. Cement

The cement used was ordinary Portland cement 53 (OPC 53). All properties of cement were determined by referring IS 12269 - 1987. The specific gravity of cement is 3.15. The initial and final setting times were found as 55 minutes and 258 minutes respectively. Standard consistency of cement was 30%.

B. Coarse aggregate

20mm size aggregates-The coarse aggregates with size of 20mm were tested and the specific gravity value of 2.78 and fineness modulus of 7 was found out. Aggregates were available from local sources. Locally available crushed blue granite stones conforming to graded aggregate of nominal size 20 mm as per IS: 383 – 1970. Crushed granite aggregate with specific gravity of 2.77 and passing through 4.75 mm sieve and will be used for casting all specimens.

C. Fine aggregate

The sand which was locally available and passing through 4.75mm IS sieve is used. The specific gravity of fine aggregate was 2.60. Locally available river sand conforming to Grading zone I of IS: 383 – 1970. Clean and dry river sand available locally will be used. Sand passing through IS 4.75mm Sieve will be used for casting all the specimens.

D. Water

The water used for experiments was potable water. Water is an important ingredient of concrete as it actively participates in the chemical reaction with cement. It should be free from organic matter and the pH value should be between 6 to 7.

E. Basalt fibre

Basalt fiber (solidified volcanic lava) is known for its resistance to high temperature, strength & durability. Basalt fiber is extruded from molten basalt rock at diameter generally in between 13-20 μm BFRP fibers products are available in various forms such as bars, mesh, cages, spirals, fabric & chopped fibers, it used as reinforcement in concrete structures.

VII.MATERIAL PROPERTIES

A. Cement

The fresh cement is used for research work having grade of cement is 43 grade (OPC) all properties of cement are tested by conforming IS -12269-1987.

S.no	Description of materials	Properties
1	Specific gravity	3.15
2	Initial setting time	90min.
3	Final setting time	180 min
4	Standard consistency	33%

Table.1 Properties of cement

B. Fine aggregate

Clean and dry river sand available locally was used. Sand passing through IS 4.75 mm sieve and as per IS: 383:1970 was used for all the specimens.

S.no	Description of materials	Properties
1	Specific gravity	2.8
2	Fineness modulus	4.44
3	Loose bulk density kg/m^3	2500
4	Compacted bulk density kg/m^3	2890
5	Water absorption %	0.46

Table.2 Properties of Fine Aggregate

C. Coarse aggregate

Locally available, aggregate passing through 20 mm sieve and retained on 12.5 mm sieve and as given in IS: 383 – 1970 is used for all the specimens

S.no	Description of materials	Properties
1	Specific gravity	2.69
2	Fineness modulus	7.950
3	Loose bulk density kg/m^3	1290
4	Compacted bulk density kg/m^3	1584

5	Water absorption %	1.343
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Table.3 Properties of coarse aggregate**D. Basalt fibre**

Basalt fiber is a relative newcomer to fiber reinforced polymers (FRPs) and structural composites. It has a similar chemical composition as glass fiber but has better strength characteristics, and unlike most glass fibers is highly resistant to alkaline, acidic and salt attack making it a good candidate for concrete, bridge and shoreline structures.

Density gr. m-3	2.6-2.8
Failure stress, Gpa	1.9-2.6
Extension at failure, %	3.5-4.5
Elasticity modulus Gpa	70-90
Tensile strength (MPa)	3000-3500
Temperature (°C)	-260~500

Table.4 Split Tensile Test Result**E. Mix Design****Design stipulations**

Grade Designation	- M-30
Type of cement	- O.P.C-53grade
Fine Aggregate	- Zone-I
Sp. Gravity Cement	- 3.15
Sp. Gravity Fine Aggregate	- 2.8
Sp. Gravity Coarse Aggregate	- 2.69

Cement (kg)/m³	FA (kg)/m³	CA (kg)/m³	Water (liter)/m³
531.43	639.048	1068.09	186
1	1.2	2	0.35

Table.5 Split Tensile Test Result**VIII. TEST PROCEDURE****a. SORPTIVITY TEST**

The sorptivity can be determined by the measurement of the capillary rise absorption rate on reasonably homogeneous material. The cylinders after casting were immersed in water for 90 days curing. The specimen size 100mm dia x 50 mm height after drying in oven at temperature of 100 + 10°C were drowned with water level not more than 5 mm above the base of specimen and the flow from the peripheral surface is prevented by sealing it properly with non-absorbent coating. The quantity of water absorbed in time period of 30 minutes was measured by weighting the specimen on a top pan balance

weighting upto 0.1 mg. Sorptivity(S) is a material property which characterizes the tendency of a porous material to absorb and transmit water by capillarity. The cumulative water absorption (per unit area of the inflow surface) increases as the square root of elapsed time (t).

$$I = S \cdot t^{1/2} \text{ therefore } S = I / t^{1/2}$$

Where;

S= sorptivity in mm,

t= elapsed time in mint.

$$I = \Delta w / A d$$

$$\Delta w = \text{change in weight} = W_2 - W_1$$

W₁ = Oven dry weight of cylinder in grams

W₂ = Weight of cylinder after 30 minutes capillary suction of water in grams.

A= surface area of the specimen through which water penetrated.

d= density of water

b. COMPRESSIVE STRENGTH TEST:

For compressive strength test, both cube specimens of dimensions 150 x 150 x 150 mm were cast for M30 grade of concrete. The moulds were filled with HFRC fibers. After 24 hours the specimens were de-moulded and were transferred to curing tank wherein, they were allowed to cure for 7 days, 14 days and 28 days. After 7-, 14- and 28-days curing, these cubes were tested on digital compression testing machine as per I.S. 516-1959. The failure load was noted. In each category, three cubes were tested and their average value is reported.

The compressive strength was calculated as follows:

Compressive strength (MPa) = Failure load / cross sectional area.

c. SPLIT TENSILE TEST

Tensile strength is the capacity of a material or structure to withstand tension. It is measured on concrete cylinders of standard dimensions using a Universal Testing machine. Both conventional and fiber reinforced specimens were tested at varying percentages of fiber and the average value was obtained. Split tensile test 7, at 14 and 28 days of curing, the split tensile strength of concrete mixture increases by HFRC respectively. There is substantial increase in the split tensile strength with the addition of fibers to the concrete mix. Hybrid fibers improve the split tensile strength noticeably as compared to mono fibers.

IX. RESULTS & DISCUSSION**RATIOS FOR SPECIAL CONCRETE (EXTRA INGREDIENTS) RATIO – I**

1. Basalt fiber Adding of 0.5 %

2. Aloe vera fiber Adding of 0.5 %

i. COMPRESSIVE STRENGTH OF CUBE

	% OF	COMPRESSIVE
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Mix design	REPLACEMENT	STRENGTH(N/mm ²)		
		7days	14 Days	28days
M30	0	26.77	31.01	37.96
	(0.5 +0.5)	28	38.6	43.16

Table.6 Compression strength Test Result

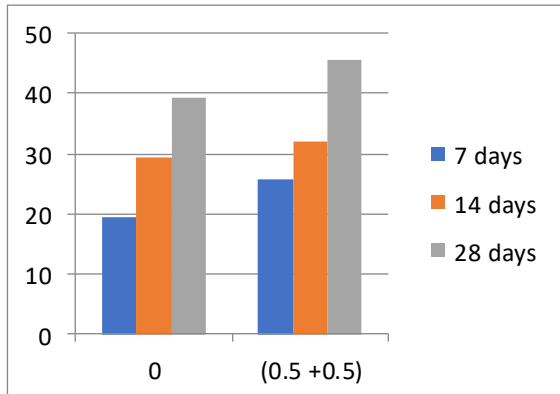


Fig.4 Compression Test Graph Result

ii. SPLIT TENSILE TEST FOR CYLINDER

Mix design	% OF REPLACEMENT	SPLIT TENSILE TEST (N/mm ²)		
		7 DAYS	14 DAYS	28 DAYS
M ₃₀	0	1.78	2.91	3.75
	(0.5 +0.5)	3.1	3.9	4.3

Table.7 Split Tensile Test Result

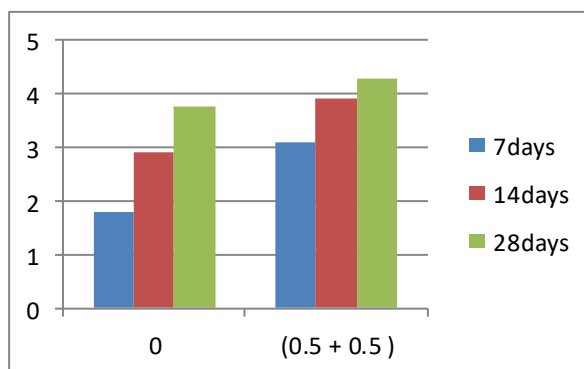


Fig.5 Split tensile Test Graph Result

iii. FLEXURAL STRENGTH TEST

Mix design	% OF REPLACEMENT	FLEXURAL STRENGTH TEST (N/mm ²)		
		7 DAYS	14 DAYS	28 DAYS
M ₃₀	0	3.1	4.8	5.39
	(0.5 +0.5)	3.7	5.2	6.8

Table.8 Flexural Test Result

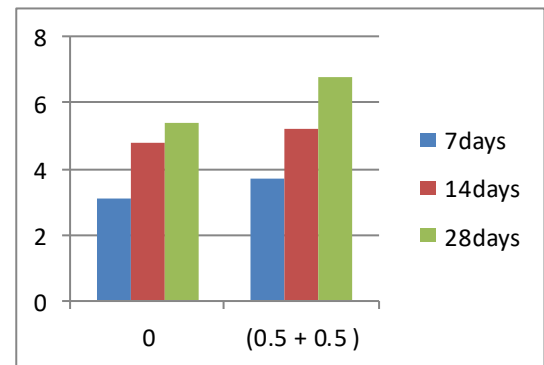


Fig.6 Flexural Test Graph Result

iv. SORPTIVITY TEST

GRADE OF CONCRETE	SAMPLES	Dry Wt In Grams	Wet Wt In Grams	Sorptivity Value in 10 ⁻⁵ mm/min ^{0.5}
M30	M0%	1108	1108.7	1.15
	(0.5 +0.5)	1022	1022.9	1.47

Table.9 Sorptivity Test Result

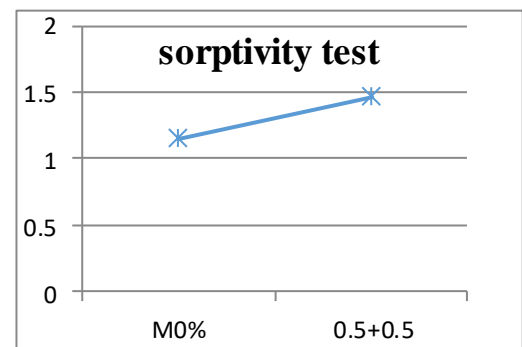


Fig.7 Sorptivity Test Graph Result

X.CONCLUSION

- The addition of fibers increased compressive strength with 0.5% fiber-cement ratio and little increase for 1% of fiber-cement ratio compared to plain concrete. The addition of Basalt & Aloe vera fibre with 0.5% in concrete will increase the compressive strength of concrete.
- The maximum compressive strength of specimen after 28 days is 43.16 N/mm² with 1% of hybrid fibers (Basalt fibre and aloe vera) compared to normal concrete and other mix. It is 10% increase over normal concrete.
- The improvement in flexural strength reveals that the toughness would be much more than

that of non-fibrous concrete which improves ductility and durability of concrete.

- Increase in fiber-cement ratio is tending to voids in concrete though thoroughly compacted because of improper bonding of materials in concrete with increase in fibers.
- The maximum flexural strength of M30 mix after 28 days is 6.8 N/mm² with 1% of hybrid fibers (Basalt fibre and Aloe vera) comparisons of normal concrete value 5.39 N/mm² at 28 days.

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STUDY OF GROUNDWATER QUALITY IN INDUSTRIAL AREA USING GIS

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Abstract-The industrial sectors provide a wide range of contamination processes with the groundwater which is required to be reduced. The study aims to get the information based on the quality assurance of groundwater in the industrial area. However, various types of parameters are also involved with the study where the determination of variation in the concentration level is the required one.

The industrial sectors nowadays are emerging at a higher rate where the consideration of pollution control is the main factor. In this scenario, the usage, as well as the requirement of water, is one of the main parts of the industrial operation process. The main focus of the study is to provide a wide range of information regarding groundwater quality so that beneficial activity can be carried out. However, the consideration of the GIS method is also involved to get the information regarding the groundwater quality in the industrial area. Different types of parameters, the concept of GIS as well as the recommendation parts are also discussed in the study to get better results.

I. 2. AIMS AND OBJECTIVE

The main aim of the study is to get information regarding the quality assurance of groundwater in the industrial area. Various types of parameters based on the usage of the GIS method are also included with the study which is also a part of the aim. In this scenario, the study also provides the application process and also proper methodological approach to provide the necessity of the groundwater quality so that a better development process can be achieved with the help of it. The objective of the study is given below-

- To understand the necessity as well as the concept of GIS.
- To provide study-related information regarding groundwater quality.
- To understand the variation of parameters based on the groundwater quality using GIS software.

II. 3. LITERATURE REVIEW

The quality assurance level as well as the usage of the groundwater is now decreasing at a higher rate. The contamination scenario of the groundwater with the

industrial waste and households is the reason behind the mentioned part. In this scenario, the methodological approach, as well as the developmental aspect based on the water quality index, is required to be followed up. In addition, the heavy usage of the water for cooling purposes in the industrial sectors is involved. The reason also provides information's regarding the fact that the operational cost for other cooling agents is higher and for that reason water is used as a form of cooling agent in the industry (Razaet al. 2017). The data related information shows that almost 12.3% of the used water after the usage as a cooling agent is given towards the river or some channels which is the main reason for pollution. In this scenario, the quality of the water also gets reduced which requires further operation procedures to get the desired quality.

III. 4. RESEARCH METHODOLOGY

The research methodology provides the acceptance level of the research topic. The research method also provides a wide range of information as well as a step-by-step approach to get the desired result. In this scenario, the study is based on the secondary research process where the literature review is mainly used (Galitskayaet al. 2017). On the other hand, the observation part of groundwater quality is also involved.

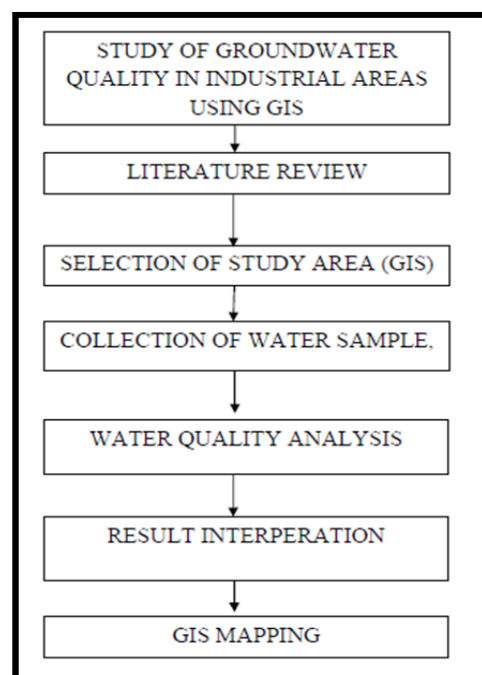


Figure 1: Research methodology

(Source: Galitskaya *et al.* 2017)

The collection of the sample is also taken to check the parameters with the help of GIS. In this scenario, the information is then rectified while using the literature review as the process consists of a previous journal and research papers.

IV. 5. MATERIALS AND METHODS

A. 5.1 Details of water sample collection

The water samples are also involved with the study where almost six samples of the water from and the industrial areas are collected. After the collection of the water samples, each of the samples is analysed with the help of adding some reagents. The testing process is also carried out in the laboratory to understand the parameter as well as the condition (Yadav *et al.* 2019). In this scenario, the most effective part is the variation in the operation process to understand the nature of the water sample where the GIS is used.

B. 5.2 Experimental procedure

1) 5.2.1 PH test

Three pH standards are used with the experimental process where the water samples are placed to get the reading from the pH standards. In this scenario, the process provides the reading based on the electrode potential for each of the pH electrodes. Then the slope of each of the electrodes is also recorded to get desirable results (Coyte *et al.* 2018). Each of the six samples provides a different reading and then the collected information is interpreted to get favourable conditions.

2) 5.2.2 Potassium test

The potassium test is carried out to get the concentration value of potassium in the sample. In addition, a flame photometer is a required apparatus to get desirable results. In this scenario, the testing process provides the calibration reading for potassium is about 0 to 10mg/L. On the other hand, intensity measurement is set to the reading of 700nm (Podgorski *et al.* 2018). The operation process is then carried out where the calibration plot determines the value of concentration.

3) 5.2.3 Total hardness test

The first step in the test process is the consideration of buffer solution. In this scenario, ammonia buffer is added to the sample up to the range of about 10. After that, the EBT indicator is added where the reaction with the calcium and magnesium ions takes place which provides the color changes in the sample (Barzegar *et al.* 2017). Then the process provides the addition of EDTA which separates the magnesium as well as the calcium from the sample and the strength is determined.

4) 5.2.4 Nitrate test

Different types of apparatus are required for the competition of the test process. In this scenario, almost 0.25 mg/L of indicators is placed within the beaker which is then mixed with the 0.5ml of phenol disulphuric acid to get a dissolution strategy in the solution. On the other hand, the process also requires cuvette holders where the samples are then packed in a separate process (Ali *et al.* 2019). Almost 20 minutes is considered for the separation where each of the samples is taken to provide the value of nitrate.

5) 5.2.5 Electrical conductivity

The equipment which is used for the measurement of the electrical conductivity of the sample is the conductivity meter. The range, capability, as well as handling process, is at the desirable range. The sampling process and also the range of value setting provide a better facility to get acceptable accuracy. As a part of the standard solution, 0.01M of KCL is used in the apparatus.

6) 5.2.6 Sodium test

The apparatus which is used for the test of sodium concentration is the flame photometer. In this scenario, the resting process also requires a calibration value where the consideration of standard solution within the range of 0 to 10 mg/L is the recommended one. On the other hand, the measurement of the intensity of the solution also needs to be placed at a desirable range which is about 884 nm.

V. 6. RESULT AND DISCUSSION

A. 6.1 Quality analysis

The quality analysis of the samples provides the acceptance level as well as the testing process required to be carried out. The reason is to further use of the water in the industrial sectors as cooling agent. On the other hand, the samples are also collected from the bore wells and open wells.

Parameter	Permissible limit	1	2	3
Electrical conductivity	1800	2400	1320	1845
pH	6.5 to 8	7.1	7	7.4
Sodium	200 to 445	321	221	124
Potassium	11 to 13	12	13	0

Table 1: Quality analysis

(Source: Created by the learner)

B. 6.2 PH

The alkalinity in water samples can be seen in a great manner. The reason that the lower value is the pH level for each of the samples (Lapworth *et al.* 2017). In this scenario, the bar graph represents the value of pH for the water samples that fall under the BIS range which is about 7 to 7.5.

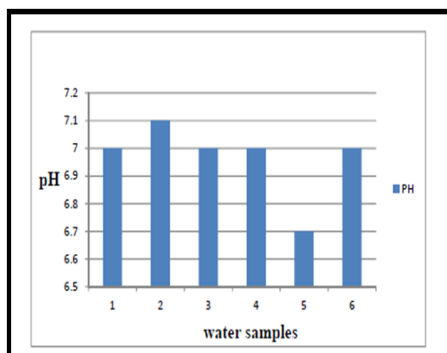


Figure 2: Variation of pH

(Source: Lapworth *et al.* 2017)

The variation of pH for the water sample also shows that for the drinking purpose it cannot be used.

C. 6.3 Electrical conductivity

The electrical conductivity determination for the water samples provides the acceptance amount of the transfer of electricity. The testing process shows the moderate value of the electrical conductivity. In this scenario, the value of concentration ranges from 1500 mg/l to 2500 mg/l.

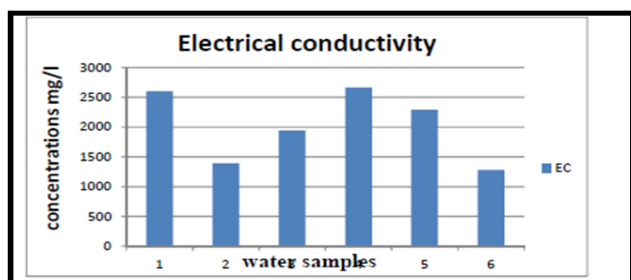


Figure 3: Variation in electrical conductivity

(Source: Aravinthasamy *et al.* 2020)

The higher value of EC indicates the huge amount of presence of soil whereas the ease of electricity transfer can occur at a higher rate (Aravinthasamy *et al.* 2020).

D. 6.4 Potassium

The potassium concentration in the water is avoided due to the cause of infection. The desirable range of potassium concentration is 10 mg/l. Higher the value of potassium the kidney disease can occur rapidly.

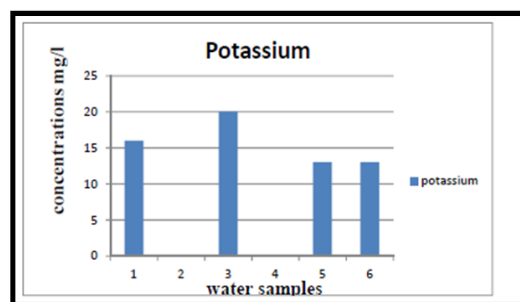


Figure 4: Variation in potassium

(Source: Aravinthasamy *et al.* 2020)

The study provides moderate as well as a higher value for potassium in the samples (Aravinthasamy *et al.* 2020). In this scenario, the bar graph shows that sample 1 has a moderate value whereas sample 3 has the higher concentration of potassium in the water sample.

E. 6.5 Sodium

The desirable range for the sodium amount in the samples is around 228 to 300 mg/l. Most of the samples on the graphical representation can be seen at the desirable range. According to the BIS limit, the value consideration for sodium also requires a higher amount of ions in the solution (Chakraborti *et al.* 2018).

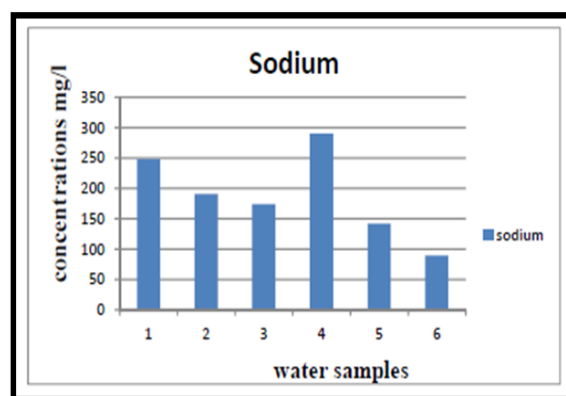


Figure 5: Sodium variation

(Source: Chakraborti *et al.* 2018)

In addition, the more the number of sodium ions in the sample the acceptability also gets increased at a higher rate.

F. 6.6 Total hardness

The measurement of the hardness of water is also important to be noted. Furthermore, the study also provides information regarding the variation of the hardness of the samples. The desirable range for the hardness of water is about 225 to 880 mg/l where most of the samples fall under the acceptable range. The calcification and also soap consumption can be seen at a higher rate.

G. 6.7 Nitrate

The nitrate sample is estimated using the UV-spectrophotometer where the consideration of the calibration value is around 530 nm.

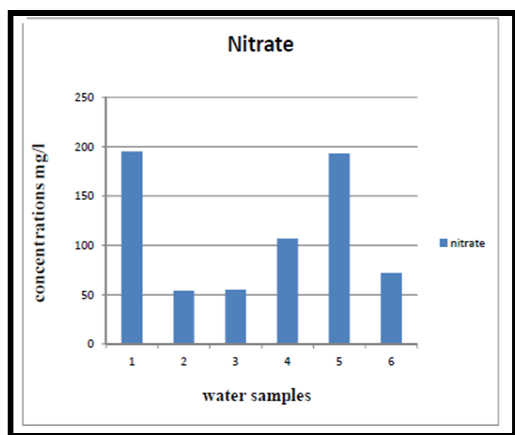


Figure 7: Nitrate variation

(Source: Buvaneshwari *et al.* 2017)

In this scenario, the operational process also provides the acceptable level based on the agricultural use whereas the increasing value of the concentration of nitrate can decrease the chances of selection princess (Buvaneshwari *et al.* 2017). Sample 1 can be used for agriculture whereas the resume for the sample 2 and 3 can be done in the industrial sectors.

VI. 7. RECOMMENDATIONS

One of the most important recommended facilities is the use of GIS software. In this scenario, the testing process of the water snake can be divided based on the mapping facilities (Chakraborti *et al.* 2018). On the other hand, the variation in the parameters for the water samples is also involved with the GIS technique.

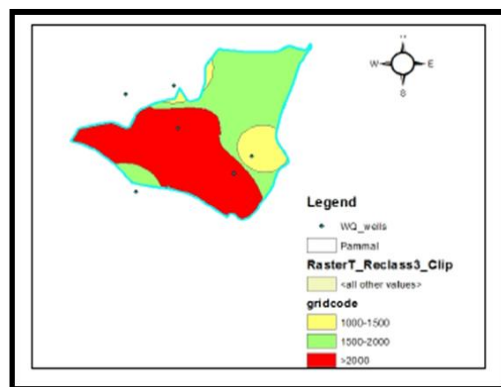


Figure 8: Spatial variation map of electrical conductivity

(Source: Maria, 2018)

In addition, the process can be used further to provide the location-wise selection of the sample of water so that better results can be achieved through the help of GIS mapping. On the other hand, the consideration of contamination with the waste also needs to be followed in the industrial sectors (Maria, 2018). The mentioned case can be solved while using the recycling technique for further use.

VII. 8. CONCLUSION

As per the study, it can be seen that a variety of information is provided towards the groundwater quality. In this scenario, a total of six samples are used where sample 1 provides the collective information (agriculture use) about the sodium concentration and potassium concentration. On the other hand, sample 2 and 3 shows the acceptable usage in the case of industrial sectors and rest of the samples requires a further testing process.

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SPLICE CONNECTION USING RAILWAY STEEL TRUSS BRIDGES

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Abstract— Structural steel has many advantages over other construction materials by its high strength and ductility. It has a higher strength to cost ratio in tension and a slightly lower strength to cost ratio in compression when compared with concrete. Thus, structural steel is an efficient and economic material in bridges. This paper is intended to design and evaluate the steel truss bridge experimentally by using splices. A typical Warren truss bridge is designed for the single lane railway traffic with the total length of 49 m. In which the truss members designed are further reduced by connecting with splices. This makes the truss structure more efficient and able to withstand seismic forces by reducing the base shear up to 27%. The increase in load carrying capacity is also examined experimentally with minimum deflection using splice connections.

Keywords— steel connection, splice connection, railway bridges, steel joint seismic

I. INTRODUCTION

The bridges are the structures, which provide means of communication (viz., passage) over a gap. The rivers, canyons and valleys form natural gaps. The railway and highway crossings, highway and canal crossings form artificial gaps. These are constructed to carry highway traffic are known as highway bridges (road bridges). The bridges built to carry railway traffic are known as railway bridges (rail bridges). The bridges used pedestrians are known as foot bridges. Some bridges which carry canals and pipe lines and these bridges are known as aqueduct bridges. These are constructed over busy localities to carry the vehicular traffic over the area keeping the continuity of activities are called as via ducts. Though the recent version of the code, IS 800:2007, contains provisions for design and detailing for seismic loads, it does not suggest the type of connections which are suitable for high or intermediate seismic zones.

II. AIM OF THE PROJECT

The aim of the project is to resist the effect of seismic force in steel truss bridge using splice connection.

III. MATERIALS USED

A. Steel Section:

Steel sections of ISMC 100 and ISMC 75 with the modulus of elasticity 200 Gpa are used and their thermal expansion is about $11.07 \times 10^{-6}/^{\circ}\text{C}$.

B. Splice Plate:

A thick steel plate is used to make the connections between the structural steel members.

C. Bolts and Nuts:

The grade 4.6 bolts have an ultimate material strength of 400 N/mm² and the yield (or proof) stress is 60% of the ultimate strength and nuts are used.

IV. RESULTS AND DISCUSSION

A. Experimental and software analysis of a Specimen with and without splice connection

For the testing the trusses are made from the ISMC 100 and ISMC 75 channel sections. According to the design characteristic the splice connections are fabricated with bolted connections. The experimental testing is made done in the Computerized Universal Testing Machine of capacity 1000 kN. Experimental investigation of steel truss bridge without splice connection shown in figure 1. and with splice connection as shown in figure.2



Figure 1 without splice connection



Figure 2 with splice connection

B. Load carrying capacity in kN for with and without splices in experimental investigation

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection. The obtained results shows that the load carrying capacity of the section with splice connection is twice than the without splice section. As shown in Figure.3 and table .1

Table 1 Load carrying capacity for with and without splices in experimental investigation.

Trusses analysis	SPLICE DETAIL	LENGTH			
		7 m		0.7 m	
Experimental investigation	WITHOUT	726	198	21.6	134
	WITH	1656.69	160.2	48.3	93.12
Software investigation	WITHOUT	617	87.5	94	17.2
	WITH	824	52.12	112	16.2

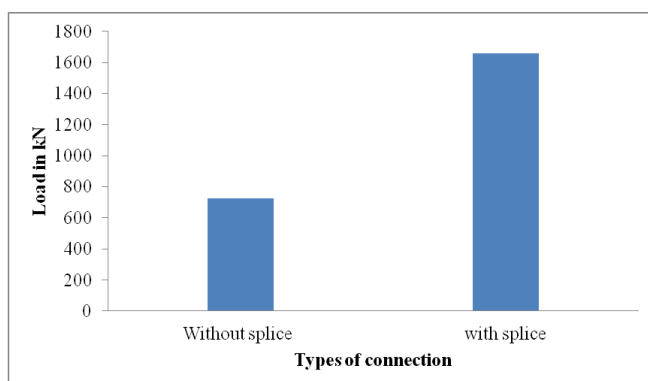


Figure 3 Load carrying capacity for with and without splices in experimental investigation.

C. Load carrying capacity in kN for with and without splices in software investigation.

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection. The obtained results shows that the load carrying capacity of the section with splice connection is 17.67 increased than the without splice section. As shown in Figure.4 and table 1.

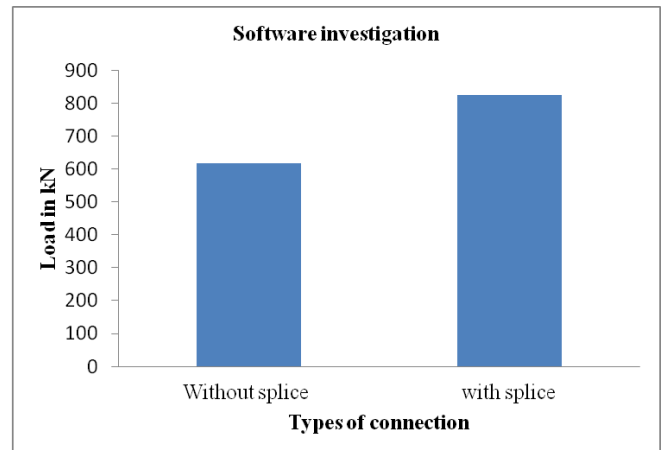


Figure 4 Load carrying capacity for with and without splices in software investigation

D. Load carrying capacity in kN for with and without splice connection in experimental and soft ware investigation

The test is carried out by taking the load carrying capacity of the steel members with and without splice connection in experimental and soft ware investigation.

In experimental investigation of with and without splice connection, the load carrying capacity is increased twice and 17.67 % compare with software analysis in both with without splice connection as shown in figure 5 and table 1.

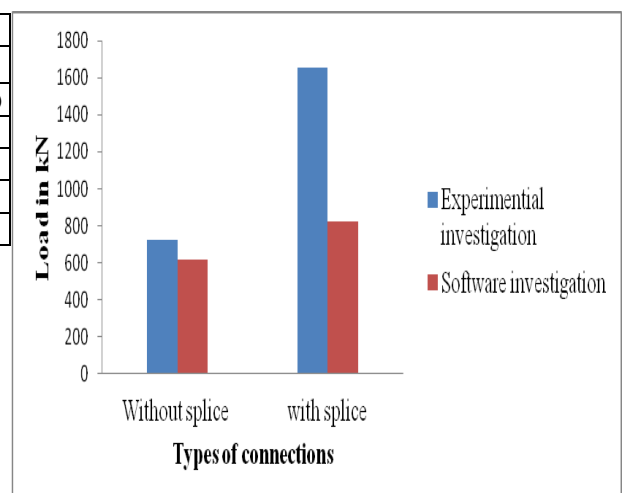


Figure 5 Comparison of load carrying capacity in with and without splice connections

E. Deflection in mm for with and without splices in experimental investigation

The test is carried out by taking the deflection of the steel members with and without splice connection. The obtained results shows that the deflection of the section with splice connection is 23.59% less than the without splice section. As shown in Figure.6 and table 1.

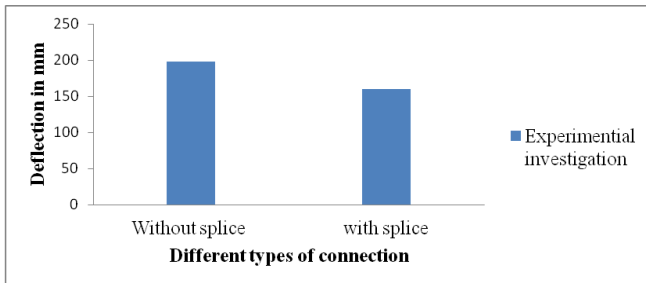


Figure 6 Deflection for with and without splices in experimental investigation

F. Deflection in mm for with and without splices in software investigation.

The test is carried out by taking the deflection of the steel members with and without splice connection. The obtained results shows that the deflection of the section with splice connection is 67.39% less than the without splice section. As shown in Figure.7 and table 1

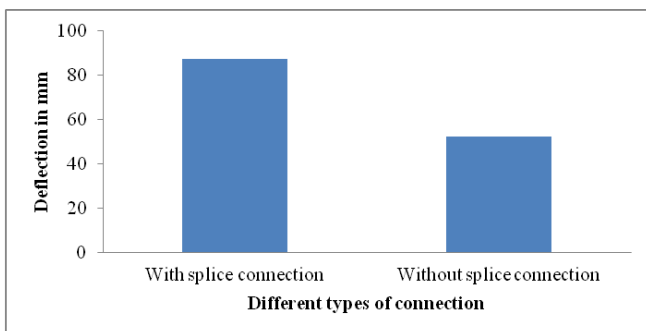


Figure 7 Deflection for with and without splices in software investigation

G. Deflection in mm for with and without splice connection in experimental and soft ware investigation.

The test is carried out by taking the deflection of the steel members with and without splice connection in experimental and soft ware investigation.

In experimental investigation of with and without splice connection, the deflection is greater than the software investigation compare with both in with without splice connection as shown in figure 8 and table 1

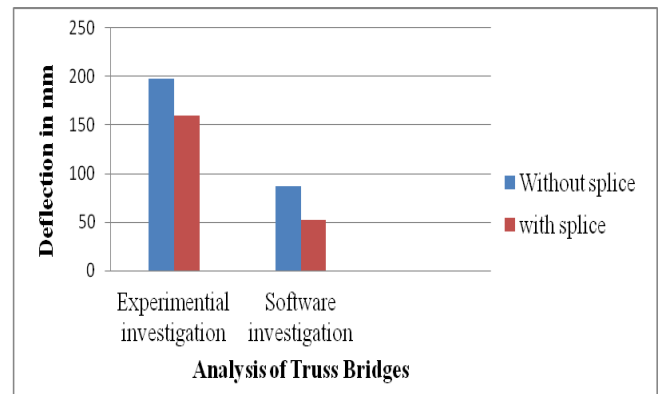


Figure 8 Comparison of deflection for with and without splice connections

V CONCLUSION

In this project the design of warren truss bridge was carried out with the calculations and assumptions taken from the review of literatures and also by the bridge rules, Ministry of Indian Railways.

The various truss members are analyzed including top chord, bottom chord and inclined members from the initial analysis using influence line diagrams.

Stringers and cross girders with the top and bottom lateral bracing are also analyzed with the obtained wind load acting on the truss members.

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Experimental Study of Concrete Made With Granite and Iron Powders as Partial Replacement of Sand

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Abstract -

Granite Powder (GP) and Iron Powder (IP) are industrial byproducts generated from the granite polishing and milling industry in powder form respectively. These byproducts are left largely unused and are hazardous materials to human health because they are airborne and can be easily inhaled. An experimental investigation has been carried out to explore the possibility of using the granite powder and iron powder as a partial replacement of sand in concrete. Twenty cubes and ten beams of concrete with GP and twenty cubes and ten beams of concrete with IP were prepared and tested. The percentages of GP and IP added to replace sand were 5%, 10%, 15%, and 20% of the sand by weight. It was observed that substitution of 10% of sand by weight with granite powder in concrete was the most effective in increasing the compressive and flexural strength compared to other ratios. The test resulted showed that for 10% ratio of GP in concrete, the increase in the compressive strength was about 30% compared to normal concrete. Similar results were also observed for the flexure. It was also observed that substitution of up to 20% of sand by weight with iron powder in concrete resulted in an increase in compressive and flexural strength of the concrete.

Keywords Granite Powder Iron Powder Compressive Strength Flexural Strength Sustainability

1. Introduction

Concrete is the single most widely used construction material in the world today. It is used in buildings, bridges, sidewalks, highway pavements, house construction, dams, and many other applications. The key to a strong and durable concrete are the mix proportions between the various components. Less cement paste can lead to more voids, thus less strength and durability while more cement paste can lead to more shrinkage and less durability. The gradation and the ratio of fine aggregates to coarse

aggregates can affect strength and porosity. The mix design should also achieve the desired workability of concrete so as

to prevent segregation and allow for ease of placement. Typically, a concrete mix is about 10% to 15% cement, 25% to 30% sand, 40% to 45%

percent aggregate and 15% to 20% water. Entrained air (5% to 7%) is also added to concrete to improve durability. Concrete should have enough compressive strength and flexural strength to support applied loads. At the same time it should have good durability to increase its design life and reduce maintenance costs. In general, durable concrete will have good resistance to freeze and thaw, abrasion, sulfate reactions, ultraviolet radiation, seawater, alkali-silica reaction and

Chlorides. The gradation and maximum size of aggregates are important parameters in any concrete mix. They affect relative proportions in mix, workability, economy, porosity and shrinkage of concrete. Granite powder, a waste material from the granite polishing industry, is a promising material for use in concrete similar to those of pozzolanic materials such as silica fume, fly ash, slag, and others. These products can be used as a filler material (substituting sand) to reduce the void content in concrete. Granite powder is an industrial byproduct obtained from crushing of granite stone and granite stone polishing industry in a powder form. It is also generated from recycling marble tops, terrazzo, granite pavers, and stone scraps and discards. If left on its own and is not properly collected and stored, the fine granite powder can be easily be airborne and will cause health problems and environmental pollution.

Inhalation of granite powder fine particles is a health hazard and is a

cause of lung diseases especially for people living near granite mills. In this present work, granite powder is used as partial replacement of sand in concrete in different percentage and the associated compressive strength, flexural, and splitting tensile strengths of concrete have been evaluated. By doing so, natural resources of sand can be preserved and the health hazards of these industrial wastes are minimized.

Recycling of granite dust will prevent these wastes from ending up in landfills and provides affordable, eco-friendly, solid stone for various uses. Recycled tiles made from

recycled glass or wastes from mines or factories have been used for floors, countertops and walls.

2. Research significance

Granite powder and iron powder industrial byproducts resulting from the granite stone crushing and polishing and from the steel production respectively. These byproducts can be used as partial replacement of sand in concrete. When used in certain proportions, granite powder and iron powder have shown to increase the compressive strength, flexural strength, and splitting tensile strength of concrete. The experimental research conducted in this study showed the mechanical properties of concrete have improved when granite powder and iron powder were used as partial replacement of sand in specified percentages. In addition, the use of these powders as a partial replacement of sand will reduce the consumption of sand in the construction industry thus preserving more of these natural resources. Recycling of these byproducts and using them in concrete will reduce their health hazards and their impact on the environment.

3. Experimental investigation

The experimental program comprised of preparing concrete cubes, beams, and cylinders with and without granite or iron powder replacement. The concrete mix included Portland cement, sand, granite powder or iron powder, coarse aggregates, superplasticizer, and water. The cubes were used to test the concrete compressive strength. The beams and the cylinders were used to test the flexural strength and split tensile strength respectively.

Materials

The material used in this study included the following: Ordinary Portland cement, coarse aggregates, fine aggregates (sand), granite powder, iron powder, water, and superplasticizers. The cement was Type I Portland cement. The coarse aggregates were crushed angular coarse aggregate 10 mm to 20 mm (3/8 in to 3/4 in) in size. The specific gravity of the aggregates was 2.72 and fineness modulus was 4.2. The sand was approximately 2 mm in diameter and has a specific gravity of 2.65 and a fineness modulus equal to 2.3. The specific gravity of granite powder was 2.53 and the fineness modulus was approximately

2.4 with a particle size less than 90 μm . Typical chemical analysis of the

granite powder is shown in Table 1. The source of iron powder was iron melting induction furnace and its chemical

composition is shown in Table 2. The gradation of granite powder, iron powder, and sand is shown in Fig. 1. The water used for the mix was potable water available locally. The water was free from concentrated acids and organic substances. A superplasticizer was used to improve the workability of concrete. A 0.5% by weight of cement water-reducing superplasticizer was added to improve the workability of concrete. The superplasticizer was Universal Polycarboxylate based High-efficiency Concrete Water Reducer Plasticizer from a commercial supplier from Latvia.

Table 1
Chemical composition of granite powder used in this study.

Chemical compound	Weight (%)
SiO ₂	64.5
TiO ₂	0.67
Al ₂ O ₃	12.01
Fe ₂ O ₃	5.77
MgO	0.57
MnO	0.39
CaO	4.80
Na ₂ O	5.92
K ₂ O	5.26
P ₂ O ₅	0.07

Table 2
Chemical composition of granite powder used in this study.

Chemical compound	Weight (%)
SiO ₂	2.41
TiO ₂	0.72
Al ₂ O ₃	1.81
Fe ₂ O ₃	89.0
MgO	0.23
MnO	2.16
CaO	0.45
Na ₂ O	0.66
K ₂ O	1.64
P ₂ O ₅	0.34
Ni	0.002
Cu	0.003

Preparation of granite powder test specimens

The granite powder was collected from granite crushing and polishing sites and was dried before use. The cement and granite powder were first mixed thoroughly. Further sand and coarse aggregate were added to the mix. The materials were mixed in dry conditions for few minutes. Once all the materials were mixed well, the super plasticizer was added to water and water containing super plasticizer was added to the dry mix in a standard concrete mixer. The resulting concrete mix was used to prepare 150 × 150 × 150 mm (6 in × 6 in × 6 in) cubes and 100 × 100 × 500 mm (4 in

× 4 in × 20 in) beams, and 150 mm × 300 mm (6 in × 12 in) cylinders. The concrete was poured into the molds and

was compacted 25 blows by a compaction rod. After that the cubes, beams, and cylinders were vibrated for 1 to 2 min on a vibrating machine and then the top surface of the specimens was finished using a trowel. After that, the molds were left to dry for 24 h. The specimens were then removed from the molds and were cured in water tank for curing for 28 days. The curing time was not a parameter in this study and hence no comparisons were made for the effect of granite powder (GP) on curing time. Several mixes were prepared with different percentages of granite powder as partial replacement of sand. All other ingredients were kept the same. The percentages of granite powder used were 0%, 5%, 10%, 15%, and 20% of sand. The mix proportions for the mixes tested in this study are shown in Table 3. A total of five mixes were tested: MG0, MG5, MG10, MG15, and MG20 containing 0%, 5%, 10%, 15%, and 20% of GP by weight respectively. This concrete with granite powder had a slump equal to 80 mm (3.2 in) and the compaction factor was 0.95. Plasticizing admixtures are added to a concrete mixture to make the mix workable without additional water especially for use in ready mixed concrete.

Table 3

Mix design proportions for various granite powder (GP) ratios (kg/m³).

Mix	Cement	Sand	Coarse agg	Water	GP	Mix proportion C: W: FA: CA: GP
MG0	410	620	1250	165	0	1: 0.4: 1.51: 3.05: 0.000
MG5	410	589	1250	165	31	1: 0.4: 1.43: 3.05: 0.075
MG10	410	558	1250	165	62	1: 0.4: 1.36: 3.05: 0.150
MG15	410	525	1250	165	95	1: 0.4: 1.28: 3.05: 0.225
MG20	410	496	1250	165	124	1: 0.4: 1.20: 3.05: 0.305

1. Testing of concrete cubes, cylinders and beams

Compression tests, split-cylinder tensile tests, and flexural tests were conducted on concrete cubes, concrete cylinders, and concrete beams respectively. The compressive strength tests were according to ASTM C39 while the flexural strength tests and the splitting tensile strength tests were done according to ASTM C78 and ASTM C496 respectively. Tests were performed at 7 days and 28 days. The compressive tests were conducted using 2000 KN (450 kips) compressive testing machine. Forty cubes were prepared and twenty were tested at 7 days and the remaining twenty were tested at 28 days. Flexural test and splitting tensile test specimens were tested using 1000 KN (225 kips) testing machine. Figs. 2 and 3 show photos of the compression testing machine and flexural test machine respectively. Twenty beams were prepared and ten were tested at 7 days and the remaining ten

were tested at 28 days. Similarly for the cylinders, twenty cylinders were prepared and ten were tested at 7 days and the remaining ten were tested at 28 days. The test results of the cubes, beams, and cylinders of concrete made with GP and IP were compared to the test results of the normal concrete (control) specimens.

4. Test results of granite powder (GP) concrete mixes

Compressive strength

The compressive strength of the cubes was determined for control specimens and for specimens with various percentages of granite powder. The average compressive strength of control cubes (Mix MG0) was

35.8 N/mm² (5.2 ksi). The cubes with granite powder showed higher compressive strength. The compressive strengths of mix designs MG5 (5% GP), MG10 (10% GP), MG15 (15% GP) and MG20 (20% GP) were



47.1 N/mm² (6.84 ksi), 48.9 N/mm² (7.1 ksi), 42.9 N/mm² (6.22 ksi),

38.7 N/mm² (5.61 ksi) respectively. The test showed that the optimum percentage of granite powder to achieve the maximum increase in compressive strength was 10%. For 20% partial replacement of sand with granite powder the increase in the compressive strength was relatively small. The values of compressive strengths of cubes made with different percentages of granite powder replacement of sand are given in Table 5 and also graphically presented in Fig. 4.

Flexural strength

The flexural strength of concrete at failure or modulus of rupture was measured using beam specimens. The modulus of rupture is determined by testing

twenty beam specimens $100\text{ mm} \times 100\text{ mm} \times 500\text{ mm}$ over a span length $L = 400\text{ mm}$ in a 4-point loading set up as shown in Fig. 5.

The flexural strength (modulus of rupture) was determined using the bending stress formula. The section modulus of the cross section was $166,667\text{ mm}^3$ (10.17 in^3) and load P was recorded by the data acquisition system. The flexural strength of the beams was determined for the control beams as well as the beams with various percentages of granite powder. The flexural strength of control beams

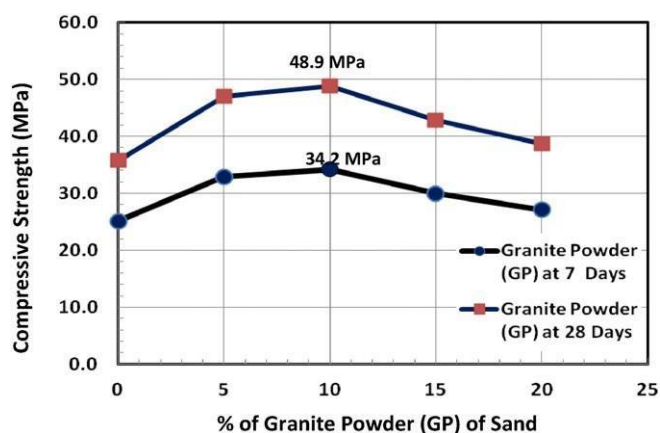


Fig. 4. Compressive strengths of cubes with different proportions of (GP).

were 3.61 N/mm^2 (524 psi), 4.62 N/mm^2 (670 psi), 3.49 N/mm^2 (506 psi) and 3.42 N/mm^2 (496 psi) respectively. The tests showed that the optimum percentage of granite powder to achieve the maximum increase in flexural strength was 10%. For 20% partial replacement of sand with granite powder the increase in the flexural strength was relatively small. The values of flexural strengths of beams made with different percentages of granite powder of sand are given in Table 6 and also presented graphically in Fig. 6.

Split tensile strength

The tensile strength of concrete was determined indirectly using the split-cylinder strength test. The indirect test is widely accepted test method to determine the tensile strength of concrete given the difficulty and variability associated with the direct tensile tests. The split-cylinder tensile strength was determined by testing twenty $150\text{ mm} \times 300\text{ mm}$ ($6\text{ in} \times 12\text{ in}$) cylinders. Ten cylinders were tested at 7 days and ten cylinders were tested at 28 days. The split-cylinder tensile strength was determined using Eq. (1):

where P is the cylinder failure load, L is the cylinder length equal to 300 mm , and D is the cylinder diameter equal to 150 mm . The split tensile strength of the cylinders was determined for the control cylinders as well as the cylinders with various percentages of granite powder. The split tensile strength of the control cylinders at 28 days (Mix MG0) was 2.62 N/mm^2 (380 psi). The cylinders with granite powder showed higher flexural strength compared to control mixes. The split tensile strength of mix designs MG5 (5% GP), MG10 (10% GP), MG15 (15% GP) and MG20 (20% GP) were 2.71 N/mm^2 (393 psi),

3.0 N/mm^2 (435 psi), 2.39 N/mm^2 (347 psi), 1.98 N/mm^2 (287 psi) respectively. The tests showed that the optimum percentage of granite powder to achieve the maximum increase in split tensile strength was 15% compared to an optimum value of 10% for compression and flexural strengths. For 20% partial replacement of sand with granite powder, the split tensile strength was lower than the control cylinders. This observation was different than those of compression and flexural strength. For compression and flexural strength, the 20% replacement of granite powder showed a modest increase rather than a decrease in strength. The values of split tensile strength of cylinders made with different percentages of granite powder of sand are shown in Table 7 and also presented graphically in Fig. 7.

Summary of test results of granite powder (GP) specimens

The concrete mix with granite powder (GP) in concrete showed good workability and had slump values similar to those of normal concrete mixes. The ingredients were easy to mix, pour, transport, finish and demold. The compressive strength of concrete increased with the addition of granite powder (GP) as partial replacement of sand. This results in more surface area that allows more Using 10% granite powder (GP) in concrete gave the best result (highest increase in compressive strength) compared to other ratios. The increase in this case was 36%. The same observation for the compression strength was observed for the flexural strength. With 10% GP replacement, the increase in flexural strength was about 43%. For the split-cylinder tensile strength, the optimum value of the percentage of (GP) in concrete was 15% compared to 10% for flexural and compressive strength. The increase in tensile strength for 15% and 10% of (GP) was approximately 30% and 15%

5. Conclusions

Based on the results of this study, the following conclusions can be drawn:

1. The concrete mix made using granite powder (GP) and iron powder (IP) as partial replacement of sand showed good workability and fluidity similar to normal concrete mixes.

1. The compressive strength of concrete increased with the addition of granite powder (GP) as partial replacement of sand. Using 10% granite powder (GP) in concrete gave the best result (highest increase in compressive strength) compared to other ratios.
2. Similar to the observations in the compressive strength, the flexural strength of concrete increased with the addition of granite powder (GP) as partial replacement of sand. The maximum increase was observed for 10% GP ratio.
3. For the split-cylinder tensile strength, the optimum value of the percentage of (GP) in concrete was 15% compared to 10% for flexural and compressive strength. The increase in tensile strength for 15% and 10% of (GP) was approximately 30% and 15% respectively. For 20% (GP) in concrete the split tensile strength was actually lower than that of the control mix.
4. For mixes with iron powder (IP), the compressive, flexural, and tensile strengths all increased with the increase in the (IP) ratio. Unlike the granite powder (GP), the increase in strengths continued to concrete with the increase in the (IP) ratio. The increase was more pronounced in flexural strength compared to compressive and tensile strengths.
5. This study was limited to the evaluation of the mechanical properties of concrete with granite powder and iron powder as well as its workability and fluidity. The longer-term performance of concrete with granite powder and iron powder was not part of this study. Durability is important for the proper use of this material in structural as well as non-structural applications and will be investigated in a future study.

Sustainable Organic Biomass By Using Dyeing Biological Sludge and Coir Pith

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Abstract—Presently, fossil fuels such as coal, oil and natural gas represent the prime source of energy in the world. However, it is expected that these sources of energy will be depleted within the next 40–50 years, however the anticipated environmental damages like as the global warming, urban smog and acid rain, photo chemical reaction due to the production of fossil fuel. In continues expansion of industries and infrastructure substitute fuel is required. This project rectifies this gap in economic and environmental understanding adjacent sustainable development. The project focuses a fairly exhaustive review of contemporary literature on the subject into a comprehensive, polished definition of sustainable development. Based on this project innovative, and with solid traction in development theory, the project then creates a combined statistic that can be used to measure sustainable development on a national range. Terminology in the field of sustainable development is becoming progressively more important, because the number of terms continues to enhance along with the rapid increase in awareness of the importance of sustainability. The significance of this project is to concentrate on thermal application of biomass briquette at various industrial purposes. Reduction of the green house gas emission, convert organic waste in to a product, residue-reused and minimize deforestation. The ingredient has been mixed together, the calorific value obtained from third party laboratory. The result of coir pith Vs dyeing biological sludge ratio 1:1 3621 KJ/Kg. Its efficient combination, this is 2 times lesser than the country fire wood. But can use as supporting fuel for boilers.

Keywords: Fossil Fuel, Sustainable development, Biomass, Green House gas emission, Organic waste—

1.Introduction

Sustainable Organic Biomass

Biomass, as the main contributor to renewable energy in the world (about 13% of total energy consumption), is a versatile energy source—it can be stored and converted in practically any form of energy carrier and also into biochemical's and biomaterials from which, once they have been used, the energy content can be recovered to generate electricity, heat, or transport fuels. It covers a broad range of products, including traditional use of wood for cooking and heating, industrial process heat, and co-firing of biomass in coal-based power plants, biogas and biofuels. Moreover, the possibility to use residues and waste as a biomass feedstock enables the production of huge quantities of energy and environmental benefits all over the world, without any fertile land use or any competition with food or feed. Since residues and wastes are part of the short carbon cycle, their use for energy purposes has a minimal extra GHG emission.

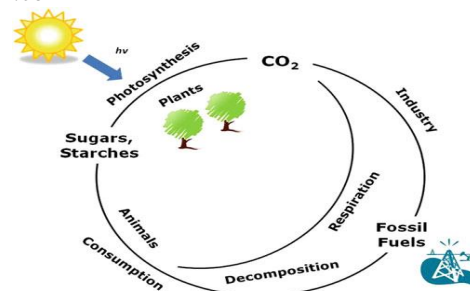


Fig 1: Carbon Cycle

Biomass for energy is the main contributor to renewable energy around the world, with almost 13% of total energy consumption in 2006, deriving from biomass. Biomass is in fact a term that covers a broad range of often very different products, although all are of organic origin. Many of these products can be used as a source of energy, either for electricity or heat production, or as a feedstock for biofuel's production. Heating—mostly in open stoves—is still common practice for many people in Developing countries. For 'modern' uses of biomass, a multitude of feedstock-to end-use routes are feasible and indeed in use today. Modern biomass is used on a large scale for heating, power generation (e.g. co-firing in large-scale coal-based power plants or combined heat and power plants) and biogas and biofuel production.

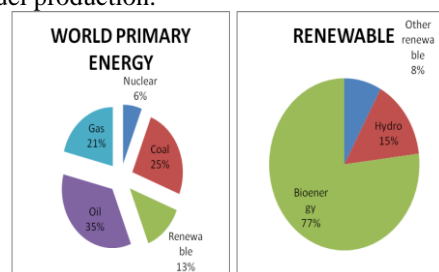


Fig.2 Share of bio energy in world primary energy mix.

Table 1 Overview of bio energy supply for a number of categories.

Biomass category (EJ/yr)	Technical potential in 2050
Energy crop production on surplus agricultural land	0–700
Energy crop production on marginal land	60–100
Agricultural residues	15–70
Forest residues	30–150
Dung	5–55
Organic wastes	5–50+
Total	<50 to> 1,100

1.1 APPLICATION OF BIOMASS BRIQUETTE

Biomass Briquette are widely used for any type of thermal application like steam generation in boilers, in furnace & foundries for heating purpose (Residential & Commercial Heating for winter, heating in Cold areas and Hotels, Canteens, Cafeterias and house hold kitchen appliances etc), drying process and in gasification plant replacing conventional solid fuels like Coal and Firewood and liquid fuels like Diesel, Kerosene, Furnace Oil (FO), etc.

- Ceramic and refractory Industries
- Spinning Mill
- Chemical units
- Dyeing plants
- Milk Plant
- Food Processing Plant
- Leather industries
- Lamination industries
- Brick manufacturing units.

1.2 SOURCE OF BOILER FUEL FOR INDUSTRIES

A combustion boiler (or steam generator) consists of fossil fuels or biomass burner and a heat-transfer system to boil water and generate steam. Steam generators also include systems and components for pressure control, heat recovery, steam delivery and distribution, condensate drainage, and separation of oxygen and non-condensable gases. The pressure vessel of a boiler is usually made of steel (or alloy steel), or historically of wrought iron. Stainless steel, especially of the austenitic types, is not used in wetted parts of boilers due to corrosion and stress corrosion cracking. Industrial boilers are closed vessels that use a fuel source or electricity to heat water or generate steam for industrial heating and humidification applications. The basic concept of a boiler involves a heat source (furnace) and a heat exchanger (pipes or tubes) or heat transfer medium which allows water to be heated above its boiling point. The type of heat source and the method of heat exchange are what primarily define different types of boilers.

The boilers are categories in terms of fuel feed.

1. Coal fuel feed boiler
2. Wood fired boiler
3. Hybrid HD boiler
4. Biomass boiler system
5. Double feed boiler (Biomass and Fossil fuel)

In Tirupur, Coimbatore and Erode districts is major textile manufacturing units and all required bleaching, colouring dyeing, desizing and other dyeing processing units and most of them required boiler. These boilers are used the following fuel .

1. Wood from forest in and around erode and Coimbatore forest region.
2. Fire wood from Thirunelveli
3. Coconut palm leaves.
4. Coal and other fossil fuels.

World organizations and international agencies, like the IEA, are concerned about the environmental impact of burning fossil fuels, and coal in particular. The combustion of coal contributes the most to acid rain and air pollution, and has been connected with global warming. Due to the chemical composition of coal there are difficulties in removing impurities from the solid fuel prior to its combustion. Modern day coal power plants pollute less than

older designs due to new "scrubber" technologies that filter the exhaust air in smoke stacks; however emission levels of various pollutants are still on average several times greater than natural gas power plants. In these modern designs, pollution from coal-fired power plants comes from the emission of gases such as carbon dioxide, nitrogen oxides, and sulfur dioxide into the air.

Acid rain is caused by the emission of nitrogen oxides and sulfur dioxide. These gases may be only mildly acidic themselves, yet when they react with the atmosphere, they create acidic compounds such as sulfurous acid, nitric acid and sulfuric acid which fall as rain, hence the term acid rain. In Europe and the U.S.A., stricter emission laws and decline in heavy industries have reduced the environmental hazards associated with this problem.

II. MATERIALS AND METHODS

A. *Source of Biological Sludge.*

The entire Tirupur environment was found to be polluted in the state of water, land and air due to the industrial process of the textile industries. Due to the disposal of sludge in the non engineered landfills the ground water as well as the soil was found to be polluted. So, disposal of sludge in Tirupur region is a major problem existing today. River Noyyal which emerges from the Vellingiri hills and flowing through Tirupur region was completely polluted which affected the irrigation of around 16,000 acres of land in Tirupur and Erode District .The surface water was also found to be much affected and the drinking water for Tirupur region is pumped from river Cauvery, which is flowing through Erode district. In such circumstances, management of sludge in textile industry has now become a burning issue due to its surplus volume and undesired characteristics.

B. *Textile ETP Sludge*

The textile ETP sludge used in the present investigation was taken from CETP, Tirupur. The wet sludge was collected from the CETP and then dried. The dried sludge was then sieved for removal of dusts. Then the sludge was mixed along with the coir pith to be tested its colorific value in ITALAB SALEM (P) LTD., laboratory at Salem. The sludge was found to have very high concentration of pollutants like sulfate, chloride, color etc., the sludge was also found to be highly corrosive and gives more colloidal content.

C. *Source of Coir Pith*

Coco peat (coco peat), also known as coir pith. coir fibre pith, coir dust, or simply coir, is made from coconut husks, which are byproducts of other industries that use coconuts. Coco peat primarily consists of the coir fibre pith or coir dust which is obtained by processing coconut husk and removing the long fibres. The coco peat which is obtained can hold large quantities of water, just like a sponge. It is used as a replacement for traditional peat in soil mixtures, or, as a soil-less substrate for plant cultivation.

Coir waste from coir fiber industries is washed, heat-treated, screened and graded before being processed into coco peat products of various granularity and denseness, which are then used for horticultural and agricultural applications and as industrial absorbent. Usually shipped in the form of compressed bales, briquettes, slabs or discs, the

end user usually expands and aerates the compressed coco peat by the addition of water. A single kilogram of coco peat will expand to 15 liters of moist coco peat

Biomass is one of the predominant renewable energy sources and the use of biomass for the energy generation has got much attention due to its environmental friendliness. Densification of coir dust into fuel briquette can solve waste disposal problem as well as can serve as an alternative energy source. The objective of this study was to investigate the possibility of producing briquette from coir dust and textile waste biological sludge blend without binder.



Fig 3- Coir pith after separation from the coir fibre and initial stages of processing.

D. Biomass briquetting technologies

Biomass densification represents a set of technologies for the conversion of biomass residues into a convenient fuel. The technology is also known as briquetting or agglomeration. Depending on the types of equipment used, it could be categorized into five main types:

- Piston press densification
- Screw press densification
- Roll press densification
- Pelletizing

III. BIOMASS MANUFACTURING PROCESS

Biomass briquettes made from bio waste materials that available free, such as agriculture waste or forestry waste can be an alternative fuel to coal, charcoal and other fossil fuels. Briquettes made from agro waste raw materials burn cleaner than coal and that's why environmental become more healthy and greener. Finally, "throw-away" materials into a green fuel source is growing because it is sustainable process.

Table 2. Composition of biomass samples

S.No	Qty of Coir pith in Kgs	Qty of DBS in Kgs	Proportionate
1	1.66	3.33	2:1
2	2.5	2.5	1:1
3	1.66	3.33	1:2

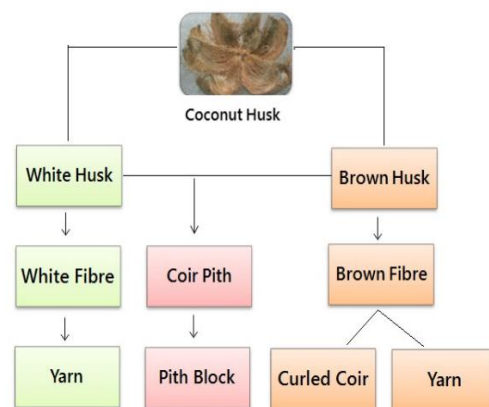


Fig.4 Coir industry process flow chart

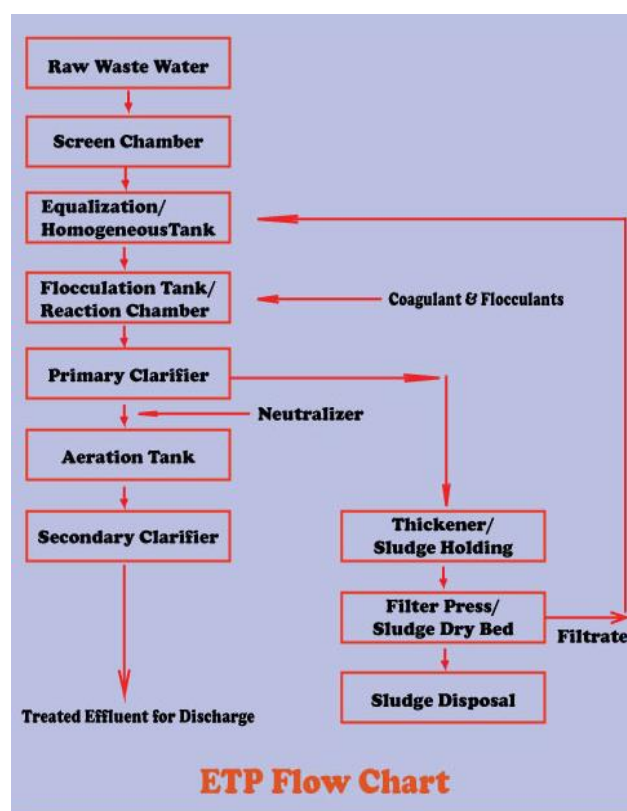


Fig. 5 Dyeing Effluent flow chart

Table 3. Source of industrial fuel in terms of energy and pollutants.

Name of Fuel	Source	By product	Pollutants	Energy in MJ/Kgs
Coal	Fossil fuel Sedimentary rock	Fly ash	SO ₂ , N _x And CO ₂	19.31
Fuel oil	Fossil fuel From	Nil	SO ₂ , N _x ,	33.72

	Natural Reservoir		VOC, And CO ₂	
Natural Gas	Fossil fuel From Natural Reservoir	Nil	NO _x , S, S O ₂ , SO ₃ And Mg	37.258 Mj/m ³
Biomass (Varies from low to high)	Non Fossil fuel from natural residues	Ash-used as a fertilizer	CO ₂ and C	19.30 to 11.30
Fire Wood Comes from Deforestation	Non Fossil fuel from natural residues	Ash-used as a fertilizer	CO ₂ and C	8.95

III. DESIGN DESCRIPTION OF BRIQUETTE

A. Temperature and pressure

It was found that the compression strength of densified biomass depended on the temperature at which densification was carried out. Maximum strength was achieved at a temperature around 220°C. It was also found that at a given applied pressure, higher density of the product was obtained at higher temperature.

B. Moisture Content

Moisture content has an important role to play as it facilitates heat transfer. Too high moisture causes steam formation and could result into an explosion. Suitable moisture content could be of 8-12%.

C. Drying

Depends on factors like initial moisture content, particle size, types of densifier throughout the process. Particle Size and Size reduction. The finer the particle size, the easier is the compaction process. Fine particles give a larger surface area for bonding. It should be less than 25% of the densified product could be done by means of a hammer mill. Wood or straw may require chopping before hammer mill.

IV. RESULTS AND DISCUSSIONS

A. BIOMASS BRIQUETTE

This is one of the alternative methods to save the consumption and dependency on fuel wood.

- Densities fuels are easy to handle, transport and store.
- They are uniform in size and quality.
- The process helps to solve the residual disposal problem.
- The process assists the reduction of fuel wood and deforestation.
- It provides additional income to farmers and creates jobs.
- Briquettes are cheaper than coal, oil or lignite once used cannot be replaced.
- There is no sulfur in briquettes.

- There is no fly ash when burning briquettes.
- Briquettes have a consistent quality, have high burning efficiency, and are ideally sized for complete combustion.

The biological sludge's were characterized for various physico-chemical parameters such as moisture content (%), Density, p^H, Total suspended solids, Electric conductivity and turbidity. Basis of laboratory test with different reading and average values are presents in

Table 4.Characteristic of biological sludge

Location Of CETP at Tirupur	Moisture Content (%)	Density Kg/m ³	p ^H	Total Suspended Solids (%)	Electric Conductivity mS/cm	Turbidity FTU
Veerapandi	5.4	920.00	8.78	94.60	6.63	30.25
Andipalayam	10.33	861.20	8.08	89.67	3.9	37.50
Angeripalayam	66.50	1065.40	9.00	33.35	2.12	45.20

Table 5. Characteristic of Coir Pith

Sample	Porosity Avg Partical Size (%)	Compressibility in %	p ^H	Total Suspended Solids (%)	Electric Conductivity mS/cm
1	83.25	70.66	6.1	110.86	3.8
2	71.20	85.23	6.5	143.25	3.71
3	76.4	86.41	6.8	124.89	3.49

Table.6 Comparison of Energy Efficiency with other Fuel

In Terms of	Fossil Fuel	Sustainable Biomass Fuel
Carbon lean	Emission of carbon dioxide, nitrogen oxides, and sulfur dioxide into the air.	Emission of carbon dioxide and other low concentrated gases in to the air.
Neutral- CO ₂	Consumption of CO ₂ not takes place and librates poisonous gas.	Trees and vegetation are consuming CO ₂ while growing and the same amount librates while burning.
Local business	Transportation is required to bring fossil fuel. Again energy is spending.	Making biomass is local business, where we can use waste residues into useful products.
Residues	High hazardous waste.	Its again used for agricultural fertilizer.

B. Discussion

The calorific value were found in ITALAB, compare the results with country fire wood, the specimen value become 2 times lesser; however the biomass can be used as a supplementary fuel with country wood or other fuels. It is non-hazardous to the environment, or any life on the planet. It is an excellent idea for recycling the agricultural wastes

that are mostly burnt in an ineffective way. It prevents deforestation and conserves the natural forest resource.

V. CONCLUSION

In the present study, the unwashed coir pith with minimum percentage of moisture content mixed with completely dried Textile ETP Sludge-Biological sludge taken at various location in Tirupur. The characteristic was completely analyzed. Found that the Sludge having more fibre content and coir pith also fibre rich dust partial which suitable for Biomass fuel for industrial boiler and other heating purpose for any industrial process.

- Briquettes replace the usage of conventional types of fuel, which helps to conserve them for very necessary usage. This helps to prevent releasing too much of CO₂ into the atmosphere.
- This fuel causes negligible pollution and does not emit sulfur or fly ash, and so keeps the eco-balance.
- Since it uses only agro-waste or bio-waste for production it is cheap and is easily available in plenty.
- Excellent source of fuel with good thermal calorific value
- Easy to produce
- Does not cause emission of effluent or harmful waste while briquetting
- It offers consistent combustion
- Due to their compact size they are easy to store, handle and transport.
- Ash content is very low as compared to fuel like coal
- The auto ignition temperature is very low as compared to coal.
- Can be used in a variety of applications in the domestic, commercial as well as industrial arena
- Does not have corrosive outcome on the boiler equipments.
- It is non-hazardous to the environment, or any life on the planet.

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Experimental Study on Behaviour of Steel Fiber Reinforced Concrete

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Abstract-This paper deals with experimental study on behavior of steel fiber reinforced concrete for M25 grade having mix proportion of 1:1:2 with 0.44 water cement ratio to study the Compressive strength, Split tensile strength, Flexural strength of steel fiber reinforced concrete (SFRC) containing fibers of 0.5% volume fraction of hook end Steel fibers of 50 aspect ratio were used. A result data obtained has been analyzed and relationship between Compressive strength, Split tensile strength, Flexural strength vs days represented graphically.

Keywords: Steel fiber reinforced concrete, Compressive strength, Flexural strength, Split tensile strength

I. INTRODUCTION:

Fiber-reinforced concrete can be defined as composite material consisting of mixture of cement, mortar or concrete and discontinues, discrete, uniformly dispersed suitable fibers, continuous meshes, woven fabrics and long wires or rods are not considered to the discrete fibers.

Definition of SFRC

Steel fibre reinforced concrete (SFRC) is a composite material whose components include the traditional constituents of Portland cement concrete (hydraulic cement, fine and coarse aggregates, admixtures ...) and a dispersion of randomly oriented short discrete steel fibres. The development of steel fibre reinforced concretes began in the early 1960s (Li, 2002). Since then, the use of SFRC has gathered great interest, with research demonstrating the potential benefits that may lie in the use of the material in both structural and non-structural applications

Objective

To investigate the properties of Steel Fibre Reinforced concrete experimentally with the following test results

- Compressive strength
- Split tensile strength
- Flexural strength

II. LITERATURE REVIEW:

Vengatachalapathy.V, Ilangoan.R (2010), This experimental study deals with the behavior and ultimate strength of steel fiber reinforced concrete (SFRC) deep beams with and without openings in web subjected to two-point loading, nine concrete deep beams of dimensions 750mm×350mm×75mm thickness were tested to destruction by applying gradually increased load. Simply supported conditions were maintained for all the concrete deep beams. The percentage of steel fiber was varied from 0 to 1.0. The influence of fiber content in the concrete deep beams has been studied by measuring the deflection of the deep beams and by observing the crack patterns.

The investigation also includes the study of steel fiber reinforced concrete deep beams with web reinforcement with and without openings. The ultimate loads obtained by applying the modified Kong and Sharp's formula of deep beams are compared with the experimental values. The above study indicates that the location of openings and the amount of web reinforcement, either in the form of discrete fibers or as continuous reinforcement are the principal parameters that affect the behavior and strength of deep beams.

Milind V. Mohod, (2012), In this paper effect of fibers on the strength of concrete for M 30 grade have been studied by varying the percentage of fibers in concrete. Fiber content was varied by 0.25%, 0.50%, 0.75%, 1%, 1.5% and 2% by volume of cement. Cubes of size 150mm X 150mm X 150mm to check the compressive strength and beams of size 500mm X 100mm X 100mm for checking flexural strength were casted. All the specimens were cured for the period of 3, 7 and 28 days before crushing. The results of fiber reinforced concrete for 3 days, 7 days and 28 days curing with varied percentage of fiber were studied and it has been found that there is significant strength improvement in steel fiber reinforced concrete. The optimum fiber content while studying the compressive strength of cube is found to be 1% and 0.75% for flexural strength of the beam. Also, it has been observed that with the increase in fiber content up to the optimum value increases the strength of concrete. Slump cone test was adopted to measure the workability of concrete. The Slump cone test results revealed that workability gets reduced with the increase in fiber content.

A.M. Shende, A.M. Pande, M. Gulfam Pathan, (2012), Critical investigation for M-40 grade of concrete having mix proportion 1:1.43:3.04 with water cement ratio 0.35 to study the compressive strength, flexural strength, Split tensile strength of steel fibre reinforced concrete (SFRC) containing fibers of 0%, 1%, 2% and 3% volume of fraction. Steel fibers of 50, 60 and 67 aspect ratio were used. A result data obtained has been analyzed and compared with a control specimen (0% fiber). A relationship between aspect ratio vs. Compressive strength, flexural strength, aspect ratio vs. Split tensile strength represented graphically. Result data clearly shows percentage increase in 28 days Compressive strength, Flexural strength and Split Tensile strength for M-40 Grade of Concrete.

Khadake S.N. Konapure C.G. (2012) This paper deals with Investigation for M-25 grade of concrete having mix proportion

1:1.50:3.17 with water cement ratio 0.465 to study the compressive strength, and Flexural strength of steel fiber reinforced concrete (SFRC) containing fibers of an interval of 0.5% from 0.0% to 1.5% volume fraction of hook end Steel fibers of 71 aspect ratio were used. The percentage of Fly Ash by weight is to be increased by 10% from 00% to 30%. After curing this specimen were tested as per relevant codes of practice Bureau of Indian Standard. A result data obtained has been analyzed and compared with a control specimen. A relationship between Compressive strength vs. days, and flexural strength vs. days represented graphically. Result data clearly shows percentage increase in 7, 28 & 45 days Compressive strength for M-25 Grade of Concrete.

III. EXPERIMENTAL PROGRAM:

METHODOLOGY

- ❖ Collection of Materials
- ❖ Finding of Material Properties
- ❖ Casting, curing of specimens
- ❖ Testing of specimens
- ❖ Results and Discussion

MATERIAL USED:

In this experimental study, Cement, sand, coarse aggregate, water and steel fibers were used.

- **Cement:** Ordinary Portland cement of 53 grade was used in this experimentation conforming to I.S-8112- 1989.
- **Fine Aggregate :** Locally available sand zone II with specific gravity 2.45, water absorption 2% and fineness modulus 2.92, conforming to I.S. – 383-1970.
- **Coarse Aggregate:** Crushed stone of 20mm size having specific gravity 2.76 confirming code book IS 393- 1970.
- **Water:** Potable water was used for the experimentation.
- **Steel Fibers:** - In this experimentation, Hook end Steel fibers were used. The Steel fibers with 50 aspect ratios, its 50mm length and 1mm diameter adopted.

CONCRETE MIX PROPORTIONS

Concrete for M25 grade were prepared as per I.S- 10262:2009. A mix proportion of 1:1:2 with 0.44 water cement ratio to get a characteristic strength of M25 was considered for this study.

Table1.Materials Requirements

SPECIMEN TYPES	TEST CONDUCTED	NO.OF DAYS	NO.OF SPECIMENS
CUBE	Compressive Strength	7,14,28	3
CYLINDER	Split tensile Strength	7,14,28	3
BEAM	Flexural Test	28	3

DETAILS OF SPECIMENS:

Cube, Cylinder, Beam casting for using M25 Grade of concrete

Table2.Specimens Details

Cement	435.45 kg
Fine Aggregate	656.60 kg
Coarse Aggregate	1073.34 kg
Water	192 litter
Steel fibers	0.5% by volume of concrete

REINFORCEMENT DETAILS

The beam are provided with 4 numbers of 12mm bars as main reinforcement and 8mm stirrups with 150 mm c/c

MIXING OF CONCRETE

The concrete shall be mixed by hand, or preferably in laboratory batch mixer, in such a manner as to avoid loss of water or other material. Each mix of concrete shall be such a size as to leave about 10% excess after moulding the desired number of test specimens. The proportion of the material including water in concrete mixes used for determining the suitability of the material available shall be similar in all respects to those to be employed in the work where the proportions of the ingredients of the concrete as used on the site to be specified by volume, they shall be calculated from the proportions by weight used in the test specimen and the unit weights of the materials.

CAS TING OF SPECIMENS

The materials were weighed accurately using a digital weighing instrument. For plain concrete, fine aggregates, coarse aggregate, cement, water were added to the mixture machine and mixed thoroughly for three minutes. Steel fibres were mechanically sprinkled inside the mixture machine after thorough mixing of the ingredients of concrete. For preparing the specimen for compressive, tensile, and flexure strength permanent steel moulds were used Before mixing the concrete the moulds were kept ready. The sides and the bottom of the all the mould were properly oiled for easy demoulding

CURING

The test specimens shall be stored in a place away from vibration, in moist air or 90% relative humidity and at a temperature of $27 \pm 1/2$ hours from the time of addition of water to dry ingredients. After this period, the specimen shall be marked and removed from the moulds and unless required for the test within 24 hours, immediately submerged in clean, fresh water of saturated lime.

IV. TEST CONDUCTED ON HARDENED CONCRETE: COMPRESSIVE STRENGTH

The compression test was conducted on cube specimens cured for 7, 14 & 28 days. The test cubes were removed from the moist storage 24 hours before testing. The top and bottom bearing plates of the compression testing machine were wiped and cleaned before the placement of the specimen. Cube moulds of size 150 x 150 x 150 mm were casted and allowed for curing in a curing tank for 28 days and they were tested at 7 days and 28 days. These cubes were tested on compression testing machine as per I.S. 516-1959. The compressive strength was calculated as follows: Compressive strength (MPa) = Failure load / cross sectional area.

TENSILE STRENGTH TEST:

For tensile strength test, cylinder specimens of dimension 150 mm diameter and 300 mm length were cast. The specimens were demoulded after 24 hours of casting and were transferred to curing tank where in they were allowed to cure for 7, 14 and 28 days. These specimens were tested under compression testing machine. In each category, three cylinders were tested and their average value is reported.

Tensile strength was calculated as follows as split tensile strength:

$$\text{Tensile strength (MPa)} = 2P / \pi DL$$

Where, P = failure load,

D = diameter of cylinder,

L = length of cylinder

FLEXURAL STRENGTH TEST

The flexural strength of concrete beam was determined based on IS: 516 –1959. Beam specimens of size 1200 mm x 150 mm x 200 mm were casted. The samples were demoulded after 24 hours from casting and kept in a water tank for 28 days curing. Beams are tested for flexural strength by using 50T capacity loading frame. The specimens were placed with the clear span of 1200mm where the centre of the beam was marked and two point loads are applied over it. Three pairs of LVDTs also placed beneath the surface for to determine the strain. The flexural specimens were white washed in order to facilitate the marking of cracks.

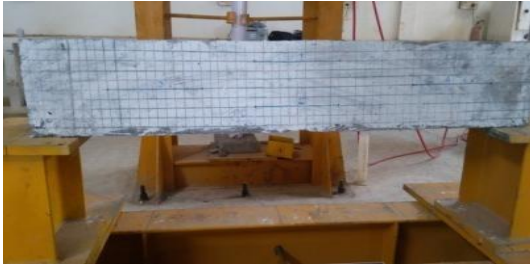


Figure.1.Flexural Test setup for Concrete Beam

V.RES ULTS &DISCUSSION**Hardened Concrete:**

The properties of hardened concrete test specimens are checked by

- Compressive strength
- Split tensile strength
- Flexural strength

COMPRESSIVE STRENGTH:

The compressive strength of cube specimen is checked after 7, 14, 28 days in compressive testing machine (CTM)

Table3.Compressive Strength of Concrete Cube

AGE OF CONCRETE	COMPRESSIVE STRENGTH (MPa)
7 days	28.79
14 days	32.45
28 days	38.46

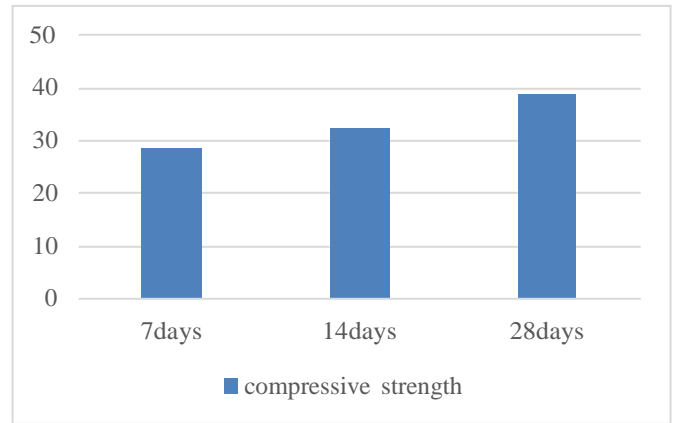


Figure.2.Compressive strength Graph

SPLIT TENSILE STRENGTH

The split tensile strength of cylindrical specimen is checked after 7, 14, 28 days in compressive testing machine (CTM)

Table4.Split Tensile Strength of Concrete Cylinder

AGE OF CONCRETE	SPLIT TENSILE STRENGTH (MPa)
7 days	1.92
14 days	2.30
28 days	3.14

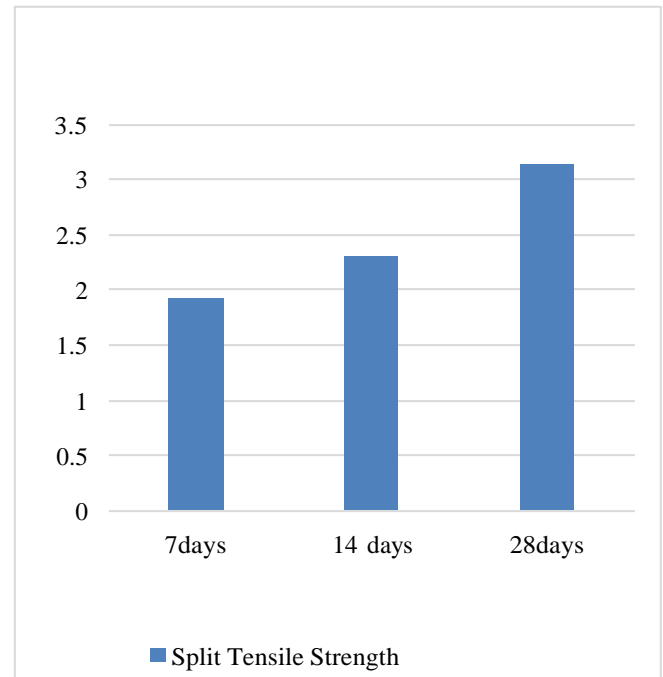


Figure.3.Split tensile strength Graph

FLEXURAL STRENGTH

The Flexural test of beam specimen is checked after 28 days

Table 5.Various deflections of SFRC-1

Load (kN)	Deflection (mm)		
	Left	Center	Right
20	0.6	0.9	1
25	0.6	0.9	1.1
30	0.6	0.9	1.2
35	0.6	1	1.3
40	0.7	1.1	1.4
45	2	1.7	1.9
50	2.2	2.3	2.4
55	2.2	2.3	2.4
60	2.6	2.7	2.8
65	2.8	2.9	3.1
70	3.3	3.2	3.5
75	3.4	3.4	3.7
80	3.7	3.6	4.1
85	4.2	4.4	4.5
90	4.1	4.9	4.8
95	5.5	4.9	5.2
100	5.7	5	5.6
105	5.9	5.1	5.9
110	5.9	5.5	6
115	6.1	5.7	6.4
120	6.3	6.1	6.8
125	6.4	6.2	7.1
126	6.7	6.4	7.2

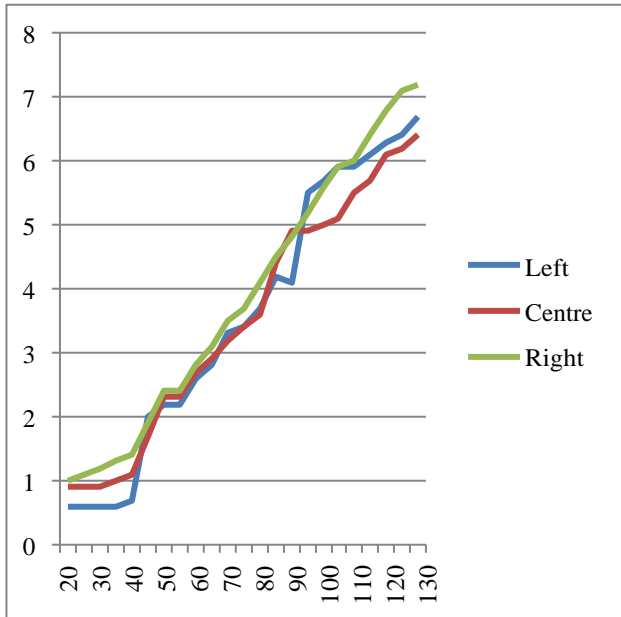


Figure. 4. Load Vs deflection curve for SFRPC-1

Table 6.Various deflections of SFRC-2.

Load (kN)	Deflection (mm)		
	Left	Centre	Right
20	0.6	0.9	1
25	0.6	0.9	1.1
30	0.6	1	1.2
35	0.9	1.3	1.4
40	2.1	1.4	1.9
45	2.2	1.8	1.9
50	2.4	2.5	2
55	2.4	2.5	2.4
60	2.8	2.9	2.6
65	2.8	2.9	3
70	3.3	3.4	3.4
75	3.5	3.6	3.9
80	3.8	3.8	4
85	4.3	4.1	4.2
90	4.3	4.4	4.9
95	5.5	4.6	5.4
100	5.6	5.2	5.6
105	6	5.7	5.8
110	6	5.9	6
115	6.2	6	6.5
120	6.5	6.2	6.8
125	6.8	6.2	7.1
130	6.8	6.5	7.5

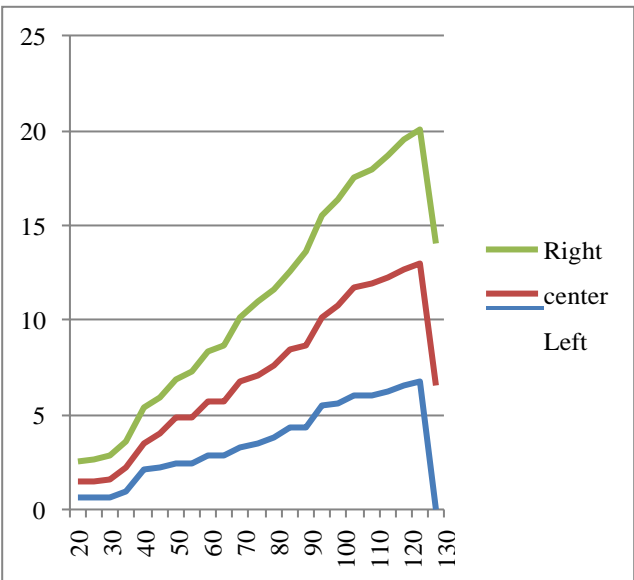


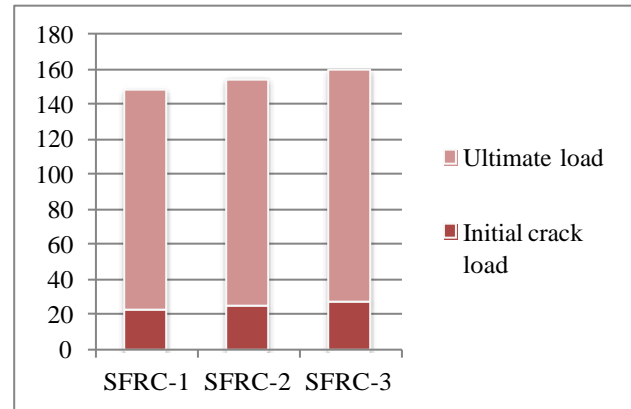
Figure. 5. Load Vs deflection curve for SFRPC-2

Table 7. Various deflections of SFRC-3

Load (kN)	Deflection (mm)		
	Left	Centre	Right
20	0.6	0.9	1
25	0.6	0.9	1.1
30	0.9	1.5	1.3
35	0.9	1.5	1.5
40	2.3	1.9	1.9
45	2.5	1.9	2
50	2.6	2.7	2
55	2.6	2.7	2.6
60	2.8	2.9	2.9
65	2.8	2.9	3.3
70	3.5	3.6	3.7
75	3.7	3.8	3.9
80	3.8	4	4.2
85	4.3	4	4.9
90	4.3	4.2	5
95	5.8	4.6	5.4
100	5.8	5.4	5.7
105	6.1	5.7	5.9
110	6.1	5.9	6.1
115	6.4	6.1	6.7
120	6.6	6.1	6.9
125	6.9	6.5	7.3
132.8	6.9	6.7	7.6

Table 8. Various stages of loading

Beam Designation	Initial crack load, P_{CR} (kN)	Ultimate load, P_{UL} (kN)
SFRC-1	22.6	126
SFRC-2	25	130
SFRC-3	28	132.8

**Figure. 8. Load carrying capacity of SFRC beams**

VI. MODES OF FAILURE

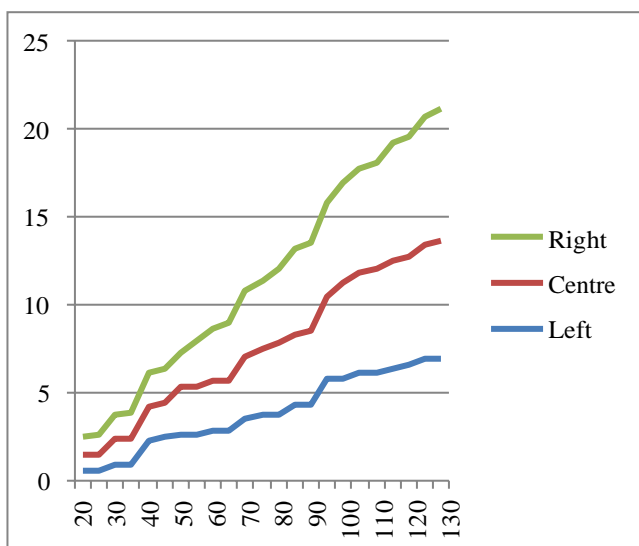
While loading the beams under loading frame, cracks are developed on the beam surface were in the pure tensile zone. When the load is keep on increased the existing cracks are propagated and new cracks developed along the span. The flexural cracks gave way to inclined cracks due to the effect of shear force. The spacing of cracks varied along the span. A few cracks appeared in the flexural zones of the concrete at initial loads. Then the cracks get widened as the loads increased. The crack width at mid span zone is considerably increased at failure loads. As well as, the deflection also increased significantly. The failure pattern of the beam specimens was found to be similar

VII. CONCLUSION

1. Addition of steel fibres to concrete increases the compressive strength of concrete marginally.
2. The addition of steel fibres increases the tensile properties of concrete and improves resistance to cracking.
3. Addition of steel fiber increase the flexural strength.
4. Increase the volume of fraction of fiber and get good strength.

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**Figure. 6. Load Vs deflection curve for SFRC-3**

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EXPERIMENTAL INVESTIGATION ON BEHAVIOUR OF FOAMED CONCRETE

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Abstract-

Foamed Concrete can be defined as a type of Cellular Lightweight Concrete (CLC); Foamed concrete doesn't contain any Coarse Aggregate(Gravel) . The whole slurry contains only the Cement, Steel slag powder, Fly ash in different proportions and Foaming agent are adding in different proportions. The foam are used in the mortar can be of two types; Natural and protein based foamed. The natural foam liquid can be prepared by using the Sapindus (from small trees in the Lychee family, native to warm temperature to tropical regions of the world). The natural foam can be generated by the soap nuts using the foam generator. The slurry and the foam mixture can produce a variety of densities ranging from 400 to 1600 Kg/m³. Cubes are made in different proportions based on the materials in same densities with natural and protein based agents; then their compressive strengths, water absorption is compared with normal mix(without foam) and the results are noted

Keywords—Foamed concrete, sapindus, protein based agent, steel slag, fly ash

INTRODUCTION

The perpetual release of anthropogenic greenhouse gases has been causing climate changes over some years now and this fact has been established through research studies that there is global growth of carbon dioxide concentration in the atmosphere. Studies have shown that the production of Portland cement alone accounted for approximately 5% of the total global carbon dioxide emissions through various human activities. A further study shows that a ton of concrete produced carbon dioxide 0.05 to 0.13 tones approximately ninety-five percent of the total estimated carbon dioxide emissions derived from production of concrete. So in order to reduce these emissions and to reduce the usage of such materials some replacements are done. Foamed concrete consists of opc, fly ash, steel

slag and preformed foam. The focus of this project is to investigate on properties of foamed concrete by the partial replacement of cement by fly ash and steel slag in various proportions and identifying their strength and other properties. The significance of the project is to use the natural foam instead of artificial agents. The foam can be produced by Soap nut, a genus of shrubs and small trees in the Lychee family, native to warm temperature to tropical regions of the world.

1. MATERIALS USED

1.2.1 Cement

Table 1.1 Test Values of OPC 53 Grade

S.NO	PROPERTY	VALUES
1.	Consistency of cement	32%
2.	Fineness of cement	10%
3.	Initial setting time	31 min
4.	Specific gravity	3.15

Class 'F' fly ash

Table 1.2 Test Values of Class F fly ash

S.NO	PROPERTY	VALUES
1.	Consistency of flyash	42%
2.	Fineness of flyash	7%
3.	Initial setting time	50 min
4.	Specific gravity	2.66

Steel Slag

Table 1.3 Test Values of Steel slag

S.NO	PROPERTY	VALUES
1.	Specific gravity	3.15
2.	Water absorption	1.32%
3.	Bulk density	2395 Kg/m ³

2. TRIAL MIXES

GENERAL

This chapter presents the mix proportions and the variations made in the proportions. The change in the proportion has a strong effect on the density, it means the altering of the cement content, steel slag, fly ash, foam and w/c ratio determines the density of the foam mixture

MIX PROPORTION

In this project, the density is kept as a constant and then the other proportions are change mortar cube will be **1200 gms**

MATERIALS	TRIAL MIX			
	M1	M2	M3	M4
Cement	30%	30%	-	45%
steel slag	20%	30%	45%	45%
fly ash	40%	30%	45%	-
foam & water	10%	10%	10%	10%

The above mixes are the trials made with different proportions. Among that **MIX F4** was a failure one because there is no filler material in

that mix and only the binders such as fly ash and cement are present. There is no sign of problem during casting. But during curing process the block started suspending in the water. So the mix F4 is a failure one.

3. CURING

3.1 PLASTIC DENSITY

The plastic density of foam concrete is determined by measuring a known volume of foam concrete with a bucket. This method is outlined in **BS EN 12350: Part 6:2000** – Testing fresh concrete. These methods are adopted in large industries for the manufacturing of foam blocks. But in this project we are using 100 x 100 x 100 mm moulds. So we can adopt small measurements such as 1 litre measuring cylinders. Here we fix density as a constant i.e., 800 gm. Pour the prepared foam mix into the measuring cylinder and then keep it in a weighing machine. Note the readings shown in the scale as shown in table 4.1, 4.2 & 4.3. If it is less than or equal to 850 gm, pour it into the moulds directly. If it is greater than 850 gm, we have to add a little foam and then repeat the procedure again.

Graph 4.1 Comparison of densities



Table 3.1 Density check for natural foamed concrete

MIX	DENSITY(in gm)
F1	784
F2	844
F3	800
F4	828

Table 3.2 Density check for protein foamed concrete

MIX	DENSITY (in gm)
F1	708
F2	800
F3	728
F4	712

Table 3.3 Density check for conventional concrete

MIX	DENSITY (in gm)
F1	1900
F2	1740
F3	1920
F4	2100

4. TESTS ON CONCRETE

4.1 GENERAL

The cubes used for testing the hardened properties were prepared as follows. The tests are taken during 7, 14 & 28 days during the curing process. The cubes are taken out of the curing tank and then the surface is cleaned with waste cloth. Then the various tests are conducted respectively.

COMPRESSIVE STRENGTH

The 100 mm test cubes were casted and then it was kept for curing in a constant temperature up to the day of testing. The cubes are then placed in the Compression Testing Machine (CTM) as shown in fig (7.1), as usual as the ones used for normal concrete. Then the load is applied to the cubes, at maximum load point the specimen shows the sign of break. That maximum value is noted as the load value. The measured compressive strength of the specimen is to be calculated by dividing the maximum applied load to the specimen during testing by the cross sectional area. Three cubes from the same mixture of foamed concrete were crushed and the average of the three results is used to define the strength of the mixture. Compressive strength of foamed concrete was recorded for 7, 14 and 28 days.

$$\text{Compressive strength} = P/A$$

$$P = \text{Maximum load in N}$$

$$A = \text{Cross sectional area of cube in mm}$$

$$\text{Size of cube} = (100 \times 100 \times 100) \text{ mm}$$

FLOATING TEST

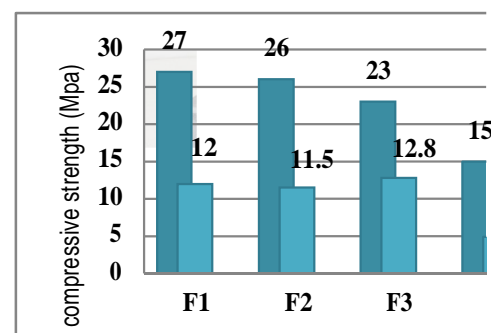
- Objects will either sink or float, depending upon their density.
- If they are more denser than water, they sink. Less dense, then they float.
- There are many types of lightweight concrete which makes the concrete float either by using lightweight aggregate or by using air entraining agent.
- Here we are using the foaming agents which also behave as an air entraining agents.
- Other than that the whole mixture does not contain any coarse aggregates and resulting in the lightweight

5. RESULTS & DISCUSSION

COMPRESSIVE STRENGTH RESULTS

Compressive strengths for various mix proportions are taken at

7, 14 & 28 days.



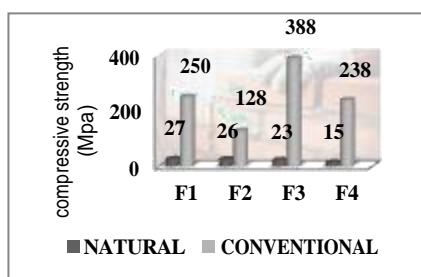
Graph 5.1 Compressive strength of natural and protein foamed concrete cubes

Table 5.1 Strength of natural foamed concrete

MIX	7 DAYS	14 DAYS	28 DAYS
F1	22.6	24.5	27
F2	20.53	23.88	26
F3	17.05	20.6	23
F4	9.27	12.44	15

Table 5.2 Strength of protein foamed concrete

MIX	7 DAYS	14 DAYS	28 DAYS
F1	6.87	9.6	12
F2	6.49	9.15	11.5
F3	7.48	10.35	12.8
F4	2.22	3.5	4.9

Graph 5.2 Compressive strength of natural and conventional concrete cubes**Table 5.3 Strength of conventional concrete**

MIX	7 DAYS	14 DAYS	28 DAYS
F1	110	180	250
F2	43	79	128
F3	218	295	388
F4	123	176	238

6. DISCUSSION

- 1) This project proves that the Foamed concrete can be prepared by using the natural foaming agent.
- 2) Comparing to protein foaming agents, the natural foaming agents are easily available and less expensive.
- 3) The natural foaming agents give higher density than the protein foaming agents.
- 4) Compressive strength of natural agents shows greater value than the protein agents.
- 5) The addition of industrial wastes such as fly ash and steel slag, imparts great strength to the foamed concrete.

EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE

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Abstract-

The need to reduce the global anthropogenic carbon dioxide has encouraged more to search for sustainable building materials. Cement, the second most consumed product in the world, contributes nearly 7% of the global CO₂ emission. Geo polymer concrete (GPC) is manufactured using industrial waste like fly ash, GGBS and silica fumes which is considered as a more eco-friendly alternative to ordinary Portland cement (OPC) based concrete. Ground granulated blast furnace slag (GGBS) is hydraulic binder, which has been known and used for 150 years. It improves the quality & durability of concrete and its production is virtually CO₂ free. Concrete made with GGBS will have a high solar reflectance and it is not the infrared radiation so, it will not be trapped by greenhouse effect of earth's atmosphere. Silica fume has been used all over the world for many years in the area where high strength and durable concrete were required. Silica fume improves the characteristics of both fresh & hard concrete. Silica fume reduces bleeding and enhances the cement paste bond to the aggregates. Our project is to replace cement in Geo polymer Concrete with varying proportions of Silica Fume, GGBS and Fly Ash to identify what is the optimum level to use silica fume in the place of Fly ash and GGBS.

Keywords: Fly ash, GGBS, Silica fumes.

I.INTRODUCTION

Concrete, is an essential building material is widely used in the construction of infrastructures such as buildings, bridges, highways, dams, and many other facilities. One of the ingredients usually used as a binder in the manufacture of concrete is the Ordinary Portland Cement (OPC) to enhance the strength properties and serviceability requirements by using supplementary materials in concrete. Such supplementary materials are blast furnace slag, fly

ash, silica fume, rice husk, crushed stone dust etc. Every 1 ton of concrete leads to CO₂ emission which vary between 0.05 to 0.13 tons. About 95% of all CO₂ emissions from a cubic yard of concrete are from cement manufacturing. It is important to reduce CO₂ emissions through the greater use of substitute to ordinary Portland cement (OPC) such as fly ash, clay and others geo-based material. Geopolymer concretes (GPC) are a type of Inorganic polymer composites, to form substantial element of an environmentally sustainable construction and building products industry by replacing supplementing the conventional concretes. The source materials may be industry waste product such as fly ash, slag, red mud, rice-husk ash and silica fume may be used as feed stock for the synthesis of geopolymer. The alkaline liquids are concentrated aqueous alkali hydroxide or silicate solution, with soluble alkali metals, usually Sodium- (Na) or Potassium- (K) based. High alkaline liquids are used to induce the silicon and aluminium atoms in the source materials to dissolve and form the Geo polymeric binder. There are many different views as to which are the main parameters that affect the compressive strength and other mechanical properties of geopolymer concrete. The significant factors affecting the compressive strength are the type of alkaline activator. The curing temperature and the curing time. The important parameters for satisfactory polymerization are the relative amounts of Si, Al, K, Na, and molar ratio of Si to Al present in solution, the type of alkaline activator, the water content, and the curing temperature. This study also examines the mechanical properties of rice husk ash-based geo polymer concrete using coarse aggregate materials by performing compressive strength tests and splitting tensile strength tests and analyzing their uncovered relationship.

II. LITERATURE REVIEW

Abhishek C. Ayachit (2016) has proposed the guidelines for the design of fly ash based geopolymer concrete of ordinary and standard grade on the basis of quantity and fineness of fly ash, quantity of water and grading of fine aggregate by maintaining water- to-geopolymer binder ratio of 0.40, solution-to- fly ash ratio of 0.35, and sodium silicate-to-sodium hydroxide ratio of 2 with concentration of sodium hydroxide as 13 M. Heat curing was done at 60 °C for duration of 24 h and tested after 7 days after oven heating. Experimental results of M20, M25, M30, M35 and M40 grades of geopolymer concrete mixes using proposed method of mix design shows promising results of workability and compressive strength. So, these guidelines help in design of fly ash based geopolymer concrete of Ordinary and Standard Grades as mentioned in IS 456:2000.

Ahmed Mohamed (2013) In this study, an inquiry geopolymer concrete, By Joe product materials (GGBS and SF) and by a reaction between alkaline liquid set was produced with the presence of physical properties of was to determine. GGBS and SF as source material were used to create geopolymer concrete. Sodium silicate solution and sodium hydroxide solution were mixed together as alkaline liquid. Silicon and aluminum in alkaline liquid GGBS and SF loose aggregates and concrete arrived to produce other materials bound geopolymer paste form Reacted with. Aggregates sand and 7 mm, 10 mm and 14 mm granite-type as coarse aggregate. In addition, to improve the workability of the concrete fresh geopolymer superplasticizer was used. The SF and contained two of geopolymer concrete measurable GGBS cubes 7, 14 and 28 days old, were tested. The behavior of the geopolymer concrete results was aimed to figure out. In addition, geopolymer concrete strength and durability were also tested. Tests results are shown in Chapter 4 that increases strength geopolymer GGBS concrete with age, but SF 7 to 28 days of age were found in the results. The result, the compressive strength geopolymer concrete made of GGBS in 7-14 days and 14-28 days of age at 3 to increase about 12 MPa.

Apoorva S. et al experimented Geopolymer Concrete mix with different proportions of Flyash and GGBS i.e., 100% FA + 0% GGBS, 90% FA + 10% GGBS, 80% FA + 20% GGBS, 70% FA + 30% GGBS and 60% FA + 40% GGBS. Geopolymer concrete members are cured at ambient temperature

and also at 80°C in oven for 24 hours with varying proportions of fly ash and GGBS for 12M concentration. After the experimental investigation, it was found that the strength of geopolymer concrete increased with increase in higher percentage of GGBS and also the strength increased with age of the concrete in case of ambient curing. The highest compressive strength of 51.7 MPa, tensile strength of 10.35 MPa and flexural strength of 10.62 MPa were obtained for the mix 60% FA + 40% GGBS at ambient curing.

S.Aravindan et al investigated the long term strength and durability properties of Alkali-Activated and flyash based Geopolymer Concrete comparing with the conventional concrete of M40 grade. The investigation resulted that there is an increase in strength characteristics with increase in concentration of sodium hydroxide solution and open air cured specimens gained more strength than dry cured specimens. The highest values of compressive, tensile and flexural strength is observed for 12 M NaOH and Open air Curing.

Wallah.S.E.et al.(2010) investigated the Creep Behavior of Fly Ash- Based geopolymer Concrete he made four different mixes were prepared and it is cured in steam and dry curing conditions then it is taken for specially-built creep testing frame with a hydraulic loading system to find the creep coefficients. From the test results that the fly ash-based geopolymer concrete undergoes low creep which is generally less than that of OPC concrete. After one year of loading, the results for specific creep of fly ash-based geopolymer concrete ranges from 15 to 29 micro strain for concrete compressive strength 67–40 MPa respectively. And the creep coefficient after one year of loading for fly ash based geopolymer concrete with compressive strength of 40, 47, and 57 MPa is around 0.6 to 0.7, while for geopolymer concrete with compressive strength of 67 MPa this value is around 0.4 to 0.5.

Dr. T.V.S.Vara Lakshmi (2013) investigated incorporation of Silica fume in the geopolymer concrete mixes resulted in finer pore structure thus produce low permeability concrete. The geopolymer concrete produced with different combination of SF and GGBS are able to produce structural concretes of high grades (much more than 45MPa) by self curing mechanisms only and percentage 40% of SF to 60% GGBS. The GPC mixes were produced easily using equipment similar to those used for production of conventional cement concretes. The influences of SF on strength of geopolymer concrete mixes were studied. It has been observed that the decreasing the quantity of SF increase of Compressive strength of geopolymer. Apart from

less energy intensiveness, the GPCs utilize the industrial wastes for producing the binding system in concrete. There are both environmental and economical benefits of using SF, fly ash and GGBS

III. MATERIALS USED IN GEOPOLYMER CONCRETE

The general description about the materials used for this concrete and Geopolymer Concrete is explained.

Fly ash

Fly ash, also known as flue-ash, is one of the residues generated in combustion, and comprises the fine particles that rise with the flue. Ash that does not rise is called bottom ash. In an industrial context, Fly ash usually refers to ash produced during combustion of coal. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal fired power plants, and together with bottom ash removed from the bottom of the furnace is in this case jointly known as coal ash. Fly ash is the most widely used material worldwide. This is particularly an important issue for India, which currently produces over 100 million ton of Fly ash annually.



Figure:1 Class C and F Fly ash

TABLE 1: Chemical composition of FLY ASH

OXIDES	METTUR FLY ASH	REQUIREMENTS AS PER IS 3812-2003
SiO ₂	55.99%	SiO ₂ >35% Total->70%
Al ₂ O ₃	15.23%	
Fe ₂ O ₃	21.78%	
CaO	0.17%	-
MgO	2.45%	<5%
LOI	0.62%	<12%

GGBS (Ground Granulated Blast Furnace Slag)

Ground Granulated blast furnace slag (GGBS) is a by-product from the blast-furnaces used to make iron. These operate at a temperature of about 1,500 degrees centigrade and are fed with a carefully controlled mixture of iron-ore, coke and limestone. The iron ore is reduced to iron and the remaining materials form a slag that floats on top of the iron. This slag is periodically tapped off as a molten liquid and if it is to be used for the manufacture of GGBS it has to be rapidly quenched in large volumes of water. The quenching optimizes the cementitious

properties and produces granules similar to coarse sand. Although normally designated as “GGBS” in the UK, it can also be referred to as “GGBFS” or “slag cement”. The main components of blast furnace slag are CaO (30-50%), SiO₂ (28-38%), Al₂O₃ (8-24%), and MgO (1-18%). In general increasing the CaO content of the slag results in raised slag basicity and an increase in compressive strength. The MgO and Al₂O₃ content show the same trend up to respectively 10-12% and 14% beyond. The GGBS can be used to increase properties in geopolymer concrete

Figure 2: GGBS



TABLE 2: Chemical composition of GGBS

OXIDES	PERCENTAGE
SiO ₂	41.24
Al ₂ O ₃	20.64
Fe ₂ O ₃	7.28
CaO	2.455
MgO	2.93
LOI	Nil

Silica Fume

Silica fume, also known as microsilica, Silica fume particles viewed in a transmission electron microscope (CAS number 69012-64-2, EINECS number 273-761-1) is an amorphous (non-crystalline) polymorph of silicon dioxide, silica. It is an ultrafine powder collected as a by-product of the silicon and ferrosilicon alloy production and consists of spherical particles with an average particle diameter of 150 nm. The main field of application is as pozzolanic material for high performance concrete. Silica fume is an ultrafine material with Properties spherical particles less than 1µm in diameter, the average being about 0.15µm. This makes it approximately 100 times smaller than the average cement particle. The bulk density of silica fume depends on the degree of densification in the silo and varies from 130 (undensified) to 600 kg/m³. The specific gravity of silica fume is generally in the range of 2.2 to 2.3. The specific surface area of silica fume can be measured with the BET method or nitrogen adsorption method. It typically ranges from 15,000 to 30,000 m²/kg.

FIGURE:3 Silica fume



TABLE 3: Chemical composition of Silica Fumes

OXIDES	PERCENTAGE
SiO ₂	94.3
Al ₂ O ₃	0.09
Fe ₂ O ₃	0.10
CaO	0.30
MgO	0.43
SO ₃	-
K ₂ O	0.83
Na ₂ O	0.27

Alkali Activator solution

In conventional concrete ordinary potable water is added in concrete for binding and curing purpose. In Geopolymer concrete water is replaced with alkaline liquids and it activates the alumina and silica in the source material. Water is added to cement for hydration process. In geopolymer concrete generally sodium or potassium based activators are used. According to the properties, availability, cost and applications two combinations of alkaline liquids are used.

They are

1. Sodium hydroxide and sodium silicate
2. Potassium hydroxide and potassium silicate

The reaction takes place while adding the alkaline liquids to source materials is termed as polycondensation process

Figure 4: Alkaline Liquids



Super Plasticizer

Super plasticizers, also known as high range water reducers, are chemical admixtures used where well-dispersed particle suspension is required. These polymers are used as dispersants to avoid particle segregation (gravel, coarse and fine sands), and to improve the flow characteristics (rheology) of suspensions such as in concrete applications.

IV.Objectives of the study

1. To study the Fresh and hardened properties of geopolymer concrete.
2. To study the mechanical properties such as Compressive Strength, Split Tensile Strength, Flexural Strength for the fly ash, GGBS and silica fume based geopolymer concrete.
3. To study the Performance of geopolymer Concrete.

4. To obtain the optimum proportion of flyash, GGBS and silica fume

V.METHODOLOGY:

Stage 1: Introduction

Brief introduction have been given about concrete and necessity of Geopolymer concrete. Also the merits and demerits of Fly ash based geopolymer concrete are given. The objective of present investigation also briefed.

Stage 2: Literature Review

In geopolymer concrete various literatures are collected and studied. The literature review are carried out in Fly ash based GPC.

Stage 3: Collection of Materials

In Geopolymer concrete material such as Fly ash, GGBS, Silica fume, Fine aggregate, coarse aggregate & Chemicals like NaOH, Na₂SO₄ are collected as per the mix proportion.

Stage 4: Preparation Mix Design

There is no standard mix design for Fly ash based Geopolymer concrete. From the literature review the various mix ratios are arrived for different combinations.

Stage 5: Casting of Concrete

The specimen are cast according to IS for finding their mechanical properties.

Stage 6: Test on Fresh Concrete

The Compaction Factor test is carried out to find out the workability of the concrete.

Stage 7: Test on Hardened Concrete

The tests for Mechanical properties are carried out at the age of 7, 14, & 28 days in Compression Testing Machine and Universal Testing Machine.

Stage 8: Test results & Discussion

From the test result various comparison are done and reasons are discussed.

Stage 9: Conclusion

In this various conclusions have been given and recommended for various applications.

VI Mix Design

As there are no standard codal provisions for the mix design of geo polymer concrete, the design mix can be arrived by assuming the density of geo polymer concrete as 2400 kg/m³. The total volume occupied by fine and coarse aggregate is around 77-80%.

- Let us we adopt 77%
- The alkaline liquid to fly ash ratio is kept as 0.4.
- 12 Molarity
- The ratio of sodium silicate to sodium hydroxide is kept as 2.5.
- Extra water 15% of Cementitious material.
- Super Plasticizer 3% of Cementitious material

TABLE:4 MIX PROPORTION

Mix ID	Fly Ash (kg)	Silica fume (kg)	GGBS (kg)	Fine Aggregate (kg)	Coarse Aggregate (kg)	NaOH Solution (kg)	Na ₂ SiO ₃ Solution (kg)	Extra Water (kg)	Super plasticizer (kg)
F50 G50	8.365	0	8.365	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G40 S10	8.365	1.673	6.692	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G30 S20	8.365	3.346	5.019	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G20 S30	8.365	5.019	3.346	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G10 S20	8.365	6.692	1.673	23.53	54.87	1.92	4.778	2.509	0.5019
F50 S50	8.365	8.365	0	23.53	54.87	1.92	4.778	2.509	0.5019

VII DIMENSION OF THE SPECIMEN

Cube size : 100mm x 100mm x 100mm

Prism Size : 500mm x 100mm x 100mm

Cylinder Size : Height= 300mm; Diameter= 150mm

VIII PREPARATION OF ALKALINE SOLUTION

Alkaline solution was prepared one day prior to the mixing. It is prepared by mixing solutions of NaOH and Na₂SiO₃. NaOH solution is of the molarity 12. NaOH solution is prepared by mixing 480 grams of commercial grade. NaOH in 1000 ml of distilled water. Care should be taken while mixing the NaOH solution since heat is liberated. Then NaOH solution and Na₂SiO₃ is mixed in the ratio 1:2.5.

TABLE 5: Weight of NaOH flakes

REQUIRED MOLARITY	WEIGHT IN gm OF NaOH FLAKES
12	480

FIGURE 5: PREPARATION OF ALKALINE SOLUTION



IX TEST RESULTS AND DISCUSSION

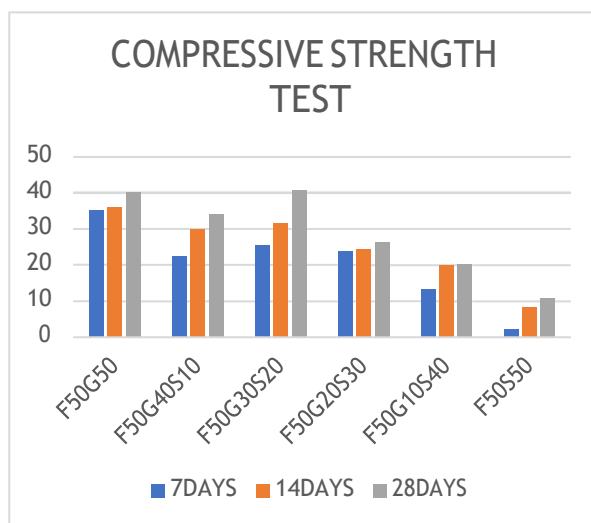
COMPRESSION STRENGTH TEST

All cubes of controlled geopolymer concrete were tested in a Compression Testing Machine with the references of IS: 516 – 1959 to determine Compressive Strength of concrete at the age of 7,14,28 day

TABLE 3: Compressive strength test

S.NO	MIX RATIO	COMPRESSIVE STRENGTH (N/mm ²)		
		7DAYS	14DAYS	28DAYS
1	F50 G50	35.25	36	40.15
2	F50 G40 S10	22.35	30.05	33.95
3	F50 G30 S20	25.45	31.65	40.8
4	F50 G20 S30	23.8	24.55	26.25
5	F50 G10 S20	13.15	19.95	20.2
6	F50 S50	2.25	8.1	10.7

CHART 1:COMPRESSIVE STRENGTH TEST



X CONCLUSION

Based on the experimental study carried out on specimen the following conclusions are drawn

1. Addition of Silica fume and GGBS in Geopolymer Concrete composites enhanced its mechanical properties.
2. With addition of Silica fume, Various fractions of GPC mix like F50G50, F50G40S10, F50G30S20, F50G20S30, F50G10S40, F50S50 are made.
3. For F50G50, F50G40S10, F50G30S20, F50G20S30, F50G10S40, F50S50 the respective Compressive Strength for 28 days are 40.15, 33.95, 40.8, 26.25, 20.2, 10.7. This shows that the increase in GGBS results in increase in compressive strength.

4. According to the Experimental Investigation the optimum mix of GPC with Fly ash, Silica fume and GGBS is F50G30S20.

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EXPERIMENTAL STUDY ON STRENGTH PROPERTIES OF PERVIOUS RIGID PAVEMENT

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ABSTRACT— concrete production has greatly improved in recent decades. concrete, on the other hand, has a unique purpose. Water cannot flow through ordinary concrete, but it passes through this concrete. the main motivation for making this type of concrete is to use it on the pavement and in open dreams, where rainwater can pass through and continue to raise low water levels. due to the decline in cement prices, cost savings were a major factor. in this experimental work made of slag powder was added to a mixture of asphalt, coarse aggregate, and water to form concrete. a small amount of slag powder can be used to improve strength. The use of strong concrete as a solution in the case of large water is desirable. The total strength of the finished concrete is determined by conducting a test of the ability of the material to withstand the strength of the slag powder that removes cement by various percentages of 0%, 10%, 20%, 30%, 40%, and 50%. the results obtained are discussed in the following chapters

Keywords: Fly ash, GGBS, Silica fumes.

I.INTRODUCTION

A. Pervious Concrete

The word "pervious" is used to describe an open, almost zero-slump area made of Portland cement, compact, with little or no compound, admixtures and water .In a simple way, concrete that drains substance. It's a great opportunity. Unlike heavy concrete, it has high strength, has high porosity and allows it to move freely. Concrete equipment. For this reason, it is useful in situations where water forms, ice or other sources are available. Other sources must be exhausted. Absence or very low porosity is found in the absence or very low content of FA. A good level of integration is in between. No-finess concrete is another name for flexible concrete, corrugated concrete or bare concrete. Cement, composite, water, and small or poor adhesives make up most of the composite. Good collections often fill the gaps between large aggregates with standard concrete.

Scope of the Project

- ✓ This concrete is a type of concrete with high porosity that helps groundwater to regenerate while reducing storm water flow.
- ✓ The scope of the work is to investigate Pervious concrete by using Steel slag as partial replacement of Cement.
- ✓ The results of research conducted in separate studies have been studied.

Objective of the Project

- ✓ To find the physical & chemical properties of various material.
- ✓ Investigate the concrete used in this study using various mixing scales.
- ✓ To find the optimum % of Pervious Concrete.
- ✓ To find the Permeability of Pervious concrete.

II. LITERATURE COLLECTION

Yongjie Xue et al (2006) Steel slag obtained by hot-sprinkling method is a very suitable aggregate with porous structure for preparing stone mastic asphalt mixtures after 3 years aging. As the restoration of basalt iron ore increases the level of optimal bitumen, all the volume performance of asphalt rock mixtures containing metal slag such as aggregates will meet the appropriate specification criteria. After two years of use, test methods show outstanding results, with a coefficient of 556abrasionandfrictionandsurfacetexturedepthof0.8mm. In summary, the efficient use of steel as a composite in the construction of the paved road will provide a modern and cost-effective solution for composite materials while also reducing the environmental hazards caused by solid debris. However, further research is needed on its recycling process and its widespread use in the future.

Hisham Qasrawi et al (2008) Metal slag is particularly beneficial for low-strength concrete in terms of compression strength and durability, i.e., lower concrete quality, increasing strength. Metal slag is applicable to standard concrete mixes that increase strength in all replacement measurements. When good content with 0.15mm removed, better results can be obtained .In this case, increasing the volume of slag instead of sand increases strength.

Chang Jiang Jhy et al (2015) Cooling concrete structures made of electric slag for air-cooled fire as combined are investigated. These tests show that ground-based concrete made of EAFS aggregates has greater mechanical strength and water strength than natural river rock concrete. Apart from this, in the strength test, the coarse concrete made of EAFS aggregates had a lower weight loss than the pulmonary concrete made of natural river stones.

EAFS-reinforced concrete has more waterproofing and compressive strength than broken stone-based concrete. The combined pressure exceeds 21 MPa, and the water availability is less than 0.01 cm / s.

Flora Faleschini et al (2015) studied the shape and the texture of EAF slag significantly improves the tensile strength of EAF-concretes, due to the better bond of these aggregates with the cement-paste. The density of EAF concrete is sensibly higher than conventional concrete, thus leading it to be suitable in high density concrete applications. Colorimetric methods based on AgNO_3 solutions can be used for the determination of chloride ingress into EAF concrete; the dark color of the latter does not preclude the clear visual determination of chloride-free and -affected zones. The use of EAF slag increases the strength of the concrete in the chloride-affected areas, reducing the equilibrium.

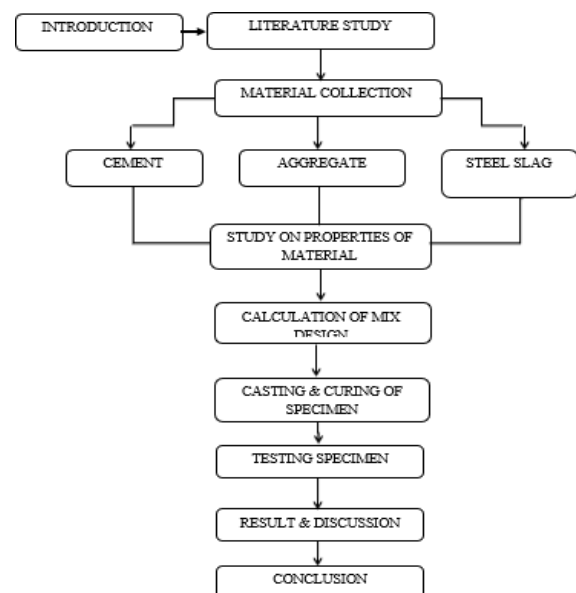
Jul Endawati et al (2017) According to the analysis, the high- pressure compounds are derived from the types of air-cooled air, consisting of 56 percent Portland cement, 15 percent ash, 3 percent silk smoke, and 26 percent air slag cooling, with 5.2 MPa. As evidenced by the concept of fly ash conversion, the maximum pressure is 16.2 MPa, with a 6% ash fly binder, 3% silica flame, and 17% granular blast grinding slag – furnace slag. The study formed a simple concrete mix with the composition of the binding content: 56 percent Portland cement, 15% jet ash, 3% silica fire, and 26 percent air-cooled air. Since the installation of cement with fire-cooled blast furnace slag has the same compressive strength combined with cement replacement and grinding granular blast furnace slag, this construction was preferred. UJ.

J. Rosales et al (2017) investigated on Slag Waste (Sw) and Slag Waste -Crushed (Sw-C) present high absorption and density. As the stainless steel slag decomposes, these values decrease; all products have a distribution of the correct particle size, so they can be used as cement substitutes. Chemically, stainless steel slags contain high levels of iron oxide, close to those found in traditional jet ash. These statistics show that waste has a good ability to strengthen cement. However, as the percentage of stainless steel slag in the mortar grows, the mortar's resistance to compression and flexural failure

reduces, thus shrinkage increases. As 30% of the cement is substituted with Sw-C, the compressive strength drops by less than 25% relative to the control, but the compressive strength is lower if the stainless-steel slag is not recycled.

Jens Groenniger et al (2016) it does not matter whether LD slag or Gabbro natural composite is used, resistance to asphalt boundary limits is equal. In contrast to Gabbro's integrated natural blends, the use of LD slag in asphalt binder and asphalt base course results in greater fatigue tolerance. Overall, the finding sand experiments conducted in this study show that asphalt mixtures made with LD slag are suitable for the construction of asphalt pavement and are effective and even better than traditional asphalt mixtures made with natural blends in most cases.

III. METHODOLOGY



IV. COLLECTION OF MATERIALS

It is Concrete's most essential component. Some of the key factors that influence cement assortment include: Diverse ages, fineness, heat of hydration alkali material, strength premises, C3A, C3S, and so on. (Fig 4.1)

There are different types of cement, out of that mostly used two types are:

- Ordinary Portland cement
- Portland Pozzlona cement

Coarse Aggregate

The coarse aggregate is the strongest and the least porous component in concrete. And it is chemically stable.

Steel Slag

Steel metal slag is a processed product, which is formed when the molten alloy is separated from the impurities in the

furnace. Slag is a complex solution of silicates and oxides that solidify when cooled like a soluble liquid. Almost all of the metal is now produced in composite steel plants using alternative oxygen system systems or in special plants (mini-mills) that use the furnace process. Other methods are no longer used. The steel slag powder is obtained from kondalampatty and the size of steel slag powder is 90micron.



Fig 4.1 Steel slag powder

Water

Water is an important component of concrete because it helps to form a calcium-silicate-hydrate (C-SH) gel by participating in the chemical reaction with cement. The act of binding hydrate cement gel is mainly due to the strength of the cement concrete. The strength of concrete, durability, waterproofing, and other structures will all suffer if the binding water level (w / b) is too high.

V. MATERIAL PROPERTIES

A. General

This chapter discusses the properties of materials used in the study of the behavior of concrete forces. The features of the equipment are as follows:

B. OPC property - 53 grades

It should meet or exceed IS 12269-1987 specified. Made with a combination of high-quality clinker (high C₃S content) with high quality gypsum at pre-set prices. Due to its high particle size distribution, high crystalline structure, and moderate phase structure, it is known for its high initial strength and high final strength, so it is widely used and suitable for fast construction, solid concrete, and inexpensive concrete compositions. (Table 5.1)

Table 5.1 Properties of OPC 53

Property	Values	IS code
Fineness of Cement	100 grams	IS:4031-Part 1-1996
Specific Gravity	3.05	IS 2720- Part 3
Initial Setting Time	35 minutes	IS 12269:1987
Final Setting Time	9 hours	IS: 4031 (Part 5) – 1988

Physical properties of slag

The slag has a rough texture and is extremely angular in form. They have low water absorption and high bulk specific gravity (less than 3 percent). The physical characteristics of the steel structure are described in Table 5.2.

Property	Values
Specific Gravity	3.40

Table 5.2 Typical physical properties of steel slag.

Chemical Properties

Slag's chemical composition is usually expressed in terms of basic oxides, measured using basic analysis and x-ray fluorescence. The different types of chemicals found in metal slag in a typical oxygen furnace are described in Table 5.3

Table 5.3 Typical steel slag chemical composition

Type Component	Steel slag
<u>CaO</u>	41.7
<u>SiO₂</u>	33.8
<u>T-Fe</u>	0.4
<u>MgO</u>	7.4
<u>Al₂O₃</u>	13.4
<u>S</u>	0.8
<u>P₂O₅</u>	<0.1
<u>MnO</u>	0.3

Mechanical Properties

The slag used has good abrasion tolerance, durability characteristics, and bearing strength, making it easy to use in combination.

- IS Code compressive strength for cube and cylinder
- Tensile strength split
- Flexural stiffness

C. Properties of coarse aggregate

Particle form, bulk weight, and source filter are all used for integrated separation. Particles larger than 4.75 mm are referred to as CA and particles less than 4.75 mm are referred to as fine-grained. With the exception of large concrete, which may have particles of up to 150 mm, fine aggregates have a particle size of 75 μm to 4.75 mm and CA with a particle size of 4.75 to about 40 mm.

The quantity of many natural minerals, such as sand and beads, ranges from 1520 to 1680 kg / cum, and produces a standard weight of concrete with a unit weight of approximately 2400 kg / m³. (Table 5.4)

Table 5.4 Properties of Coarse Aggregate

VI. EXPERIMENTAL WORK

Compressive strength of pervious concrete

For pressure compression, cubes of 150x150x150mm were spread. The strength of the various concrete cubes is measured according to BIS:516-1959 and was tested using a pressure gauge at 7, 14, and 28 days. The combined strength of the M20 control marks and conceptualized concrete was measured using a cake sample. Three cubes were measured each year in each compound, and the total pressure was calculated.

A sample of the cube was inserted during the pressure test. The full packaging of the types, as well as the appearance of concrete and other unexplained failures, has all been proven. The estimated compressive strength of the specimen is determined by dividing the total applied load during the evaluation of the c/s area. Representing the previous mix combination as an average of three values. The following formula is used to calculate compressive strength. (Fig 7.1)

Compressive strength(MPa) = Maximum load(N)

/cross sectional area (mm²)

= P/A

Where,

P - Failure load of the specimen.

A- Area of specimen.



Fig 7.1 Compressive strength testing of cube Specimen

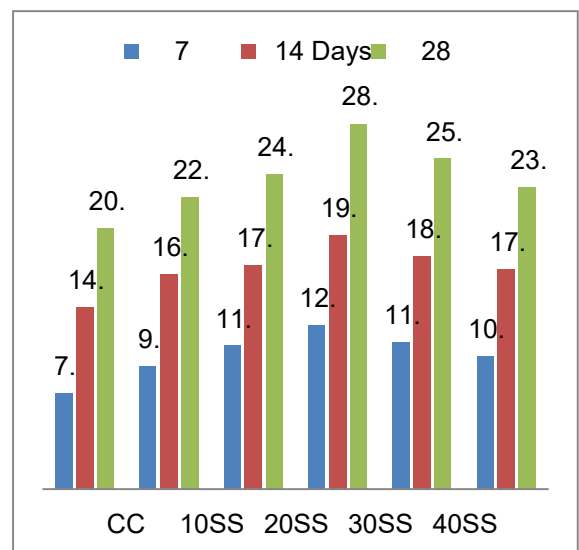
Property	Values	IS Code
Specific Gravity	2.83	IS:2386-Part 3-1963
Water absorption (%)	1%	IS:2386-Part 3-1963
Bulk Density(kg/m ³)	8.718	IS:2386 Part 3

RESULTS AND DISCUSSION**Compression strength of concrete**

The compressive strength of six concrete mixes was tested in seven different years: seven days, fourteen days, .concrete as high value is used, depending on the scale used. eight days. The findings are listed in Table 8.1, and the differences are reflected in Figure 8.1. The findings show that 30 percent metal slag has a higher compression strength than other alloys. At 7, 14, and 28 days, the 30SS combination developed a compressive strength of 12.8, 19.8, and 28.5 Mpa greater than the control concrete.

Table 8.1 Compressive Strength of Concrete

S.No	Mix ID	Compressive Strength (MPa)		
		7days	14 days	28 days
1	CC	7.5	14.2	20.4
2	10SS	9.6	16.8	22.8
3	20SS	11.20	17.5	24.6
4	30SS	12.8	19.8	28.5
5	40SS	11.50	18.2	25.8
6	50SS	10.4	17.20	23.6



Split tensile strength of concrete

The split strength of the six-mass concrete mix is measured in seven different years: seven, fourteen, and twenty-eight days. The results are presented in Table 8.2, with the differences being shown in Figure 8.2.

The findings show that 30 percent steel slag produces more cracking strength than other compressive strengths comprising almost 30 percent steel. At 7, 14, and 28 years, it was found that the 30SS alloy provided a strength of 1.75, 2.56, and 2.85Mpa over the control concrete.

Table 8.2 Tensile Strength of Concrete

S.No	Mix ID	Split Tensile Strength (MPa)		
		7 days	14 days	28 days
1	CC	1.22	1.72	2.35
2	10SS	1.48	1.95	2.50
3	20SS	1.55	2.18	2.66
4	30SS	1.75	2.56	2.85
5	40SS	1.62	2.42	2.72
6	50SS	1.50	2.06	2.54

Permeability test

The coefficients of permeability obtained by the cylindrical mold made of a mixture of different PCCs with different sizes of steel and water are allowed using a sample with the help of a tri axial test placed under a different pressure head set in Table 8.4.

Table 8.4 Permeability Coefficient

S.No	MixID	Co efficient of permeabilitycm/sec
1	CC	0.96
2	10SS	0.92
3	20SS	0.90
4	30SS	0.88
5	40SS	0.94
6	50SS	0.95

VII. CONCLUSION

The purpose of this analysis is to investigate the efficiency of the slag steel concrete. The appendix properties were investigated, and it was found that they all met the prescribed requirements. M20 quality concrete has been used in the construction of control concrete mixing. Broken, solid, and water-absorbent areas have been

identified. The following statement is obtained based on the strength structures of the slag steel concrete.

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EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE

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Abstract— The need to reduce the global anthropogenic carbon dioxide has encouraged more to search for sustainable building materials. Cement, the second most consumed product in the world, contributes nearly 7% of the global CO₂ emission. Geo polymer concrete (GPC) is manufactured using industrial waste like fly ash, GGBS and silica fumes which is considered as a more eco-friendly alternative to ordinary Portland cement (OPC) based concrete. Ground granulated blast furnace slag (GGBS) is hydraulic binder, which has been known and used for 150 years. It improves the quality & durability of concrete and its production is virtually CO₂ free. Concrete made with GGBS will have a high solar reflectance and it is not the infrared radiation so, it will not be trapped by greenhouse effect of earth's atmosphere. Silica fume has been used all over the world for many years in the area where high strength and durable concrete were required. Silica fume improves the characteristics of both fresh & hard concrete. Silica fume reduces bleeding and enhances the cement paste bond to the aggregates. Our project is to replace cement in Geo polymer Concrete with varying proportions of Silica Fume, GGBS and Fly Ash to identify what is the optimum level to use silica fume in the place of Fly ash and GGBS.

Keywords: Fly ash, GGBS, Silica fumes.

I.INTRODUCTION

Concrete, is an essential building material is widely used in the construction of infrastructures such as buildings, bridges, highways, dams, and many other facilities. One of the ingredients usually used as a binder in the manufacture of concrete is the Ordinary Portland Cement (OPC) to enhance the strength properties and serviceability requirements by using supplementary materials in concrete. Such supplementary materials are blast furnace slag, fly ash, silica fume, rice husk, crushed stone dust etc. Every 1 ton of concrete leads to CO₂ emission which vary between 0.05 to 0.13 tons. About 95% of all CO₂ emissions from a cubic yard of concrete are from cement manufacturing. It is important to reduce CO₂ emissions through the greater use of substitute to ordinary Portland cement (OPC) such as fly ash, clay and others geo-based material. Geopolymer concretes (GPC) are a type of Inorganic polymer composites, to form substantial element of an environmentally sustainable construction and building products industry by replacing supplementing the conventional concretes. The source materials may be industry waste product such as fly ash, slag, red mud, rice-

husk ash and silica fume may be used as feed stock for the synthesis of geopolymer. The alkaline liquids are concentrated aqueous alkali hydroxide or silicate solution, with soluble alkali metals, usually Sodium- (Na) or Potassium- (K) based. High alkaline liquids are used to induce the silicon and aluminium atoms in the source materials to dissolve and form the Geo polymeric binder. There are many different views as to which are the main parameters that affect the compressive strength and other mechanical properties of geopolymer concrete. The significant factors affecting the compressive strength are the type of alkaline activator. The curing temperature and the curing time. The important parameters for satisfactory polymerization are the relative amounts of Si, Al, K, Na, and molar ratio of Si to Al present in solution, the type of alkaline activator, the water content, and the curing temperature. This study also examines the mechanical properties of rice husk ash- based geo polymer concrete using coarse aggregate materials by performing compressive strength tests and splitting tensile strength tests and analyzing their uncovered relationship.

II. LITERATURE REVIEW

Abhishek C. Ayachit (2016) has proposed the guidelines for the design of fly ash based geopolymer concrete of ordinary and standard grade on the basis of quantity and fineness of fly ash, quantity of water and grading of fine aggregate by maintaining water- to-geopolymer binder ratio of 0.40, solution-to- fly ash ratio of 0.35, and sodium silicate-to-sodium hydroxide ratio of 2 with concentration of sodium hydroxide as 13 M. Heat curing was done at 60 °C for duration of 24 h and tested after 7 days after oven heating. Experimental results of M20, M25, M30, M35 and M40 grades of geopolymer concrete mixes using proposed method of mix design shows promising results of workability and compressive strength. So, these guidelines help in design of fly ash based geopolymer concrete of Ordinary and Standard Grades as mentioned in IS 456:2000.

Ahmed Mohamed (2013) In this study, an inquiry geopolymer concrete, By Joe product materials (GGBS and SF) and by a reaction between alkaline liquid set was produced with the presence of physical properties of was to determine. GGBS and SF as source material were used to create geopolymer concrete. Sodium silicate solution and sodium hydroxide solution were mixed together as alkaline

liquid. Silicon and aluminum in alkaline liquid GGBS and SF loose aggregates and concrete arrived to produce other materials bound geopolymer paste form Reacted with. Aggregates sand and 7 mm, 10 mm and 14 mm granite-type as coarse aggregate. In addition, to improve the workability of the concrete fresh geopolymer superplasticizer was used. The SF and contained two of geopolymer concrete measurable GGBS cubes 7, 14 and 28 days old, were tested. The behavior of the geopolymer concrete results was aimed to figure out. In addition, geopolymer concrete strength and durability were also tested. Tests results are shown in Chapter 4 that increases strength geopolymer GGBS concrete with age, but SF 7 to 28 days of age were found in the results. The result, the compressive strength geopolymer concrete made of GGBS in 7-14 days and 14-28 days of age at 3 to increase about 12 MPa.

Apoorva S. et al experimented Geopolymer Concrete mix with different proportions of Flyash and GGBS i.e., 100% FA + 0% GGBS, 90% FA + 10% GGBS, 80% FA + 20% GGBS, 70% FA + 30% GGBS and 60% FA + 40% GGBS. Geopolymer concrete members are cured at ambient temperature and also at 80°C in oven for 24 hours with varying proportions of fly ash and GGBS for 12M concentration. After the experimental investigation, it was found that the strength of geopolymer concrete increased with increase in higher percentage of GGBS and also the strength increased with age of the concrete in case of ambient curing. The highest compressive strength of 51.7 MPa, tensile strength of 10.35 MPa and flexural strength of 10.62 MPa were obtained for the mix 60% FA + 40% GGBS at ambient curing.

Wallah.S.E.et al.(2010) investigated the Creep Behavior of Fly Ash- Based geopolymer Concrete he made four different mixes were prepared and it is cured in steam and dry curing conditions then it is taken for specially-built creep testing frame with a hydraulic loading system to find the creep coefficients. From the test results that the fly ash-based geopolymer concrete undergoes low creep which is generally less than that of OPC concrete. After one year of loading, the results for specific creep of fly ash-based geopolymer concrete ranges from 15 to 29 micro strain for concrete compressive strength 67–40 MPa respectively. And the creep coefficient after one year of loading for fly ash based geopolymer concrete with compressive strength of 40, 47, and 57 MPa is around 0.6 to 0.7, while for geopolymer concrete with compressive strength of 67 MPa this value is around 0.4 to 0.5.

Dr. T.V.S.Vara Lakshmi (2013) investigated incorporation of Silica fume in the geopolymer concrete mixes resulted in finer pore structure thus produce low permeability concrete. The geopolymer concrete produced

with different combination of SF and GGBS are able to produce structural concretes of high grades (much more than 45MPa) by self curing mechanisms only and percentage 40% of SF to 60% GGBS. The GPC mixes were produced easily using equipment similar to those used for production of conventional cement concretes. The influences of SF on strength of geopolymer concrete mixes were studied. It has been observed that the decreasing the quantity of SF increase of Compressive strength of geopolymer. Apart from less energy intensiveness, the GPCs utilize the industrial wastes for producing the binding system in concrete. There are both environmental and economical benefits of using SF, fly ash and GGBS.

III. MATERIALS USED IN GEOPOLYMER CONCRETE

The general description about the materials used for this concrete and Geopolymer Concrete is explained.

FLY ASH

Fly ash, also known as flue-ash, is one of the residues generated in combustion, and comprises the fine particles that rise with the flue. Ash that does not rise is called bottom ash. In an industrial context, Fly ash usually refers to ash produced during combustion of coal. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal fired power plants, and together with bottom ash removed from the bottom of the furnace is in this case jointly known as coal ash. Fly ash is the most widely used material worldwide. This is particularly an important issue for India, which currently produces over 100 million ton of Fly ash annually.



Figure:1 Class C and F Fly ash

TABLE 1: Chemical composition of FLY ASH

OXIDES	METTUR FLY ASH	REQUIREMENTS AS PER IS 3812-2003
SiO ₂	55.99%	SiO ₂ >35% Total->70%
Al ₂ O ₃	15.23%	
Fe ₂ O ₃	21.78%	
CaO	0.17%	-
MgO	2.45%	<5%
LOI	0.62%	<12%

GGBS (Ground Granulated Blast Furnace Slag)

Ground Granulated blast furnace slag (GGBS) is a by-product from the blast-furnaces used to make iron. These operate at a temperature of about 1,500 degrees centigrade and are fed with a carefully controlled mixture of iron-ore, coke and limestone. The iron ore is reduced to iron and the remaining materials form a slag that floats on top of the iron. This slag is periodically tapped off as a molten liquid and if it is to be used for the manufacture of GGBS it has to be rapidly quenched in large volumes of water. The quenching optimizes the cementitious properties and produces granules similar to coarse sand. Although normally designated as “GGBS” in the UK, it can also be referred to as “GGBFS” or “slag cement”. The main components of blast furnace slag are CaO (30-50%), SiO₂ (28-38%), Al₂O₃(8-24%),and MgO(1-18%). In general increasing the CaO content of the slag results in raised slag basicity and an increase in compressive strength. The MgO and Al₂O₃ content show the same trend upto respectively 10-12% and 14% beyond. The GGBS can be used to increase properties in geopolymer concrete



Figure 2: GGBS

TABLE 2: Chemical composition of GGBS

OXIDES	PERCENTAGE
SiO ₂	41.24
Al ₂ O ₃	20.64
Fe ₂ O ₃	7.28
CaO	2.455
MgO	2.93
LOI	Nil

Silica Fume

Silica fume, also known as microsilica, Silica fume particles viewed in a transmission electron microscope (CAS number 69012-64-2, EINECS number 273-761-1) is an amorphous (non- crystalline) polymorph of silicon dioxide, silica. It is an ultrafine powder collected as a by-product of the silicon and ferrosilicon alloy production and consists of spherical particles with an average particle diameter of 150 nm. The main field of application is as pozzolanic material for high performance concrete. Silica

fume is an ultrafine material with Properties spherical particles less than 1µm in diameter, the average being about 0.15µm. This makes it approximately 100 times smaller than the average cement particle. The bulk density of silica fume depends on the degree of densification in the silo and varies from 130 (undensified) to 600 kg/m³. The specific gravity of silica fume is generally in the range of 2.2 to 2.3. The specific surface area of silica fume can be measured with the BET method or nitrogen adsorption method. It typically ranges from 15,000 to 30,000 m²/kg.

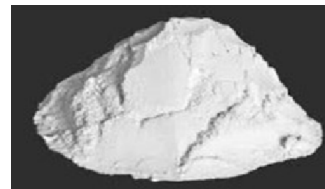


FIGURE:3 Silica fume

TABLE 3: Chemical composition of Silica Fumes

OXIDES	PERCENTAGE
SiO ₂	94.3
Al ₂ O ₃	0.09
Fe ₂ O ₃	0.10
CaO	0.30
MgO	0.43
SO ₃	-
K ₂ O	0.83
Na ₂ O	0.27

ALKALI ACTIVATOR SOLUTION

In conventional concrete ordinary potable water is added in concrete for binding and curing purpose. In Geopolymer concrete water is replaced with alkaline liquids and it activates the alumina and silica in the source material. Water is added to cement for hydration process. In geopolymer concrete generally sodium or potassium based activators are used. According to the properties, availability, cost and applications two combinations of alkaline liquids are used.

They are

1. Sodium hydroxide and sodium silicate
2. Potassium hydroxide and potassium silicate

The reaction takes place while adding the alkaline liquids to source materials is termed as polycondensation process

Figure 4:Alkaline Liquids



SUPER PLASTICIZER

Super plasticizers, also known as high range water reducers, are chemical admixtures used where well-dispersed particle suspension is required. These polymers are used as dispersants to avoid particle segregation (gravel, coarse and fine sands), and to improve the flow characteristics (rheology) of suspensions such as in concrete applications.

IV. Objectives of the study

1. To study the Fresh and hardened properties of geopolymer concrete.
2. To study the mechanical properties such as Compressive Strength, Split Tensile Strength, Flexural Strength for the fly ash, GGBS and silica fume based geopolymer concrete.
3. To study the Performance of geopolymer Concrete.
4. To obtain the optimum proportion of flyash, GGBS and silica fume.

V. METHODOLOGY:

Stage 1: Introduction

Brief introduction have been given about concrete and necessity of Geopolymer concrete. Also the merits and demerits of Fly ash based geopolymer concrete are given. The objective of present investigation also briefed.

Stage 2: Literature Review

In geopolymer concrete various literatures are collected and studied. The literature review are carried out in Fly ash based GPC.

Stage 3: Collection of Materials

In Geopolymer concrete material such as Fly ash, GGBS, Silica fume, Fine aggregate, coarse aggregate & Chemicals like NaOH, Na₂SO₄ are collected as per the mix proportion.

Stage 4: Preparation Mix Design

There is no standard mix design for Fly ash based Geopolymer concrete. From the literature review the various mix ratios are arrived for different combinations.

Stage 5: Casting of Concrete

The specimen are cast according to IS for finding their mechanical properties.

Stage 6: Test on Fresh Concrete

The Compaction Factor test is carried out to find out the workability of the concrete.

Stage 7: Test on Hardened Concrete

The tests for Mechanical properties are carried out at the age of 7, 14, & 28 days in Compression Testing Machine and Universal Testing Machine.

Stage 8: Test results & Discussion

From the test result various comparison are done and reasons are discussed.

Stage 9: Conclusion

In this various conclusions have been given and recommended for various applications.

VI Mix Design

As there are no standard codal provisions for the mix design of geo polymer concrete, the design mix can be arrived by assuming the density of geo polymer concrete as 2400 kg/m³. The total volume occupied by fine and coarse aggregate is around 77-80%.

Mix ID	Fly Ash (kg)	Silica Fume (kg)	GGBS (kg)	Fine Aggregate (kg)	Coarse Aggregate (kg)	NaOH Solution (kg)	Na ₂ SiO ₃ Solution (kg)	Extra Water (kg)	Super Plasticizer (kg)
F50 G50	8.365	0	8.365	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G40 S10	8.365	1.673	6.692	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G30 S20	8.365	3.346	5.019	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G20 S30	8.365	5.019	3.346	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G10 S20	8.365	6.692	1.673	23.53	54.87	1.92	4.778	2.509	0.5019
F50 G50	8.365	8.365	0	23.53	54.87	1.92	4.778	2.509	0.5019

VI. DIMENSION OF THE SPECIMEN

Cube size : 100mm x 100mm x 100mm Prism Size : 500mm x 100mm x 100mm Cylinder Size : Height= 300mm; Diameter= 150mm

VII PREPARATION OF ALKALINE SOLUTION

Alkaline solution was prepared one day prior to the mixing. It is prepared by mixing solutions of NaOH and Na₂SiO₃. NaOH solution is of the molarity 12. NaOH solution is prepared by mixing 480 grams of commercial grade. NaOH in 1000 ml of distilled water. Care should be taken while mixing the NaOH solution since heat is liberated. Then NaOH solution and Na₂SiO₃ is mixed in the ratio 1:2.5.

TABLE 5: Weight of NaOH flakes

REQUIRED MOLARITY	WEIGHT IN gm OF NaOH FLAKES
12	480

- Let us we adopt 77%
- The alkaline liquid to fly ash ratio is kept as 0.4.
- 12 Molarity
- The ratio of sodium silicate to sodium hydroxide is kept as 2.5.
- Extra water 15% of Cementitious material.
- Super Plasticizer 3% of Cementitious material



FIGURE 5: PREPARATION OF ALKALINE SOLUTION

VIII TEST RESULTS AND DISCUSSION

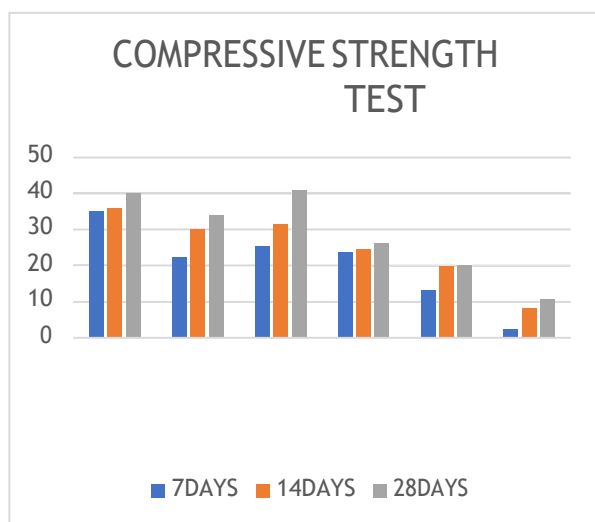
COMPRESSION STRENGTH TEST

All cubes of controlled geopolymer concrete were tested in a Compression Testing Machine with the references of IS: 516 – 1959 to determine Compressive Strength of concrete at the age of 7,14,28 day

TABLE 3: Compressive strength test

S.NO	MIX RATIO	COMPRESSIVE STRENGTH (N/mm ²)		
		7DAYS	14DAYS	28DAYS
1	F50 G50	35.25	36	40.15
2	F50 G40 S10	22.35	30.05	33.95
3	F50 G30 S20	25.45	31.65	40.8
4	F50 G20 S30	23.8	24.55	26.25
5	F50 G10 S20	13.15	19.95	20.2
6	F50 S50	2.25	8.1	10.7

CHART 1:COMPRESSIVE STRENGTH TEST



X CONCLUSION

Based on the experimental study carried out on specimen the following conclusions are drawn

1. Addition of Silica fume and GGBS in Geopolymer Concrete composites enhanced its mechanical properties.
2. With addition of Silica fume, Various fractions of GPC mix like F50G50, F50G40S10, F50G30S20, F50G20S30, F50G10S40, F50S50 are made.

3. For F50G50, F50G40S10, F50G30S20, F50G20S30, F50G10S40, F50S50 the respective Compressive Strength for 28 days are 40.15, 33.95, 40.8, 26.25, 20.2, 10.7. This shows that the increase in GGBS results in increase in compressive strength.

4. According to the Experimental Investigation the optimum mix of GPC with Fly ash, Silica fume and GGBS is F50G30S20.

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DUPLICATE SIGNATURE VERIFICATION USING DEEP LEARNING ALGORITHM

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Abstract—

Biometrics technology is used in a wide variety of security applications. The aim of such systems is to recognize a person based on physiological or behavioral traits. In the first case, the recognition is based on measurements of biological traits, such as the fingerprint, face, iris, etc. The latter case is concerned with behavioral traits such as voice and the handwritten signature. Biometric systems are mainly employed in two scenarios: verification and identification. In the first case, a user of the system claims an identity, and provides the biometric sample. The role of the verification system is to check if the user is indeed who he or she claims to be. In the identification case, a user provides a biometric sample, and the objective is to identify it among all users enrolled in the system. Signature verification systems aim to automatically discriminate if the biometric sample is indeed of a claimed individual. In other words, they are used to classify query signatures as genuine or forgeries. Signature verification is a biometric

verification which is an important research area targeted at automatic identity verification such as legal, banking and high security environments. A set of actual signatures is collected from individuals whose signatures have to be authenticated by the system. The topological and texture features are extracted from the actual signature set. The system is trained by using these features. The mean feature values of all the actual signature features are calculated. This mean features acts as the model for verification against a test signature. Euclidian distance between template signature features and claimed signature features serves as a measure of similarity between the two. If this distance is greater than a predefined threshold, then the test signature is detected as fake by Deep learning algorithm

Index Terms—Biometric system, Distance measurements, Signature verification, Features Extraction, Deep learning algorithm

I. INTRODUCTION

Biometrics refers to metrics related to human characteristics. Biometrics authentication (or realistic authentication) is used in computer science as a form of identification and access control. It is also used to identify individuals in groups that are under surveillance. Biometric identifiers are then distinctive, measurable characteristics used to label and describe individuals. Biometric identifiers are often categorized as physiological versus behavioral characteristics. Physiological characteristics are related to the shape of the body. Examples include, but are not limited to fingerprint, palm veins, face recognition, DNA, palm print, hand geometry, iris recognition, retina and odour/scent. Behavioral characteristics are related to the pattern of behavior of a person, including but not limited to typing rhythm, gait, and voice. Some researchers have coined the term behavior-metrics to describe the latter class of biometrics. Fig 1 shows the block diagram illustrates the two basic modes of a biometric system. First, in verification (or authentication) mode the system performs a one-to-one comparison of a captured biometric with a specific template stored in a biometric database in order to verify the individual is the person they claim to be.

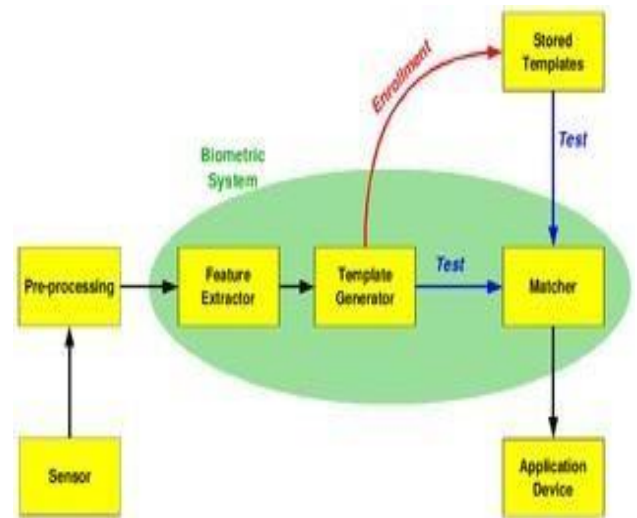


Fig 1: Block diagram of biometric system
Three steps are involved in the verification of a person. In the first step, reference models for all the users are generated and stored in the model database. In the second step, some samples are matched with reference models to generate the genuine and impostor scores and calculate the threshold. Third step is the testing step. This process may use a smart card, username or ID number (e.g. PIN) to indicate which template should be used for comparison. 'Positive recognition' is a common use of the verification mode, "where the aim is to prevent multiple people from using the same identity".

Second, in identification mode the system performs a one-to-many comparison against a biometric database in an attempt to establish the identity of an unknown individual. The system will succeed in identifying the individual if the comparison of the biometric sample to a template in the database falls within a previously set threshold. Identification mode can be used either for 'positive recognition' (so that the user does not have to provide any information about the

template to be used) or for 'negative recognition' of the person "where the system establishes whether the person is who she (implicitly or explicitly) denies to be". The latter function can only be achieved through biometrics since other methods of personal recognition such as passwords, PINs or keys are ineffective.

The first time an individual uses a biometric system is called enrollment. During the enrollment, biometric information from an individual is captured and stored. In subsequent uses, biometric information is detected and compared with the information stored at the time of enrollment. Note that it is crucial that storage and retrieval of such systems themselves be secure if the biometric system is to be robust. The first block (sensor) is the interface between the real world and the system; it has to acquire all the necessary data. Most of the times it is an image acquisition system, but it can change according to the characteristics desired. The second block performs all the necessary pre-processing: it has to remove artifacts from the sensor, to enhance the input (e.g. removing background noise), to use some kind of normalization, etc. In the third block necessary features are extracted. This step is an important step as the correct features need to be extracted in the optimal way. A vector of numbers or an image with particular properties is used to create a template. A template is a synthesis of the relevant characteristics extracted from the source. Elements of the biometric measurement that are not used in the comparison algorithm are discarded in the template to reduce the file size and to protect the identity of the enrollee.

During the enrollment phase, the template is simply stored somewhere (on a card or within a database or both). During the matching phase, the obtained template is passed to a matcher that compares it with other existing templates, estimating the distance between them using any algorithm (e.g. Hamming distance). The matching program will analyze the template with the input. This will then be output for any specified use or purpose (e.g. entrance in a restricted area). Selection of biometrics in any practical application depending upon the characteristic measurements and user requirements. In selecting a particular biometric, factors to consider include, performance, social acceptability, ease of circumvention and/or spoofing, robustness, population coverage, size of equipment needed and identity theft deterrence. Selection of a biometric based on user requirements considers sensor and device availability, computational time and reliability, cost, sensor size and power consumption

For any legal transactions the authorization is done by the signature. So the need of the signature verification increases. The handwritten signatures are unique for individuals and which is impossible to duplicate. The technology is easy to explain and trust. Identification and verification of hard written signature from images is major issue. This is very difficult as even human eye does not have that much visual ability to identify every detail of the in handwritten. Signature changes every time so it is difficult for humans to identify the original and forged ones. By using deep learning which uses the sophisticated is digital configured replica of human brain, we can identify the forgery done in signature with higher

accuracy. The primary advantage that signature verification systems have over other type's technologies is that signatures are already accepted as the common method of identity verification. The handwritten signature verifications are of two types Online and the offline. On-line method uses an electronic technique and a computer to extract information about a signature and takes dynamic information like pressure, velocity, speed of writing etc. for the purpose of verification. In off-line signature verification involves less electronic control and uses signature images captured by scanner or camera. An off-line signature verification system uses features extracted from scanned signature image. The features used for offline signature verification are much simpler. In this only the pixel image needs to be evaluated. But, the off-line systems are difficult to design as many desirable characteristics such as the order of strokes, the velocity and other dynamic information are not available in the off-line case. The verification process has to wholly rely on the features that can be extracted from the trace of the static signature images.

II. RELATED WORK

Ajay Kumar, et.al,...[1] focuses on the comparative performance evaluation from the phase encoding of iris patterns using four approaches; Haar wavelet, Gabor filter, Discrete Cosine Transform (DCT), and Fast Fourier Transform (FFT) based feature extraction. The resulting combination of the best performing approaches is used to investigate the further performance improvement. The experimental results illustrated in this paper suggest that the performance from the Haar wavelet and

log Gabor filter based phase encoding is the most promising among all the four approaches considered in this work. Therefore the simultaneously extracted matching scores from these two matches are combined for further performance improvement. The difference in the magnitude of adjacent blocks is computed and a binary feature vector is formed from the zero crossings of each difference. The size of the blocks was chosen to be 8×12 with an overlapping of 4 pixels in the vertical direction and 6 pixels in the horizontal direction. The size of the resulting feature vector was 8160 bits and Hamming distance was used to measure the difference between the feature vectors. The feature extraction using the four level Haar wavelet decomposition of the enhanced image was firstly investigated.

Yingzi Du, et.al,...[2] proposed to use Fourier-based trigonometry to estimate the two spherical components of angle of gaze and used an affine transformation to "correct" the image and center the gaze. Schuckers et al. proposed two methods to calculate angle of gaze: using Daugman's integrodifferential operator and also an angular deformation calibration model. It is assumed that an estimate of the degree of off-angle is available for the algorithms and subjects are required to place their heads on a chin rest looking front (while the camera is rotated horizontally in fixed angles). Both methods are limited because "the affine transformation assumes the iris is planar, whereas in fact it has some curvature". Recently, we proposed the Regional Scale Invariant Feature Transform (SIFT) approach for noncooperative iris recognition which works for off-angle iris images. Iris features are described without a polar or affine transformation and the feature point

descriptors are scale and rotation invariant. However, the iris region consists of both noise and patterns, and Regional SIFT describes the area around a feature point using gradient information, which is not best suited for feature extraction. Most importantly, Regional SIFT would not work well with local pattern deformation. If the strengths of SIFT and Gabor wavelets can be combined for feature extraction, it may improve the recognition accuracy for off-angle iris images. A simple combination of SIFT and Gabor wavelet method would not work, and it is challenging to design a method that can take advantage of the SIFT and Gabor wavelet. The SIFT method may select many feature points in a small region. This increases the computational complexity.

Ying Chen, et.al,...[3] proposed an efficient iris recognition system based on optimal sub feature selection strategies and sub region fusion method. This recognition system is composed of two parts. The first part is discriminative sub feature selection based on finite-delete-sorting multistage strategy, and the second one is fusion sub region of segmented annular iris area. The goal of discriminative sub feature selection is to discard the redundant SIFT key point's feature; the feature selection strategies include (1) feature selection based on key point's orientation, (2) feature selection based on key point's neighborhood magnitude, and (3) compounded feature selection. The purpose of weighted sub-region feature fusion is to overcome the major drawback of standard SIFT technology. First, we divide segment iris annular area into three equally sized partitions in a non-overlapping way. Second, weighted coefficients of sub-region are obtained via training with

particle swarm optimization (PSO) method. Finally, we adopt weighted sub-region matching to achieve final decision. The goal of the work is to design such an iris recognition algorithm.

Tieniu Tan, et.al,...[4] presented a novel iris segmentation method, aiming at noisy iris images in non-cooperative or less-cooperative environments. In this paper, we have presented an efficient and robust algorithm for noisy iris image segmentation in the context of non-cooperative and less-cooperative iris recognition and in response to the NICE.I iris recognition contest. The genuine iris region is then extracted with the assistance of several semantic priors, and the non-iris regions (e.g. eyelashes, eyebrow, glass frame, hair, etc.) are identified and excluded as well, which greatly reduces the possibility of mis-localizations on non-iris regions. Secondly, an integrodifferential constellation is introduced to accelerate the traditional integer differential operator, and meanwhile, enhance its global convergence ability for pupillary and limbic boundary localization. Thirdly, a 1-D horizontal rank filter and an eyelid curvature model are adopted to tackle the eyelashes and shape irregularity, respectively, during eyelid localization. Finally, the eyelash and shadow occlusions are detected via a learned prediction model based on intensity statistics between different iris regions. Extensive experiments on the challenging UBIRIS iris image databases have shown that the proposed method achieves state-of-the-art iris segmentation accuracy, and therefore can be well adapted for non-cooperative iris recognition.

Chun-Wei Tan, et.al,... [5] automated the iris recognition has emerged

as one of the most promising biometrics technologies to provide reliable human identification. Almost all the existing commercial iris recognition systems acquire iris images using near infrared (NIR) imaging within short distance (typically between one to three feet) and under constrained environment. In other words, significant cooperation is expected from the users to provide their eye images while staring at imaging devices under such constrained environment. Such imaging can generally achieve remarkable matching accuracy as iris texture is more clearly preserved in such high quality iris images acquired using NIR imaging under the constrained setup. The superiority of the NIR-based iris recognition technologies has been practically engaged in very large scale applications, such as in Aadhar project to identify millions of citizens, or in border-crossing control system in UAE. Recent advancement in the iris recognition technologies involves acquisition of the iris images at-a-distance and under less constrained environments using visible illumination imaging.

III. EXISTING METHODOLOGIES

One of the main challenges for the signature verification task is having a high intra-class variability. Compared to physical biometric traits, such as fingerprint or iris, handwritten signatures from the same user often show a large variability between samples. Signature identification is the problem of recognizing the writer or author of a questioned document according to its handwriting style and it has been studied on different scripts. Although signature identification seems to require scale invariant features, scale sensitive features might be suited as well. Writers tend to

write with a specific size; therefore the scale of the texture tends to be directly dependent on the sampling rate. The task of signature identification is almost always done with respect to a dataset, where the sampling rate is defined or at least known when performing feature extraction. It is feasible and probably worth the effort of resampling all text images to a standard sampling resolution, rather than improvising a scale invariant feature-set. The existing feature-set as is the norm, is derived from the histogram of occurring binary patterns. LBP were defined as a local structural operator, operating on the periphery of a circular neighborhood. LBP are encoded as integers, which in binary notation would map each sample on the periphery to a binary digit. In what concerns the bit count, a bit-count of 8 presents us with many benefits. Implementation wise, the LBP transform is an image that uses one byte per pixel. Its histogram has 256 bins providing a high feature-vector dimensionality and good discriminative properties. proposed methodologies

As signature is the primary mechanism both for authentication and authorization in legal transactions, the need for efficient auto-mated solutions for signature verification has increased. In this project, a signature verification system has been proposed based on deep learning. First the local features of the image are calculated and with the help of a predefined codebook an occurrence histogram can be created. This histogram is compared to determine the identity of the writer or the similarity of other handwritten documents. Currently the methods for signature identification can be divided into two approaches: the first approach analyzes the characters

themselves and the second approach uses textural features of the handwriting. In forensics the writer identification is done by analyzing the style of the characters. For this analysis it is necessary that the foreground has to be separated from the background in the images, which makes the results of the writer identification dependent of the binarization algorithm. HOG counts occurrences of gradient orientation in localized portions of an image. The essential thought behind the HOG descriptors is that local object appearance and shape within an image can be described by the distribution of intensity gradients or edge directions. This technique divides the image into small square cells and then computes the histogram of gradient directions or edge directions based on the central differences. HOG features are calculated by taking orientation histograms of edge intensity in a local region and with shape features. In this project we can implement classification algorithm using neural network approach to classify the signature text. The proposed layout is shown in fig 2.

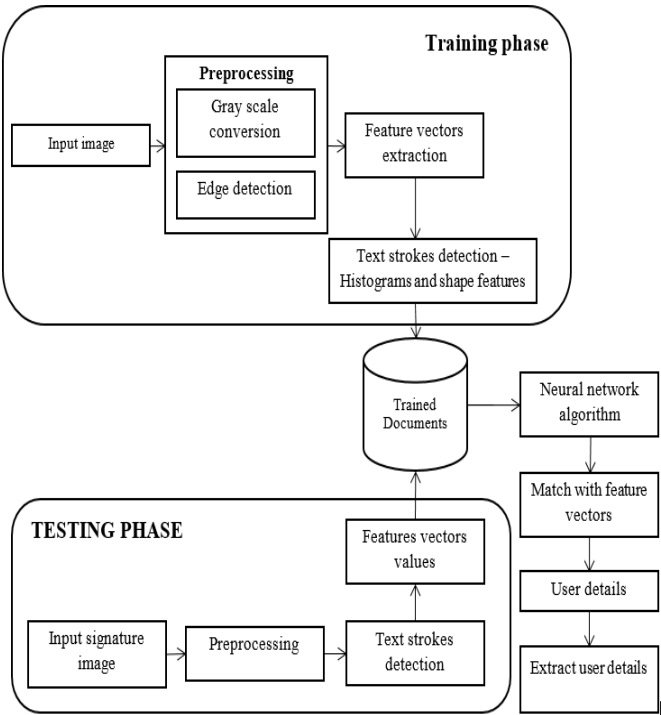


Fig 2: Proposed framework

4.1 IMAGE ACQUISITION

For any legal transactions the authorization is done by the signature. So the need of the signature verification increases. The handwritten signatures are unique for individuals and which is impossible to duplicate. The technology is easy to explain and trust. The primary advantage that signature verification systems have over other type's technologies is that signatures are already accepted as the common method of identity verification. Paper based signature is first converted into a digital image by scanning and then it is used for verification purpose. In this module, user can upload the signature image for training and testing.

4.2 PREPROCESSING

It is the most important step in signature verification and recognition that exists for the manipulation and modification of images. Its successful

implementation produces improved results and higher accuracy rates. Threshold method is used to extract the signature from the background of a signature. All pixels of signature are converted to “1” and rest of pixels those are belongs to background of signature convert to “0”. Noise reduction filter is employed to the binary signature to do this job. It removes the single black pixels on the white background. Defects removal, image enhancement and quality achieved.

4.3 FEATURES EXTRACTION

Feature extraction techniques play vital role to improve the accuracy of signature verification system. This process identifies and differentiates an individual signature from another. It can be achieved by employing different type features such as global features, geometric features, texture features. In Feature extraction, the essential features are extorted from the original input signature. The features to be extorted are based on the application and fluctuate accordingly. Characteristic constraints are computed from the sort out data and are used to characterize signature. The choice of a powerful set of features is crucial in signature verification systems. The features that are extracted from this phase are used to create a feature vector. We use a feature vector to uniquely characterize a candidate signature.

4.4 CLASSIFICATION

After detecting text region in the image, from that text region text is extracted from the image using character descriptors and structure configuration. In the verification stage, a signature to be tested is preprocessed and feature extraction is performed on preprocessed test signature image. In this module, implement back propagation neural network algorithm. It is an excellent

ability in generalizing the given image but has a limitation of determining which kernel to be used, classification using BPN requires considerable time and space. They are used for regression and classification by analyzing data and recognizing patterns.

4.5 NOTIFICATION

After verification of feature vector, signature can be verified. If the features are matched means, signature can be considered as original otherwise signature is forged and provide notification about forged signature

IV. EXPERIMENTAL RESULTS

Real time available datasets are used for our experimental evaluations. There are iris based features in the real time face datasets. As for the biometric representations, we extracted three different features descriptors, LBP, HOG, and HOG with deep learning transform for signature recognition. For LBP, each signature image is first divided into 8×8 non-overlapping blocks with the size of 8×8 pixels. A 59-dimensional uniform LBP for each block is extracted and then concatenated into a 3776-dimensional vector. For HOG, each image is first divided into 16×16 non-overlapping blocks with the size of 4×4 pixels, and then divided into 8×8 non-overlapping blocks with size of 8×8 pixels. As a result, we obtain a 9-dimensional HOG feature for each block, and they are finally concatenated to form a 2880- dimensional vector. As for proposed system, one 128-dimensional feature over each 16×16 patch is computed, where the spacing of two neighboring patches is 8 pixels. Finally, the HOG features are concatenated into a 6272-dimensional vector using Deep learning algorithm. We

perform accuracy measurements to calculate the performance of the system.

$$\text{Accuracy} = \frac{TP}{TP+TN+FP+FN}$$

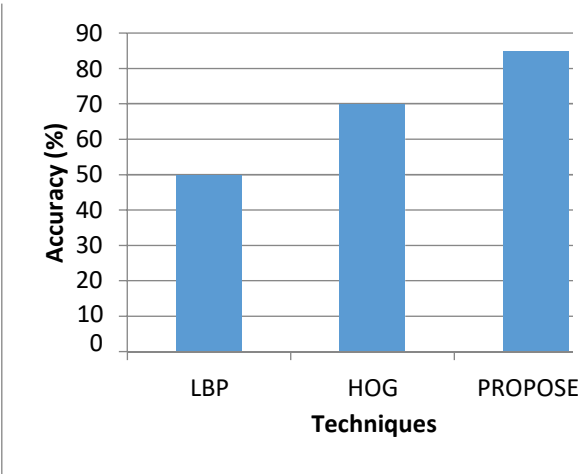


Fig 4 Accuracy chart

The proposed system provides improved accuracy rate for signature recognition.

V. CONCLUSION

Biometrics technology is used in a wide variety of security applications. The aim of such systems is to recognize a person based on physiological or behavioral traits. In the first case, the recognition is based on measurements of biological traits, such as the fingerprint, face, iris, etc. The latter case is concerned with behavioral traits such as voice and the handwritten signature. Biometric systems are mainly employed in two scenarios: verification and identification. The handwritten signature is a particularly important type of biometric trait, mainly due to its ubiquitous use to verify a person’s identity in legal, financial and administrative areas. Handwritten signature verification is the most easiest and non-invasive biometric method. Signatures can be identified by their

geometrical shape. The verification system modeled is generous to intra-personnel signature variations and rude to inter-personnel signature variation ones, the forgery. HOG and shape features itself enhances signature verification because of their scale and rotation invariance property. This shape descriptor feature is combined with geometric features like circularity and aspect ratio and yielded a better accuracy. This project presents a method of handwritten signature verification using neural network approach. The method uses features extracted from preprocessed signature images. The extracted features are used to train a neural network using error back propagation training algorithm.

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Formulation and Development of Instant Mix Products by Using Turkey Berry Powder

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ABSTRACT

Turkey berry is a vegetable with good energy, carbohydrate, protein, vitamin and minerals. Processing of turkey berry for the preparation of several food products using food technology might help people for proper utilization of the nutrients from turkey berry as it contains several nutrients which plays most important role in preventing and curing of diseases the current study involves formulation of Indian based instant mix products on the basis of turkey berry and development of food products incorporated with turkey berry powder with varied proportion and evaluation of sensory characteristics by using sensory tools. The shelf life study of turkey berry powder was done by keeping the powder under controlled conditions and checked for microbial examination. The acceptability of the product was good and the sensory attributes for the trained panel members scored high impact and the shelf life of the prepared instant powder was acceptable in all aspects for three months.

Keywords - Turkey berry powder, formulation, instant mix products, sensory evaluation

I. INTRODUCTION

Turkey berry is a vegetable that holds plenty of health benefits and as such with mild alteration can be used for the preparation of beverages. (Asiedu-Addo, s.2014) Extracts from turkey berry are useful in the treatment of hyperactivity colds and cough, pimples, skin diseases and leprosy including methyl caffeate, and it's shows an anti-diabetic effect in streptozotocin induced diabetic rats (Garden-Robinson, J.2012). Nutritionally, turkey berry is an excellent source of the following micronutrients such as vitamin A, B1, B6, calcium(0.28mg), copper, folic acid, iron(24.5mg), magnesium, niacin, as well as potassium and it also has fat(1.7mg) and fiber(56.9mg) (Matsubara, K., 2005) Solanum torvum revealed the presence of flavanoids, sterols and triterpens which may be responsible for anti-ulcer property. (Gnangui, S. N., 2010).

PROCESSING OF TURKEY BERRY POWDER



Figure - 1

II. METHODOLOGY

Turkey berry selected for the research was procured from the local market of salem district, India. Then it is screened for spoilage insect bites and other issues. The selected sample was dried by using the method of sundry. The process was taken for 8 days for the complete drying of the turkey berry. After drying it was powdered by using mixer. The grounded turkey berry was sieved for getting fine powder. Then it is processed powdered was taken for storing for further use of the presense study. The sundried vegetables gives better shelf life by controlling the activity of microorganism (Adepoju O.T, 2008). The processing of turkey berry powder is given in figure-1. The keeping quality of

turkey berry increases when it undergoes sun drying. (Appiah F., 2011).

A. Development of Recipes by Incorporating Turkey Berry Powder

The processed turkey berry powder was incorporated in all developed recipes like idly, dosa, sambar, rasam, tea, chicken curry, upma, tomato rice. The formulation and development of food product by using turkey berry powder is given in Table-1. The developed recipes were compared with Standard recipes and it was taken for sensory evaluation to evaluate the sensory characteristics of developed recipes.

THE BASIC INGREDIENT USED FOR THE PREPARATION OF DIFFERENT PRODUCTS BY USING TURKEY BERRY POWDER

TABLE-1

Recipe	Ingredients	% Incorporation of developed recipes
Idly	Rice flour	66.6
	Black gram dhal	20
	Turkey berry powder	13.3
Dosa	Rice flour	60
	Black gram dhal	20
	Turkey berry powder	13.3
Sambar	Red gram dhal	40
	Tomato	13.3
	Radish	6.6
	Turkey berry powder	13.3
Rasam	Tomato	20
	Tamarind	13.3
	Turkey berry powder	13.3
Chicken curry	Chicken	40
	Tomato	6.6
	Onion	6.6
	Turkey berry	13.3

	powder	
Upma	Upma flour	40
	Chilies green	6.6
	Tomato	6.6
	Turkey berry powder	13.3
Tomato Rice	Rice	40
	Tomato	6.6
	Green chilies	6.6
	Onion	13.3
	Turkey berry powder	66.6
Tea	Milk	66.6
	Sugar	4
	Tea powder	6.6
	Turkey berry powder	6.6

B. Shelf Life Analysis

The processed sundry turkey berry powder is taken for shelf life analysis by storing it in tupper wear, glass bottle, aluminium foil cover at room temperature. It was stored for 3 months of duration at room temperature.

III. RESULTS AND DISCUSSION

A. Nutrient Analysis Of Turkey Berry Powder

Nutritive value of developed turkey berry powder was determined by using laboratory analysis. The nutrients analyzed were protein, crude fiber, fat, calcium, iron, potassium and zinc. The analyzed nutrient value of the dried sundry powder was compared with the nutritive value of raw turkey berry. The standard nutritive value of turkey berry in the Table-1. The computed nutritive value of turkey berry which includes moisture, carbohydrates, protein, fat, crude fibre, and iron was compared turkey berry powder which was undergone with sundry is displayed in Table-3

B. Comparison Of Nutritive Value Of Raw
And Sun Dried Turkey Berry Powder

TABLE-2

S.No	Parameters	Nutritive Value of Turkey Berry%	Nutritive Value of Sun Dried Turkey Berry Powder %
1	Moisture	86.230	75.69
2	Carbohydrate	7.033	7.23
3	Protein	2.322	11.78
4	Fat(g)	0.278	4.87
5.	Iron	23.6	28.64
6	Crude fibre(g)	3.993	22.88
7.	Zinc(mg)	21.460	3.32
8.	Calcium (mg)	221.583	286.41
9.	Potassium (mg)	268.451	2328.75

PHYSICAL PROPERTIES OF TURKEY
BERRY POWDER

TABLE-3

S.No	Physical Properties	Standard Nutritive Value	Analyzed Nutritive Value
1	Moisture	86.230	78.96
2	Colour		
	L	99.46	75.69
	A	3.73	8.43
	B	0.05	15.93

C. Shelf Life Analysis

The processed sundried turkey berry powder is taken for self life analysis by storing it in Tupper wear, glass bottle, aluminium foil cover at room temperature. It was stored for 6 months of duration at room temperature without any changes in all attributes which shows fitness to use with the same period.

It expresses colour as three values : L for the lightness from black (0) to white, A from green (-) to red (+), and B from blue (-) to yellow(+). CLELAB was designed so that the same amount of numerical change in these values corresponds to roughly the same amount of visually perceived change.

SENSORY EVALUATION

Overall Acceptability Of
Developed Products

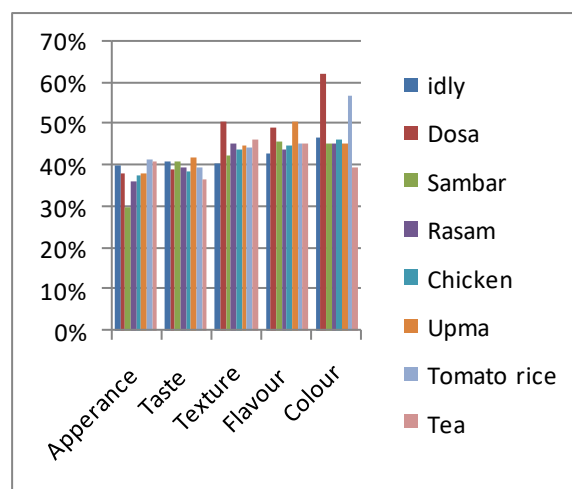


Figure - 2

IV. CONCLUSION

A turkey berry is a nutrient rich food which contributes high quality of iron and minerals like potassium, calcium and copper. In addition to fibre and beta-carotene. The turkey berry has antioxidants like flavanoids, alkaloids etc, Turkey berry can ward off various cardiovascular disease and can prevent heart stroke. It can also help to eradicate the harmful uric acid from the body, thus utilization of turkey berry and enhancement of quality research to make reach among public helps in healthy lifestyle.

Recommendations

1. The study can be done in large scale.
2. Nutritional awareness programme can be done to enlighten the use of Turkey berry and its medicinal values

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