10th Edition

INTERNATIONAL CONFERENCE ON ADAPTIVE TECHNOLOGIES FOR SUSTAINABLE GROWTH (ICATS'25)

(Hybrid Mode) - 28th May 2025

INSTITUTION'S INNOVATION COUNCIL (Ministry of Education Initiative)

ICATS-2025

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PAAVAI ENGINEERING COLLEGE

ABOUT THE INSTITUTION

PAAVAI ENGINEERING COLLEGE

Paavai Engineering College started in the year 2001, offering UG programmes and PG programmes has been approved by AICTE, NAAC and accredited by NBA. The college is securing top ranks consistently among the leading engineering colleges in Coimbatore region. The departments of Engineering and Management Studies are recognized as approved research centers by Anna University, Chennai to offer Ph.D. programmes. It has obtained research grants from AICTE, TNSCST, DST and other funding agencies. The college has been organizing Seminars, Workshops, FDP and Conferences periodically in the state-of-the-art technologies. The institution has signed MoUs with leading MNCs like Infosys, Microsoft, Wipro, various universities located in abroad like Purdue, Taiwan, Malaysia University and also Spoken Tutorial of IIT Bombay resource Centre. Our college got ARIIA ranking Band ‘B’ TOP 25-50 Institutions in India. Also, our institution keep a Platinum position in AICTE – CII Survey for the past 6 years.

ABOUT THE ICATS

ICATS-2025

INTERNATIONAL CONFERENCE ON ADAPTIVE TECHNOLOGIES FOR SUSTAINABLE GROWTH (ICATS'25)

ICATS 2025 will bring together a distinguished group of speakers, academicians, industry professionals, policymakers, social activists, and subject experts from around the world. This diverse gathering aims to create a rich exchange of knowledge and skills, especially benefiting aspiring engineers and young researchers. The conference will focus on critical scientific and technological topics, encouraging thoughtful discussions and innovative solutions to contemporary challenges. It serves as a dynamic platform to unveil cutting-edge research, share practical experiences, and foster collaboration across disciplines.

The event features plenary sessions, technical paper and poster presentations, and an exhibition showcasing innovative, eco-friendly, cost-effective, and socially responsible products from leading manufacturers. Additionally, pre- and post-conference tours will offer participants valuable exposure to industrial and technological sites. ICATS 2025 is an unparalleled opportunity to engage with the latest adaptive technologies and contribute to the advancement of sustainable and impactful engineering practices in today's fast-evolving world.

CHAIRMAN'S MESSAGE

Shri.CA.N.V.NATARAJAN
FOUNDER & CHAIRMAN
PAAVAI EDUCATIONAL INSTITUTIONS

India continues to distinguish itself globally through remarkable advancements in technology, manufacturing, agriculture, education, space exploration, economic growth, and renewable energy. It is the solemn responsibility of the emerging generation of engineers and innovators to bridge this divide and steer our nation toward inclusive and sustainable progress.

This International Conference on Adaptive Technologies in Science and Technology (ICATS 2025),organized by Paavai Engineering College, assumes great significance. It provides a vibrant platform for scholars, researchers, professionals, and industry leaders to converge, collaborate, and contribute to the evolving landscape of science and technology. Its emphasis on interdisciplinary research is both timely and vital in fostering innovation that addresses real-world challenges.

ICATS 2025 exemplifies the spirit of knowledge exchange and forward-thinking inquiry. It is an ideal arena for showcasing emerging technologies and for inspiring novel solutions that align with global advancements and national aspirations.

I extend my heartfelt wishes for the grand success of ICATS 2025, confident that it will catalyse meaningful dialogue, foster groundbreaking innovation, and illuminate pathways to a more equitable and technologically empowered future.

DIRECTOR – ADMINISTRATION'S MESSAGE

Dr.K.K. RAMASAMY
DIRECTOR – ADMINISTRATION
PAAVAI EDUCATIONAL INSTITUTIONS

It is truly commendable that Paavai Engineering College is hosting the International Conference on Adaptive Technologies for Sustainable Growth – ICATS 2025. In an age where innovation drives progress, such academic gatherings are instrumental in fostering collaboration across disciplines and promoting dialogue on forward-thinking technologies that address real-world challenges.

In today's fast-evolving world, the pursuit of research and continuous upgradation of scientific knowledge are vital. Conferences like ICATS – 2025 not only nurture a spirit of inquiry but also support interdisciplinary collaboration, which is essential for addressing the challenges of sustainable development and technological advancement.

I extend my heartfelt congratulations to the organizers, faculty, and students for their dedicated efforts in making this event possible. I am confident that ICATS – 2025 will be a meaningful and impactful experience for all participants, and I wish the conference resounding success.

Wishing the conference ICATS-2025 a great success.

DIRECTOR-RESEARCH MESSAGE

Dr.R.R. KRISHNAMURTHY
DIRECTOR – RESEARCH
PAAVAI EDUCATIONAL INSTITUTIONS

It is with great pride and purpose that I extend my heartfelt greetings to all participants of the 10th Edition of the International Conference on Adaptive Technologies for Sustainable Growth (ICATS-2025), hosted by Paavai Engineering College.

In this era of rapid technological evolution, fostering meaningful dialogue and collaborative research is more important than ever. ICATS-2025 emerges as a vital platform that brings together thought leaders, innovators, and scholars from across disciplines to address real-world challenges through adaptive and sustainable solutions. Its emphasis on interdisciplinary research reflects the very spirit of innovation that our world demands.

The strength of a nation lies not merely in its technological prowess but in its ability to channel innovation toward inclusive and equitable development. ICATS-2025 stands as a catalyst in this direction—bridging academic inquiry with practical impact.

I am especially proud that all departments of Paavai Engineering College have come together in a spirit of unity and academic excellence to make this conference a reality. Their collaborative commitment, supported by distinguished experts from academia, industry, and international institutions, ensures that this event will be both intellectually rich and socially relevant.

As Director - Research, I view ICATS-2025 not only as a scholarly event but also as a collective affirmation of our responsibility to create knowledge that serves humanity. I encourage every participant to engage with curiosity, share with openness, and leave inspired to make a difference.

May ICATS-2025 spark enduring partnerships, ignite transformative ideas, and chart pathways toward a more sustainable and technologically empowered world.

Wishing ICATS-2025 resounding success!

PRINCIPAL'S MESSAGE

Dr.M. PREMKUMAR
PRINCIPAL
PAAVAI ENGINEERING COLLEGE

Engineering is fundamentally the art of transforming principles of science and mathematics into practical, innovative systems that benefit society. Beyond classroom learning, academic initiatives such as national and international conferences, symposiums, and seminars play a vital role in fostering knowledge exchange. These platforms bring together a diverse group of scholars, researchers, industry experts, and students, offering a unique opportunity for intellectual collaboration and growth.

It is essential that both faculty and students actively participate in such events—sharing their insights, presenting their ideas, and engaging in meaningful dialogue. Viewing engineering and scientific concepts through a broader, more innovative lens is key to staying relevant in today's fast-evolving world. Out-of-the-box thinking not only drives knowledge enhancement but also fuels creativity and innovation.

Conferences like ICATS-2025 provide a valuable forum for blending perspectives, exploring interdisciplinary approaches, and fostering professional development. They serve as catalysts for academic excellence and collaborative progress.

I wholeheartedly wish ICATS-2025 great success and hope it achieves its objective of inspiring minds and advancing knowledge.

PHOTOVOLTAIC FOR BATTERY RECHARGE OF AIRPORT GROUND SERVICE VEHICLES

MH. Khan[1], P. Lamberti[2], E. Sieni[3], and V. Tucci4.
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The aviation ground services are characterized by several electrical vehicles devoted to supporting a flight to move passengers and baggage from the airport to aircraft, and other services like aircraft mover and service vehicles. In modern airports these vehicles are supplied by electrical batteries that need to be periodically recharged. In this contribution photovoltaic (PV) plants were sized considering available areas (e.g. roof surfaces) on 3 airports at three different latitudes (North Africa, Central Europe, and Northern Europe). Given the size of the batteries of ground services considered, the number of vehicles that can be recharged in a day considering June and December cases is estimated. Our findings emphasize the potential of solar energy to decarbonize airport ground service.

RECENT APPLICATION OF LCA ON ORGANIC WASTE VALORIZATION

[1]Vincenzo Torretta, [2]Alberto Pietro Damiano Baltrocchi, [3]Marco Carnevale Miino
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University of Insubria, Varese, Italy

Organic waste produced in municipal areas (MOW) represents a strong opportunity for material and energy recovery. In last years, several studies focused on alternative approaches for the management of this fraction of waste. Several examples of treatment and valorization through insects' larvae (InL) are reported in literature. In this work, the environmental sustainability of a chain for MOW treatments through InL and their subsequent valorization has been evaluated. The analysis of aquatic and terrestrial ecotoxicity (AqE and TeE, respectively) highlighted that the phase of lipid and protein extraction is the most impactful.

Keywords: environmental sustainability, carbon footprint, resource recovery, circular economy

OPTIMIZATION OF A JET DEFLECTOR FOR A HOT FLOW FROM A ROCKET NOZZLE

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[1,2]Department of Aerospace Engineering, [1,2]Periyar Maniammai Institute of science and Technology, Tamilnadu..

To control supersonic exhaust flows from converging-diverging rocket nozzle, this study checks the aerodynamic adaptation of jet deflector angles by combining Schlieren imaging with computational fluid dynamics (CFD) software. Temperature, pressure and Mach numbers are one of the important variables investigated for the deflecting angles of 30°, 45° and 60°. The 45° Deflector performs the best, according to the results, resumes the flow effectively, preserving stability and reducing the backpressure. CFD verification of oblique shock theory reveals significant flow properties. The 45° Deflector supports controlled supersonic-to-transonic injections by obtaining the highest post-shock pressure (2.90 times) and ideal temperature (171.06 k). The results suggest that the shock wave behavior, thermal load, and flow separation interactions are for the forecast of performance in the real world, stating how the exact current values reported by CFD are. This work improves the design of high efficiency deflector systems, which increases durability and safety in aircraft applications, requiring accurate exit flow control.

DESIGN AND FABRICATION OF FLAT PLATE GROOVED HEAT PIPE

[1]G Sasi, [2]Karthikeyan.D, [3]Rithika.B, [4]Srikanth.M

[1,2,3,4]Student, Department of Aeronautical Engineering,

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This study presents the design of a rectangular flat plate grooved heat pipe intended for efficient thermal management in compact electronic systems. The model features a transparent enclosure revealing uniformly spaced, parallel micro grooves along the internal surface to enhance capillary action and fluid distribution. The grooved structure is critical for the passive recirculation of the working fluid, enabling efficient heat transfer from the evaporator section to the condenser section. The rectangular cross-section is optimized to allow flat integration with

planar heat sources and sinks, ensuring compatibility with space-constrained environments. This heat pipe design aims to achieve high thermal conductivity through effective phase-change heat transport, offering a lightweight and maintenance-free cooling solution for modern thermal control applications.

A NUMERICAL STUDY OF TESTING AND COMPARISON OF SLOTTED AND NON-SLOTTED WINGS

[1]Bharath G, [2]Mandara Nagaraj Gunaganakoppa, [3]Harshitha K S,[4]Abhishek T K

[1,2,3,4]Student, Department of Aeronautical Engineering, Nitte Meenakshi Institute of Technology, Bengaluru,Karnataka.

The project investigates the aerodynamic behavior and performance differences between slotted and non-slotted wings, with a primary focus on evaluating their lift and drag characteristics. The study specifically utilizes a 3D model of the NACA 4412 airfoil, a well-known cambered airfoil widely used in low-speed aircraft applications. The purpose of the project is to analyze how the inclusion of a slot affects the airflow, lift generation, and drag forces on a wing, and to determine which configuration offers better performance under varying flight conditions. The wings were modelled using CATIA V5, a CAD tool known for its precision in aerodynamic design. The aerodynamic simulations were conducted using ANSYS Fluent, a powerful CFD (Computational Fluid Dynamics) software, to evaluate the airflow behavior over both slotted and non-slotted wing configurations. The simulations were performed across a range of angles of attack (AOA), both positive and negative, spanning from 0° to 16°. This range allows for the study of both pre-stall and post-stall behavior under different flight conditions, such as cruising, climbing, take-off, and landing. CFD results were obtained for both wing types, focusing on key aerodynamic parameters including lift coefficient (Cl) and drag coefficient (Cd). These results were plotted and compared to determine how the presence of a slot influences the aerodynamic efficiency of the wing. It was observed that the slotted wing generally provides higher lift at greater angles of attack while delaying stall, making it particularly effective for high-lift scenarios such as take-off and landing. On the other hand, the non-slotted wing showed better performance under moderate AOA conditions, suggesting suitability for cruise flight where reduced drag is preferable. The analysis concludes by identifying the operational scenarios in which each wing type performs optimally. Slotted wings,

due to enhanced airflow reattachment and delayed stall, are more suitable for low-speed, high-lift conditions. Non-slotted wings, with their simpler geometry and lower drag at moderate AOA, are more efficient for cruising. This comparative study offers valuable insights for wing design optimization in different phases of flight, supporting better aerodynamic efficiency and performance in aircraft engineering.

STRUCTURAL OPTIMIZATION OF DRONES FOR IMPROVED PERFORMANCE AND ENHANCED PATH PLANNING

[1]Mr. S. Suthagar, [2]G. Madhubalan, [3]M. Subalraj,

[1]Assistant professor,[2,3]Student,

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Unmanned Aerial Vehicles (UAVs), commonly known as drones, are increasingly vital in today's technology-driven world due to their versatility, operational efficiency, and cost-effectiveness. Their applications span diverse sectors including agriculture, military operations, disaster response, medical deliveries, and e-commerce logistics. As UAV adoption continues to grow, there is a critical need to improve their performance through energy-efficient designs, sustainable materials, and intelligent navigation strategies. First,the project introduces a novel propeller design based on the E63 arfoil, known for its aerodynamic efficiecy. To validate its performance, Computational Fluid Dynamics (FD) simulations are conducted and compared with theoretical predictions using Blade Element Theory (BET). To further optimize drone missions, a hybrid flight path planning algorithm is developed by combining the Artificial Bee Colony (ABC) algorithm with the Rapidly Exploring Random Tree Star (RRT*) method. This hybrid approach enables UAVs to navigate dynamic terrains with greater obstacle avoidance, energy efficiency, and mission success.

CFD-BASED DESIGN OPTIMIZATION OF A RAMJET COMBUSTION CHAMBER USING VENTILATED DISC TECHNOLOGY

[1]S Marypriya, [2]Dr M Senthilkumar,[3]Dr R Arravind, [4]S. Thrisha

[1,2,3]Assistant professor, [4]student, Department of Aeronautical Engineering

[1,3,4]Paavai Engineering College,[2] Kumaraguru college of Technology.

Ramjet engines are vital for supersonic propulsion but often face challenges in combustion stability and efficient air-fuel mixing. This study presents a sustainable and adaptive design approach for a subsonic ramjet combustion chamber by integrating ventilated disc technology. The modified configuration enhances turbulence and mixing through strategically designed circular and rectangular fins placed after the diffuser. All components of the ramjet-including diffuser, combustion chamber, ventilated disc, and nozzle-were modeled in CATIA and analyzed using ANSYS 13.0 for key parameters such as pressure, temperature, and velocity distributions. The use of ventilated discs significantly improved combustion efficiency by minimizing flow blockages and promoting better air-fuel interaction. This contributes to improved thrust performance at lower operational costs, supporting the development of low-cost, energy-efficient aerospace propulsion systems. The findings of this research align with the conference's objective of promoting adaptive technologies that enable sustainable growth in engineering, particularly in aerospace applications.

COMPUTATIONAL STUDY OF EFFECT OF CORRUGATION ON NACA 4412 AIRFOIL

[1]Ruthika U Arashinkar, [2]Priyanka V, [3]Abhishek T K,
[1,2,3,]Student, Department of Aeronautical Engineering
Nitte Meenakshi Institute of Technology, Bengaluru, India

This study investigates the aerodynamic performance of a modified NACA 4412 airfoil with strategically placed corrugations. Given its high lift characteristics at low Reynolds numbers, the airfoil was modified by incorporating corrugations at different locations: the leading and trailing edges of both the upper and lower surfaces. The aerodynamic behavior of these configurations was analyzed using Computational Fluid Dynamics (CFD) simulations in ANSYS Fluent. The study employed the Reynolds-Averaged Navier-Stokes (RANS) equations with the Spalart-Allmaras turbulence model to evaluate the lift and drag characteristics. Simulations were conducted at a Reynolds number of 2,310,000, with angles of attack ranging from -8° to 20°. The results reveal that leading-edge corrugations enhance lift while maintaining the stall angle comparable to the conventional NACA 4412 airfoil. This research provides insights into optimizing airfoil modifications for improved aerodynamic efficiency in various

aerospace applications.

NUMERICAL INVESTIGATION APPROACH ON COLD GAS THRUSTER WITH HIGH PRESSURE FEED SYSTEM

[1]Subramaniam Dhanakotti, [2]Badhri Kumaravel, [3]Vignesh Sankar, [4]Sriganapathy

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This study presents a comprehensive numerical investigation of a cold gas thruster (CGT) system integrated with a high-pressure feed mechanism, specifically engineered for precise attitude control in small-scale satellite and CubeSat applications. Cold gas thrusters operate by expelling a stored inert gas—such as carbon dioxide (CO_2)—through a converging-diverging nozzle, thereby generating thrust without undergoing any combustion or chemical reaction. The simplicity of the design, combined with enhanced safety and lower operational risks, makes CGTs a preferred choice for space missions requiring low-thrust and high-precision maneuvering. The current investigation focuses on a titanium cold gas thruster model weighing approximately 470 grams, pressurized to an inlet pressure of 580 PSI (equivalent to 4,000,000 Pa). Titanium, known for its high strength-to-weight ratio and corrosion resistance, offers an excellent material choice for space applications where weight and durability are critical factors. CO_2 is selected as the working fluid due to its favorable thermophysical properties and storage convenience in space systems. A detailed computational fluid dynamics (CFD) simulation is conducted to evaluate the internal flow behavior, pressure and velocity distribution, turbulence characteristics, and overall performance of the thruster. The simulations utilize high-fidelity turbulence models and structured meshing techniques to ensure accuracy in capturing flow dynamics and boundary layer interactions. Key analysis tools such as velocity contours, pressure plots, streamline visualizations, and thrust vector profiles are employed to interpret flow performance and optimize the nozzle geometry. Results from the simulation highlight uniform flow expansion within the nozzle, significant acceleration of CO_2 at the throat, and effective conversion of pressure energy into kinetic energy—ensuring maximum thrust efficiency. Furthermore, mesh quality analysis reveals minimal skewness and high orthogonality, contributing to the reliability of the numerical predictions. A comparison with ignition- based thruster systems indicates that cold gas systems eliminate risks of combustion instability, reduce system complexity, and minimize maintenance, thereby offering enhanced reliability and operational longevity for space platforms. This investigation not only validates the use of cold gas propulsion in modern aerospace

engineering but also serves as a foundation for further optimization of nozzle designs for micro-propulsion systems. The insights derived from the pressure and velocity fields provide design guidelines for enhancing thrust output while ensuring system compactness and energy efficiency.

TENSILE CHARACTERIZATION OF SUSTAINABLE BIOFIBER COMPOSITES USING NATURAL AND SYNTHETIC RESINS FOR AEROSPACE APPLICATIONS

[1]Manoj Kumar K.S, [2]Chithra S.P, [3]Hemanth Kumar L.E,[4]Dr Venugopal M.M,
[5]Mahendra M.A,[1,2,3,4,5]Department of Aeronautical Engineering,
Nitte Meenakshi Institute of Technology Bangalore, India

This study investigates the tensile strength of hybrid composites made from natural fibers (Areca, Hemp, Linen) and synthetic Glass fiber, reinforced with natural (rosin) and synthetic resins. Fabrication followed ASTM standards using hand lay-up techniques with precise fiber alignment. Tensile testing revealed that glass fiber with synthetic resin showed the highest strength of 112.59 MPa. Natural resin composites had lower strength (35.15 MPa) but displayed better ductility. Synthetic resin samples were stiffer, while rosin-based ones were more flexible. Despite lower performance, natural resin composites are eco-friendly. These findings support the potential use of such materials in aerospace applications.

RESONANT INDUCTIVE CHARGING SYSTEM FOR ENHANCED DRONE ENDURANCE

[1]P.Prasanna, [2]Elakkiya.S, [3]Madhesh Adhithya.S, [4]Thirumalai.E
[1]Assistant professor, [2,3,4]Student, Department of Aeronautical Engineering,
Paavai Engineering College, Namakkal

It is the system for transmitting the electrical power from a transmitting source to load wirelessly using coils. In this project two coils are used, one on the transmitter side called as primary coil and another at the receiver side called as secondary coil. This project is not similar to the wireless signal transmission which is used in cell phones. In this method of transmission, power from electrical source is transmitted in the form of magnetic flux. In this project, the AC power is supplied to the transmitting circuit which converts the AC Power into magnetic flux

using primary coil. When secondary coil interacts with this flux, an E.M.F. will be induced in the secondary coil. In this way, electrical power will be transmitted without using wires.

SMART HEXACOPTER FOR SOILSENSING AND PRECISION PLANTING

[1]Mr.K.Gokulnath, [2]M. Logeshwaran, [3]Sakthivel, [4]Vijay

[1]Assistant professor, [2,3,4]student, Department of Aeronautical Engineering,

Paavai Engineering College,Namakkal

Precision agriculture is revolutionizing modern farming by integrating autonomous aerial systems for real-time soil analysis and optimized planting. This project introduces a Smart Hexacopter Equipped with soil moisture and temperature sensors, the hexacopter collects real-time data to determine optimal planting conditions. GPS-based navigation and IoT connectivity enable remote monitoring and precision farming. The system features a multi- compartment seed storage unit, allowing automatic switching between different seed types based on soil properties. This enhances multi-crop farming and intercropping efficiency, ensuring optimal seed selection for varied field conditions. The precision seed-dropping mechanism ensures equal-distance seed distribution, reducing wastage and improving crop density. By analyzing soil conditions, the system minimizes excessive water, fertilizer, and seed usage, promoting eco-friendly agriculture. The aerodynamic structure ensures stable flight in varying wind conditions, while lightweight materials enhance endurance. The modular seed dispenser can be customized for different crops, making the hexacopter adaptable to diverse agricultural applications.

Keywords: Hexacopter, Precision Agriculture, Soil Sensing, Seed Dispensing, UAV, Smart Farming, IoT.

A QUADCOPTER DRONE UTILIZING FOR ADVANCED IMAGE PROCESSING AND SENSOR TECHNOLOGY FOR CROP HEALTH ANALYSIS

[1]Dr. R. Arravind, [2]K.C. Jayanth, [3]P. Akhilesh, [4]S.Niranjan Reddy, [5]T. Venkata Saketh
[1]Professor, [2,3,4,5]Student, Department of Aeronautical Engineering, Paavai Engineering College

This paper presents the development of a quadcopter drone equipped with a Raspberry Pi 5, high-

resolution camera, and GPS for real-time crop health analysis. The system employs custom Python-based image processing algorithms using OpenCV to detect stressed vegetation by identifying non-green (yellow and grey) regions in aerial imagery. The drone autonomously captures and processes images, geotags affected areas, and provides actionable insights for precision agriculture. Field tests demonstrated the system's ability to accurately identify crop stress, though environmental factors such as lighting variations posed challenges. The study highlights the potential of low-cost, embedded drone systems for improving agricultural productivity through early disease detection and optimized resource management.

OPTIMIZATION STRATEGIES FOR HETEROGENEOUS DRONE AND CARTESIAN ROBOTIC SYSTEMS FOR MULTI-DOMAIN APPLICATIONS

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The increasing complexity of multi-domain automation tasks demands the synergistic integration of diverse robotic systems. This paper presentsthe development and optimization of a heterogeneous robotic platform combining unmanned aerial vehicles (UAVs) and Cartesian robotic manipulators to address this need. The UAV provides agile aerial reconnaissance and payload transport, while the Cartesian robot offers ground-based precision manipulation. An integrated optimization framework utilizing Genetic Algorithms (GA) and Particle Swarm Optimization (PSO) was implemented to enhance task allocation, path planning, and energy management across platforms. Prototyping, field testing, and simulation validated the system's effectiveness in achieving synchronized, efficient, and resilient operations under real-world constraints such as energy limitations and dynamic environments. Significant improvements were observed in system performance, coordination accuracy, and mission efficiency. This work establishes a strong foundation for future advancements in intelligent, cooperative, and scalable heterogeneous robots.

IOT-ENABLED CROWD SURVEILLANCE DRONE WITH ESP-BASED FACIAL RECOGNITION AND AUTOMATED TEAR GAS DISPENSING

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The project aims to develop an IoT-enabled crowd surveillance drone that integrates ESP-based facial recognition technology and automated tear gas dispensing for effective crowd control. The drone utilizes real-time video processing to identify potential threats or individuals of interest within a crowd using facial recognition, while continuously transmitting data to a central control system. In case of a threat or crowd disturbance, the system automatically triggers a tear gas dispensing mechanism, ensuring a precise and controlled response. By combining IoT, facial recognition, and unmanned aerial vehicles, this system offers enhanced public safety, enabling law enforcement to monitor and manage large gatherings remotely with minimal human intervention, improving security, response times, and operational efficiency in crowd management. The IoT-enabled system allows for remote monitoring and control, ensuring that law enforcement agencies can respond to security threats swiftly while minimizing direct human intervention. The drone utilizes high-resolution cameras and AI-driven facial recognition to identify individuals in a crowd, enabling law enforcement to track persons of interest in real time. The ESP-based system ensures cost-effective processing and low power consumption, making the drone an efficient and scalable solution for large-scale surveillance operations. To enhance public safety and riot control, the drone features an automated tear gas dispensing mechanism capable of dispersing crowds when necessary.

Keywords: IoT-enabled, Crowd surveillance, Drone technology, ESP32, Facial recognition, Automated tear gas dispensing.

BIODEGRADABLE BOWLS USING RICE BRAN: A SUSTAINABLE PATHWAY FOR SMALL-SCALE FARMERS

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This research investigates a novel solution to sustainable product design through the use of rice bran, a large-scale agricultural by-product, as the major raw material for the production of biodegradable bowls. With escalating concern for environmental issues caused by plastic waste and the pressing need to create environmentally friendly replacements, this research examines the potential for converting rice bran, typically waste or utilized at minimal levels as animal feed, into a viable biodegradable product. The project highlights the viability and advantages of this solution for small farmers, especially in rice-growing areas, providing them with an alternative source of income and waste reduction. The study includes the development of rice bran composite tableware through the combination of rice bran with plant-based binders and additives, followed by low-cost, small-scale moulding techniques. The resulting bowls underwent extensive testing for determination of mechanical strength, water resistance, thermal stability, and biodegradability. The results indicate that rice bran, when suitably processed, produces biodegradable tableware of acceptable durability for everyday use and complete biodegradation in natural conditions in a short time period. Apart from technical verification, the research assesses the socio-economic contribution of implementing this technology in rural agricultural communities. It determines potential implementation challenges, such as availability of resources and training requirements, and suggests a scalable model that enables farmers to transform agricultural residues into profitable, environmentally friendly products. Through the process of turning waste into wealth, this method not only helps in environmental sustainability but also supports circular economy tenets and rural development objectives. We assessed the effects of the RH to starch ratio (w/w %), pressing temperature (°C), and duration (minutes) on the hardness, colour variation, and density of the bowls, with the goal of optimizing the manufacturing process. A cost-effective manual die machine has been designed to process agricultural residues, enabling rural smallholders and women entrepreneurs to produce valuable products, thereby fostering circular economies and sustainable income. This research presents an innovative approach to addressing plastic waste while simultaneously enhancing the livelihoods of individuals in rural communities through the introduction of biodegradable rice bran bowls.

Keywords:Rice bran, Wheat starch, Finger millet flour, Corn starch, Glycerol, Areca leaf, Die machine, and Heating element.

MANUFACTURING OF BIODEGRADABLE PACKAGING FILM BY USING OF AGRICULTURAL RESIDUES

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The increasing environmental concerns associated with synthetic polymers have driven the search for sustainable alternatives. This study focuses on the development of a biodegradable film derived from agricultural residues, specifically groundnut shells, orange peel powder, and corn cobs. These agro-wastes, abundant and underutilized, were processed to extract natural polymers and blended to form a cohesive, eco-friendly film. The resulting biodegradable film exhibits remarkable mechanical strength, flexibility, and biodegradability, making it suitable for applications in packaging and agricultural mulching. Characterization techniques, including tensile strength testing, water absorption analysis, and biodegradation assessment, demonstrated the film's potential to replace conventional plastics. Furthermore, the use of agricultural residues not only reduces environmental pollution but also promotes waste valorization and circular economy practices. This innovative approach addresses the dual challenges of plastic waste and agricultural residue management, offering a sustainable pathway toward eco-friendly material development.

DESIGN AND DEVELOPMENT OF A COST-EFFECTIVE RIDGE MAKER CUM SEED SOWER

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In modern agriculture, it is crucial to achieve accurate seed placement while reducing manual labor to enhance both productivity and sustainability. This initiative introduces the Ridge Maker Cum Seed Sower, an affordable and energy-efficient device designed specifically for small to medium-sized farming enterprises. This innovative machine merges two essential agricultural tasks creating furrows and sowing seeds into a single cohesive unit. The system

operates using a 12V DC motor (60 RPM) and is equipped with a solar panel for battery charging, thereby promoting sustainability through the use of renewable energy sources. A chain drive mechanism links the ground wheel directly to the seed dispensing system, ensuring that seed release is perfectly timed with the distance traveled. This design guarantees uniform seed spacing of 8 cm, irrespective of variations in speed. Additionally, the machine is equipped with a furrow opener positioned either in front of or beneath the seed dropping mechanism, allowing it to form planting rows as it advances. The implementation of mechanical transmission through a chain drive enhances reliability while simplifying the electronic control systems. By combining solar energy with mechanical accuracy, this project presents a sustainable and effective approach to precision farming. It minimizes seed loss, decreases labor needs, and lessens reliance on fossil fuels, thereby fostering eco-friendly agricultural methods. Future enhancements may include automation through microcontrollers and the ability to adjust seed spacing for compatibility with various crops.

Keywords: Seed Sowing Machine**,** Row Maker, Solar Powered Agriculture**,** Precision Farming.

DEVELOPMENT OF ORGANIC FOOTWEAR FROM WHEAT STRAW

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This study explores the innovative use of wheat straw, an agricultural byproduct, in the sustainable manufacturing of temple socks. Traditionally discarded or burned, wheat straw contains valuable cellulose fibers that can be processed into biodegradable textiles. The research focuses on extracting and refining these fibers through eco-friendly mechanical and chemical treatments, followed by blending them with natural or recycled fibers to enhance durability and comfort. The resulting material is soft, breathable, and suitable for use in temple socks, which are typically worn in sacred spaces requiring cleanliness and respect. This approach not only provides an environmentally friendly alternative to synthetic textiles but also adds value to agricultural waste, supporting rural economies and reducing environmental pollution. The project demonstrates the feasibility of integrating traditional practices with sustainable innovation in textile manufacturing.This project focuses on developing orthopedic, foot-comforting footwear integrated with natural fiber socks. Wheat straw, an abundant agricultural byproduct, is utilized for its multiple benefits. To enhance its strength, the straw is treated with

starch extracts derived from corn and potato. A blend of aloe vera gel and starch is applied to improve the flexibility and handling of the straw. The extraction of natural fibers from the straw and their conversion into socks is currently in the developmental phase of the project.

Keywords: wheat straw, cellulose fibre, orthopedic, starch.

GREENGROW: OPTIMIZING CROP HEALTH AND REDUCTING ENVIRONMENTAL IMPACT

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GreenGrow represents a transformative innovation in modern agriculture through its intelligent integration of artificial intelligence (AI), data analytics, and sustainable farming practices. This pioneering platform is designed to optimize crop health while significantly reducing the dependency on chemical pesticides and fertilizers. By offering location-specific, data-driven recommendations, GreenGrow empowers farmers to adopt precise and environmentally friendly agricultural methods that enhance productivity while safeguarding the ecosystem. The core strength of GreenGrow lies in its robust use of real-time data collected from soil health indicators, weather patterns, and remote sensing technologies. Through advanced algorithmic modeling and AI-powered insights, the platform provides actionable guidance tailored to individual farm conditions. This precise intervention strategy enables early disease detection, optimal treatment plans, and predictive maintenance of crop health, ensuring minimal resource wastage and maximum yield efficiency. GreenGrow also introduces a seamless user experience through its bilingual mobile and web applications, making cutting-edge agricultural technology accessible to a diverse range of farmers regardless of language barriers or technical expertise. By harmonizing traditional agricultural knowledge with modern technological advancements, GreenGrow seeks to revolutionize the farming ecosystem, promoting practices that are both economically viable and ecologically sustainable. Its community-driven features, including expert consultation forums and real-time alerts, foster collaboration among farmers, agronomists, and researchers. GreenGrow not only addresses critical challenges such as environmental degradation, inefficient pesticide use, and declining crop yields but also paves the way for the next generation of precision agriculture.

AUTOMATED BIRD REPELLENT SYSTEM

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Agriculture plays a vital role in contributing to one-third of India's Gross Domestic Product and a significant part of the country is relying upon It for their survival. The annual income of farmers is Largely dependent upon the yield of crops that they produce. which is continuously decreasing due to a number of factors and one such factor that we are focusing on is the damage caused by birds. By taking into consideration, we would like to propose the model of an automated bird repellent system using IoT devices. Our model consists of two main functionality one is the detection using cameras and the other part is repeller that will generate sounds of the predator which will drift the birds away from the field. Our model aims to minimize the damage of the crop and shows how loT devices can help achieve this.
Keywords: Solar, Bird, Repellent, Prediction, Crops.

DESIGN AND DEVELOPMENT OF SOLAR OPERATED SEMI AUTOMATIC COW DUNG COLLECTOR

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In the field of Rural & Urban development, we are develop a working model for Bridging the innovation and to empower the Agricultural sectors by the Multipurpose equipment for Sustainable Agriculture. In today's scenario farmers are having hard time in maintaining the cow shed to clean the cow dung they have to spend more time, or they have to hire workers for more money. So in this paper we suggest a mechanism which is used to collect the cow dung and also used to clean the area. We use cow dung cleaning machine which runs under the power generated by solar. By using this process human power will be saved. The solar-operated cow dung collector and cleaning equipment is a Multipurpose solution designed to solve the key challenges in agriculture, such as high Labour costs, low productivity, lack of market access,

and poor hygiene. It is used for Collection, cleaning, and transportation of cow dung and also for transporting the Agricultural produce and resources. It significantly reduces manual labour cost, duration and improving operational efficiency. Additionally, it ensures cleaner farm environments, enhancing Hygiene and reducing the risk of disease. This affordable and eco-friendly solution Enhances market access, supports sustainable agriculture, and improves overall farm performance.

Keywords: Multipurpose equipment, solar energy, collection-cleaning-transportation,Improves Hygiene, Affordable and Eco-friendly.

DEVELOPMENT OF AN IOT - BASED MUSHROOM PRODUCTION SYSTEM

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Mushroom cultivation requires precise environmental conditions, including temperature, humidity, CO_2 levels to ensure optimal growth and high yield. Traditional methods rely on manual monitoring and control, which can lead to inefficiencies and inconsistencies. To address these challenges, this project proposes an “Development of an IoT-based Mushroom Production System” that integrates sensors, real-time monitoring environmental control. The system utilizes temperature and humidity sensors, CO_2 detectors to continuously monitor the growing conditions. Data collected from these sensors is processed by a microcontroller (such as Arduino) which automatically adjusts parameters through actuators like humidifiers, exhaust fans, and lights. The system is connected to a mobile (Wi-Fi) platform, allowing users to remotely monitor the environment via a “mobile”.

Keywords: IoT, Smart Farming, Mushroom Cultivation, Automation, Environmental Monitoring.

DESIGN AND DEVELOPMENT OF A BANANA PSEUDO-STEM FIBER EXTRACTION MACHINE

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The increasing demand for sustainable and eco-friendly materials has highlighted the potential of banana stem fibers as a valuable natural resource. Banana plants, widely cultivated across tropical and subtropical regions, produce large quantities of pseudo-stem biomass that are often discarded as agricultural waste. This project focuses on the design, development, and evaluation of a banana stem fiber extractor machine to efficiently extract fiber from the banana pseudo-stem, thereby reducing waste and promoting environmental sustainability. Traditional fiber extraction methods are labor-intensive, time-consuming, and result in significant material wastage. To address these limitations, a semi-automatic extractor was developed using readily available materials and components. The prototype machine features a 0.5 HP electric motor, a belt and pulley drive system, rollers, and a stripping drum equipped with both serrated and plain-edge blades. The feed mechanism is manual, while the fiber extraction and separation process is mechanized to ensure consistency and improved efficiency. The laboratory testing was conducted to compare the efficiency and waste generation of the manual extraction method versus the developed machine. Results demonstrated a significant improvement in fiber extraction efficiency, increasing from 47.2% (manual method) to 65% with the machine, and a reduction in wastage from 34.5% to 25.9%. The machine provides a scalable solution for rural farmers and small-scale industries aiming to capitalize on banana stem by-products. The fibre extractor not only demonstrates mechanical innovation but also supports sustainable agriculture and income generation from agricultural residues. The banana stem fiber extractor serves as a practical and environmentally conscious solution to a previously underutilized resource
Keywords: fiber, extraction, waste utilization, sustainable, pseudo-stem, rural technolog

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FABRICATION OF COIR FIBRE EXTRACTOR

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The extraction of coir fiber from coconut husks is a crucial process in the coir industry, with applications in textiles, agriculture, and eco-friendly products. Traditional methods of fiber

extraction are labor-intensive, time-consuming, and inefficient, leading to lower productivity and quality. In this project coir Fiber Extractor is designed to improve efficiency, reduce labor efforts, and enhance fiber quality. The proposed machine integrates a motorized decorticator with optimized blade arrangements to separate fiber from the husk effectively. Performance analysis indicates significant improvements in extraction speed, fiber yield, and reduction in waste material. This innovation has the potential to modernize coir fiber processing, making it more sustainable and economically viable for small-scale and industrial applications. Our project mainly focuses towards developing a promotional strategy for a new innovation and generate public awareness regarding the availability of a coconut fibre extraction machine in the market at a reasonable cost. The development of this coir extractor holds potential to revolutionize the coir industry improve profitability and promote sustainable practices in agriculture waste management.

DESIGN AND DEVELOPMENT OF PULVERIZER FOR BROWN SUGAR PRODUCTION

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The agricultural industry is moving fast toward automation and mechanization to increase productivity and decrease dependency on manual labor. The design and development of a pulverizer for brown sugar manufacturing focus on increasing efficiency, lowering energy usage, and increasing product consistency in small to medium-sized processing plants. Brown sugar, usually with the tendency to clump from moisture, demands special milling for obtaining constant particle size and retaining its inherent properties. The present project targets designing an efficient, low-cost, easy-maintenance pulverizer with enhanced grinding efficiency. Principal considerations involve making suitable material selection (like food-grade Rubber Auger), selecting ideal rotor speed, and having a sieve arrangement for controlling the particle size. The pulverizer utilizes impact and shear forces to crush sugar crystals with minimal heat generation, which would otherwise change sugar characteristics. Computational modeling and prototype testing guarantee mechanical integrity and operational efficiency. The system developed has adjustable acceleration settings to suit different sugar moisture content and fineness

requirements. Performance assessment targets throughput capacity, energy efficiency, and product uniformity relative to traditional processes. Findings show that the designed pulverizer cuts processing time by 20–30% without compromising product quality, qualifying it for artisanal and industrial production of brown sugar. This project supports sustainable food processing through the provision of a scalable process that reduces waste and energy consumption, enabling local sugar producers to achieve higher-quality outputs at reduced operating costs.

Keyword: Pulverizer, brown sugar, food-grade milling, energy efficiency, particle size control.

DESIGN AND DEVELOPMENT OF SOLAR POWERED FERTILIZER BROADCASTER

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The solar-powered fertilizer broadcaster is an innovative agricultural implement designed to promote eco-friendly and cost-effective farming practices. The design integrates a solar panel, DC motor, rechargeable battery, and a fertilizer dispensing unit, all configured to ensure efficient and uniform distribution of fertilizers across the field. This broadcaster utilizes photovoltaic panels to convert sunlight into electrical energy, which powers a DC motor responsible for the uniform distribution of fertilizers. The integration of a rechargeable battery ensures uninterrupted operation, even during periods of limited sunlight. This design eliminates reliance on fossil fuels, reducing greenhouse gas emissions and operational costs. This machine offers a sustainable alternative to manual broadcasting, minimizing labour requirements and health risks associated with traditional methods. Field tests demonstrated improved performance, with significant reductions in time and labour, making it an ideal solution for small-scale farmers aiming for environmental sustainability and operational efficiency.

KeyWord: Fertilizer Broadcaster, Agriculture Machinery, Low labour Cost, Eco- Friendly.

DESIGN AND DEVELOPMENT OF A SOLAR POWERED MILK CHILLING SYSTEM

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Milk spoilage is a major challenge in dairy farming, especially in rural areas with unreliable electricity. A solar-based milk chilling system offers a sustainable and cost-effective solution by utilizing solar energy to power refrigeration units, ensuring proper milk storage and reducing losses. This system consists of photovoltaic (PV) panels that generate electricity, a battery storage unit for backup, and a refrigeration system optimized for energy efficiency. Some designs incorporate phase change materials (PCM) to enhance thermal storage, maintaining cooling even during low sunlight hours. Key benefits include reduced dependency on fossil fuels, lower operational costs and improved milk quality by preventing bacterial growth. This technology is particularly beneficial for small-scale farmers and remote dairy operations, contributing to a more sustainable and efficient dairy supply chain. Further advancements in solar energy storage and energy-efficient cooling technologies can enhance the viability and scalability of solar-based milk chilling systems in the future.

Keywords: Milk chilling, Phase change materials, Sustainability, Refrigeration system.

STUDY OF EFFECTS OF COMBINED BIOFERTILIZER ON GROWTH AND YIELD OF BHENDI

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An experiment was conducted to determine the effect of two biofertilizers (Azospirillum, Phosphobacteria) and their interaction on growth, fruit yield and quality of Bhendi (Abelmoschus wintas. L.) under pot culture inside shadenet. Six treatments are included in the trial viz: Ti (Control); T2 (100% Recommended Dose Fertilizer), T3 (50% Recommended Dose Fertilizer + Azospirillum): T4 (50% Recommended. Dose Fertilizer+ Phosphobacteria); T5 (50% Recommended Dose Fertilizer + Azospirillum + Phosphobacteria); To (75%

Recommended Dose Fertilizer + Azospirillum + Phosphobacteria). The observations are to be recorded at different time intervals as:30, 60, 90, days after sowing. This study will show all biofertilizers treatment and their interaction significant effect in plant height (cm), number of branches per plant, number of leaves per plant, fruit length (cm), fruit diameter (cm), number of fruits per plant, fruit yield per plant (g) and fruit yield (1/ha) comparing with control treatment.

Keywords: Biofertilizer, Azospirillum, Soil fertility, Phosphobacteria, Growth and yield.

A SMART DRIVEN PRECISION AGRICULTURE FOR SUSTAINABLE CROP MANAGEMENT THROUGH DEEP LEARNING

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The integration of Deep Learning methods into sustainable agriculture provides precise opportunities to address global challenges like food security, climate change, water consumption, human needs and crop disease. This paper examines the blending of Artificial intelligence (AI) in agriculture, with focus on crop disease identification, yield forecasting, soil remote sensing associated with autonomous system. We enhance the role of Unmanned Aerial Vehicle (UAV), satellite images, and IoT-enabled sensors for collecting various agricultural data and how these data are monitored effectively through Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). Furthermore, it also covers the current gaps in the literature, including insufficient data, generalizability of the models and the difficulties of deploying AI models in sustainable agriculture environments. This review highlights the potential of deep learning to advance sustainable agricultural practices worldwide, while identifying key directions for future research and development.

A RESEARCH STUDY ON LEVERAGING DEEP LEARNING FOR SUSTAINABLE AND PRECISION HEALTHCARE SOLUTIONS IN ONCOLOGY AND DIABETOLOGY

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Healthcare is evolving due to the use of Deep Learning (DL) and Machine Learning (ML), particularly in the diagnosis, treatment, and management of chronic diseases like diabetes and cancer. Doctors can provide more individualized therapies, make more precise prediction, and use resources more effectively with the use of these technology, which improves and sustains healthcare. Machine learning (ML) is being utilized in cancer care to identify tumors, diagnose cancer early, and forecast patient response to therapy. This reduces the possibility of a misdiagnosis and enhances patient results. By predicting glucose levels, evaluating risk, assisting with early diagnosis, and even automating insulin delivery, machine learning (ML) techniques can help individuals with diabetes manage their condition more effectively and precisely. Real-time patient monitoring and medication discovery are being accelerated by these technologies' ability to analyze massive amounts of medical data. Even if there are still obstacles to overcome, such as safeguarding patient privacy and simplifying these models, AI in healthcare appears to have a bright future ahead of it. It has the ability to improve treatment by increasing accuracy, efficiency, and patient-focus.

A SMART EYE LENSES FOR FINGERPRINT RECOGNITION USING AI-POWERED BIOMETRIC AUTHENTICATION

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Biometric security systems have evolved to a great extent with the introduction of artificial intelligence (AI), allowing for safer and more streamlined identification processes. This paper discusses a new biometric method using AI-powered smart contact lenses with the ability to identify fingerprints. In contrast to conventional systems with physical touch-based sensors, the proposed "Biometric Lens" integrates micro-scale biometric sensors into contact lenses to scan fingerprint patterns non-invasively. The system employs high- resolution imaging and convolutional neural networks (CNNs) to analyze and process fingerprint information in real time, using the natural eye movements during normal activities for continuous verification. This paper outlines the design architecture, AI integration, performance metrics, and discusses practical applications in authentication, surveillance, and next-generation security systems. This

is a novel method for stepping towards more intuitive and secure biometric authentication instead of using physical touch with fingerprint readers.

EXPLORING THE USE OF AI IN AUTOMATED DATA ANALYSIS AND PLANETARY

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The paper explains the role of Artificial Intelligence (AI) it enhances the capabilities of space missions, that focus on its application in autonomous navigation, decision-making, and scientific discovery. The use of Artificial Intelligence tools has revolving in various types of science, which includes space exploration. From Earth based research of celestial bodies to space mission plan, the extensive use of AI in space exploration. This finding highlights the significant role, where AI plays in enhancing the efficiency, accuracy, and autonomy of space exploration, that contribute to the scientific advancements and discoveries in the realm of space. The survey of space has always enchanted human imagination, and advancements in technology have made space missions gradually feasible. AI has emerged as a promising tool for improving various aspects of space exploration, that ranging from satellite operations to data analysis and autonomous spacecraft.

ARTIFICIAL NEURAL NETWORK FOR SUSTAINABLE DEVELOPMENT

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A growing number of effective instruments in the fight for a more sustainable world are artificial neural networks (ANNs), which are modeled after the functioning of the human brain. They enable us to use resources more prudently, make better decisions, and comprehend the environmental impact of our activities. ANNs are currently being utilized for a wide range of tasks, including waste management, assisting with smart farming techniques, forecasting climate change, and enhancing renewable energy systems. For tasks like pollution forecasting, energy grid optimization, and

minimizing the environmental effect of industrial operations, their capacity to analyze vast quantities of data and reveal hidden patterns makes them particularly helpful. They are also contributing to better water management, biodiversity preservation, and urban planning. ANNs are opening the door to innovations that are not only environmentally benign but also flexible and robust in the face of environmental issues as the globe searches for greener solutions. They have the potential to revolutionize sustainability when combined with cutting edge technology like wireless energy transfer and digital twins.

A CASE STUDY ON SUSTAINABLE PREDICTIVE MAINTENANCE IN HEALTHCARE INFRASTRUCTURE USING EXPLAINABLE AI

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Predictive maintenance (PdM) uses data and advanced analytics to predict when a component in a system is likely to fail, allowing for maintenance to be done before any breakdown occurs. By integrating technologies like data analytics and artificial intelligence (AI), PdM systems become more accurate, efficient, and adaptable, especially in complex and ever-changing environments. This paper explains recent advancements in AI-driven PdM, highlighting key components, the importance of trust in these systems, and emerging trends for the future. It reviews the latest techniques, challenges, and opportunities related to AI-based PdM, while also addressing how AI is being applied in real-world scenarios. This paper discusses about the human-robot collaboration, ethical concern surroundings in AI, and the testing and validation of AI models in PdM. Finally, it points to promising areas for future research, such as digital twins, the metaverse, generative AI, collaborative robots (cobots), blockchain, trustworthy AI, and the Industrial Internet of Things (IIoT). This comprehensive review provides valuable insights into the current state of AI-based PdM and its potential for the future.

A COMPARATIVE STUDY ON AI-DRIVEN COMPUTER VISION TO DIAGNOSE CROP DISEASE SYMPTOMS

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This study compares AI-driven computer vision techniques for early crop disease detection, evaluating deep learning models like CNNs, Vision Transformers (ViTs), AI-powered Diagnostics and hybrid approaches. While CNNs achieve high accuracy, ViTs demonstrate superior interpretability in identifying disease symptoms across diverse conditions. The analysis highlights trade-offs in computational efficiency, robustness to environmental variability, and scalability for real-world deployment. Key challenges include limited annotated datasets and model adaptability to field conditions. Results suggest integrating attention Machine Learning Model mechanisms with traditional architectures could optimize diagnostic reliability for precision agriculture. The findings guide development of automated tools to enhance crop health monitoring and sustainable farming practices

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A SMART INTEGRATED AI AND IOT FRAMEWORK FOR SUSTAINABLE URBAN WASTE MANAGEMENT

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The accelerating pace of urbanization has amplified the complexities of effective waste management, raising critical environment and public health concerns. This paper presents an integrated framework that combines Artificial Intelligence (AI) and the Internet of Things (IoT) to enhance the sustainability and operational efficiency of urban waste management systems. The proposed architecture leverages real-time data from smart sensors deployed in waste bins, collection vehicles, and recycling facilities to enable intelligent monitoring, dynamic route optimization, predictive analytics, and automated decision-making. AI algorithms analyze waste generation patterns to forecast

collection demands and optimize resource allocation, while IoT connectivity facilitates seamless communication across all nodes in the waste management network. The system aims to reduce operational costs, minimize carbon emissions, and encourage waste segregation and recycling at the source, thereby contributing to the realization of smart and sustainable cities. Simulation results and case studies validate the effectiveness of the proposed framework in transforming conventional waste management into an adaptive, data-driven infrastructure supporting urban sustainability.

INTELLIGENT TRANSPORTATION SYSTEMS FOR ENHANCED URBAN SUSTAINABILITY AND EMISSION CONTROL

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Intelligent Transportation Systems reduce urban carbon footprints by optimizing traffic flow, enhance public transit, and promoting sustainable mobility through smart technology. Intelligent Transportation Systems (ITS) offer innovative solutions to reduce the urban carbon footprint. By integrating technology with transportation, ITS enhances traffic flow and reduces congestion. This principals to lower fuel consumption and fewer emissions. Smart traffic signals and real-time route optimization helps minimize the vehicle idle time. ITS promotes the use of eco-friendly transport modes like electric vehicles and public transit. This system supports better urban planning and mobility management. ITS also encourages the behaviour change through intelligent travel information. This case study shows measurable reductions in emissions where Systems ITS is implemented. Challenges remain in terms of infrastructure costs and integration. Overall, ITS is a key enabler of sustainable and low-carbon urban transport.

MEDICAL CARE BOT BASED WITH AI ASSISTANT

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Artificial intelligence is disrupting the healthcare industry, and one of the most exciting innovations to make headlines is the emergence of AI- driven medical care robots. This article is an in-depth look at the creation and invention of an intelligent medical assistant a robot designed to speak like a human and reason like a physician. It employs natural language processing (NLP), machine learning (ML), and deep searches for enormous databases of medical literature to provide accurate, reliable healthcare information right when you need it. The brain of the bot is trained on a rich blend of information—imagine peer- reviewed research articles, formal clinical guidelines, and vetted health information drawn from reliable sources such as PubMed, Medline, and the World Health Organization (WHO). With some serious technology under the hood—PyTorch, LangChain, and a LLaMA- based processing environment—it can sort through all that information and provide clear, relevant responses to your health questions in real time.

VISION-GUIDED AUTONOMOUS DRONES FOR SMART WASTE SORTING ON COASTAL AREA

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Marine pollution, an ever-increasing environmental problem, calls for good waste management practice to keep it in check. In this respect, we propose vision-aided autonomous drone systems to revolutionize waste sorting in coastal regions. The application of advanced computer vision and machine learning technologies allows these drones to quickly identify, sort, and separate waste categories, achieving unprecedented levels of accuracy. Working in real time, these drones exploit onboard cameras and deep-learning algorithms to separate biodegradable and non-biodegradable waste with high accuracy. For optimization purposes, drones utilize an optimized path-planning mechanism allowing for full area coverage of contaminated sites. The system further employs IoT connectivity, allowing for seamless data transmission and remote monitoring for effective and sustainable waste management at scale. Our experimental studies show that this approach is efficient for enhanced waste sorting accuracy while minimizing environmental consequences and thus promoting cleaner and healthier coastal ecosystems worldwide.

PIONEERING SUSTAINABLE AIR TRAFFIC CONTROL THROUGH EMERGING PARADIGMS

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The Air traffic control (ATC) lies in reimagining it as a harmonious blend of innovation, equity, and sustainability in future. This research envisions a system where cutting-edge technology and human-centric design work to tackle aviation's environmental and social challenges. In this proposed system, Airspace is structured by block chain-powered smart contracts instead of outdated protocols that automatically reward airlines for choosing cleaner routes or quieter aircraft fostering a culture of realtime accountability. Here, Controllers equipped with AI tools that adapt to their stress levels via biometric sensors and they prioritize eco-friendly decisions like smoother descents to cut fuel use without compromising safety. Also we have implemented Quantum computing to solve complex puzzles, like rerouting flights around weather or contrails in milliseconds, slashing aviation's climate impact by nearly a third. The framework also ensures about reserved "Green Slots" that gives underserved regions access to busy skies, while AI listens to community noise complaints to reroute planes away from marginalized neighborhoods. This isn't just about tech—it's about building an adaptive, ethical ATC ecosystem that learns, heals, and evolved as a holistic change where efficiency, equity, and Earth's well-being soar together

A NOVEL CHATBOT FOR WOMEN'S PERINATAL MENTAL HEALTHCARE

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Perinatal mental health issues, including anxiety, depression, and emotional stress during pregnancy and postpartum, are significant yet often underdiagnosed challenges affecting millions of women worldwide. This project presents the development of a novel AI-powered

chatbot specifically designed to support women's mental health during the perinatal period. The chatbot aims to provide accessible, stigma-free, and timely support by offering emotional check-ins, evidence- based self-help strategies, psychoeducation, and referrals to professional care when needed. Built with a user centric design, the system incorporates natural language processing (NLP) to understand and respond empathetically to user inputs while maintaining privacy and confidentiality. The chatbot ensures both sensitivity and clinical relevance. The solution addresses the barriers women face in seeking help, such as time constraints, social stigma, and limited access to care. This project demonstrates the potential of conversational AI to complement traditional healthcare services and empower women with continuous mental health support during one of the most critical phases of life.

Keywords: Perinatal Depression, Postpartum Anxiety, Emotional Support, Cognitive Behavioral Therapy(CBT), Self Assessment Tools, Mood Tracking, Crisis Intervention Guidance, Referral System, Patient Education, Psycho education, Mental Health Screening

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SMART DRIVEN PRECISION AGRICULTURE FOR SUSTAINABLE CROP MANAGEMENT THROUGH DEEP LEARNING

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The integration of Deep Learning methods into sustainable agriculture provides precise opportunities to address global challenges like food security, climate change, water consumption, human needs and crop disease. This paper examines the blending of Artificial intelligence (AI) in agriculture, with focus on crop disease identification, yield forecasting, soil remote sensing associated with autonomous system. We enhance the role of Unmanned Aerial Vehicle (UAV), satellite images, and IoT-enabled sensors for collecting various agricultural data and how these data are monitored effectively through Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). Furthermore, it also covers the current gaps in the literature, including insufficient data, generalizability of the models and the difficulties of deploying AI models in sustainable agriculture environments. This review highlights the potential of

deep learning to advance sustainable agricultural practices worldwide, while identifying key directions for future research and development.

Keywords: Artificial Intelligence, Deep Learning, Crop Disease Prediction, Interpretability, Convolutional Neural Networks and Recurrent Neural Networks, Precision Farming, Yield Prediction, IoT Sensors.

THE SMART URBAN MOBILITY FRAMEWORK USING IOT, AI AND VEHICLE - TO - INFRASTRUCTURE COMMUNICATION

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The unceasing growth of the urban population has brought with it new problems, primarily the need for far more advanced automative intelligence traffic management systems. In response to these challenges, we put forth the holistic Smart Urban Mobility Framework (SUMF) that incorporates the Smart Traffic Sign Boards (STSB), traffic camera IoT sensors, Intelligent Artificial Traffic Flow Control Systems, and real time emergency vehicle segregation commands into a singular unified platform. Alongside traditional fixed time signal systems and isolated smart devices, our framework draws upon edge computing computer vision, and Vehicle-to-Infrastructure (V2I) communication for a fully responsive solution to traffic problems. Through the aid of machine learning and real time sensor data, our predictive traffic modeling engine dynamically forecasts congestion and recommends progressive traffic sign board signal changes. Furthermore, the system incorporates AR spectacles of dashboard demonstrating voice controlled features that aid in road safety by visually and audibly alerting drivers on approaching road features, traffic protocols, or dangers regardless of prevailing visibility conditions. Within a moderately sized urban area, we were able to experimentally deploy and simulate the AI leading to greater reductions in vehicle idling stroke, emissions, and likelihood of accidents. Robustly improving mid regions regardless of bolstered traffic control and altercated management solutions. This helps support SPB while significantly elevating traffic safety while aligning with sustainable urban development goals…

Keywords: Smart Urban Mobility Framework (SUMF), AI-driven Traffic Management,

Predictive Traffic Modeling, Edge Computing, Vehicle-to-Infrastructure (V2I) Communication, Sustainable Urban Development, Intelligent Traffic Systems, IoT Sensors, AR-enhanced RoadSafety.

AN AI-DRIVEN PREDICTIVE FRAMEWORK FOR MULTI-MARKET FINANCIAL FORECASTING: APPLICATIONS IN STOCK, CRYPTO, AND MONEY MARKETS WITH "INTEGRATION OF AAA"

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The global financial ecosystem is increasingly intertwined with stock markets, where investment decisions are heavily influenced by market volatility and economic uncertainties. In recent years,the stock market has become a critical domain for the application of Artificial Intelligence (AI) and Machine Learning (ML). This paper presents a predictive framework utilizing advanced AI models, such as Long Short-Term Memory (LSTM), Gradient Boosting (XG Boost), and Natural Language Processing (NLP), and Generative AI Tools and Automated AI Agents integration (constructed by automation tools like n8n, zapier) to forecast stock prices, analyze trends in cryptocurrency markets, and predict fluctuations in the money market. The proposed system integrates historical price data, sentiment analysis from news and social media, and technical indicators to enhance prediction accuracy. Experimental results demonstrate significant improvements in forecasting reliability compared to traditional models. The approach is evaluated on multiple financial datasets, showing its effectiveness in guiding investment decisions and minimizing risk. This study also explores the real-time applications of AI-driven predictions in stock trading, crypto markets, and foreign exchange, emphasizing its relevance in modern financial ecosystems and making it more efficient using AI Tools for specific functions and enabling its Automation through Automated AI Agents.

Keywords: Stock Market Prediction, Artificial Intelligence (AI), Machine Learning (ML), Long Short-Term Memory (LSTM), XG Boost, Natural Language Processing (NLP), Sentiment Analysis, Cryptocurrency Forecasting, Technical Indicators, Financial Risk Minimization, n8n, Zapier, Microsoft power automa

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AN EMOTION-BASED ROOM FRAGRANCE AUTOMATION SYSTEM USING AI AND IOT

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The intersection of artificial intelligence (AI) and the Internet of Things (IoT) has ushered in a new era of emotionally responsive smart environments. This paper proposes an advanced Emotion-Based Room Fragrance Automation System that intelligently modulates ambient scents in real-time based on the emotional state of individuals within a room. Leveraging AI-driven emotion recognition algorithms—either via facial expression analysis or physiological signal processing (e.g., heart rate variability and galvanic skin response)—the system classifies emotional states such as happiness, sadness, stress, or anger with high accuracy. The detected emotion is then mapped to a corresponding aromatic profile, and an IoT-enabled microcontroller (ESP32) activates precise scent diffusers using servo-controlled actuators. This dynamic adaptation of environmental conditions not only enhances user comfort but also contributes to emotional regulation through targeted aromatherapy. The proposed system demonstrates strong potential for deployment in smart homes, therapeutic centers, and wellness-oriented IoT ecosystems, representing a significant step toward emotionally aware and human-centric automation solutions.

Keywords: Artificial Intelligence, Internet of Things, Emotion Detection, Aromatherapy, Smart Home Automation, ESP32, Scent Diffusion, Mental Wellness.

A DATA-DRIVEN APPROACH TO ENHANCING PUBLIC TRANSPORTATION USING REAL-TIME GPS DATAAND ARTIFICIAL INTELLIGENCE

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Urban public transport systems encounter significant issues related to efficiency, reliability, and

the optimal allocation of resources. This research introduces an innovative AI-based methodology aimed at enhancing public transportation by analyzing real-time GPS data. The study integrates machine learning techniques with spatial-temporal analysis, focusing on the development of an intelligent system designed to improve route planning, predict vehicle arrival times, and optimize fleet management. This solution incorporates various AI techniques, including deep learning models like Long Short-Term Memory (LSTM) networks, reinforcement learning, and ensemble methods to analyze continuous GPS data from transportation vehicles. The data preprocessing steps handle challenges such as signal disruptions, missing data, and spatial inconsistencies effectively. Furthermore, the system recognizes traffic patterns, predicts passenger demand, and enables dynamic route modifications to optimize overall performance. To evaluate the system's effectiveness, multiple metrics, including prediction accuracy, response time, fuel efficiency improvements, and reduced passenger waiting times, are analyzed. Results indicate that the proposed AI- powered approach significantly outperforms traditional scheduling methods, showing a 24% reduction in waiting times and an 18% enhancement in fuel efficiency. Additionally, the system provides user-friendly visual tools, assisting transportation authorities in better decision-making. Future research will explore the integration of additional data sources, such as weather conditions and events, to improve optimization further, alongside the implementation of edge computing for real-time performance enhancement.

Keywords: Artificial Intelligence, Public Transport Optimization, Real-Time GPS Data, Machine Learning, Route Planning, Traffic Prediction, LSTM Networks, Smart Cities, Urban Mobility, Decision Support Systems

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ADVO-COURTMATE AN AI COURTROOM ASSISTANT - BRIDGING THE ACCESS TO JUSTICE GAP

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Access to legal support remains a critical challenge for underprivileged litigants in India and other developing nations due to high legal costs, complex procedures, language barriers, and the scarcity of free legal guidance. This paper introduces an AI-powered Courtroom Assistant

designed to provide accessible, real-time legal support to self-representing individuals using a chatbot-based mobile application. The system leverages advanced transformer-based Natural Language Processing (NLP) models such as BERT and GPT, which are fine-tuned on structured legal datasets including court rulings, case summaries, statutes, and procedural guidelines, primarily in CSV and JSON formats. The application provides multilingual support tailored to the Indian context, offering voice and text interactions in major Indian languages . The application guides users in drafting legal petitions, interpreting legal notices, understanding court procedures, and preparing for in-court behavior through real-time prompts, all accessible via mobile devices and laptops. The chatbot is built using Dialogflow and enhanced through Google Translate API integration to offer seamless cross-lingual understanding and response generation. Legal information is sourced from verified public repositories, Indian aid portals, public court portals, legal aid organizations, academic repositories, and case law databases, then structured into Google Sheets to create a backend knowledge system. Users can ask questions related to legal rights, common offenses, bail procedures, filing First Information Reports (FIR), and civil or criminal case processes. The application uses webhook integration between FlutterFlow and the chatbot API, ensuring real-time responsiveness within a mobile or web app interface. In addition to AI-driven legal conversation, the application features a repository of curated example cases from various legal categories such as family law, property disputes, labour rights, and criminal justice. These are displayed in an easy-to-navigate format sourced dynamically from Google Sheets or Firebase, enabling users to explore similar case scenarios. Furthermore, the app includes interactive procedural guides that walk users through court processes such as how to file an FIR, submit an affidavit, or appear in court—supported with visual aids and multilingual audio playback using text-to-speech APIs. These procedural flows are designed using drag- and-drop elements in FlutterFlow and Voiceflow, ensuring accessibility even to first-time users.The design focuses on usability, accessibility, and ethical implementation. The app supports voice input, large-text rendering, and simplified navigation, making it suitable for low-literacy users. Privacy protection and ethical AI principles are embedded by minimizing personal data collection, using disclaimers for legal liability, and clearly stating that the tool is an informational aid, not a substitute for professional legal counsel. Future plans include integrating with e-Court filing systems, adding voice emotion recognition to detect distress, and partnering with government and NGO legal aid services for long-term impact. By enabling citizens to interact with legal systems in their own language and through an intuitive mobile interface, this application aspires to democratize legal literacy,

reduce court delays caused by procedural ignorance, and empower the underserved to advocate for their rights effectively

Keywords: Artificial Intelligence, Legal Technology, NLP, Chatbot, Multilingual Support, Courtroom Assistant, Legal Aid, India, Underprivileged Litigants, Flutterflow, Voiceflow, Dialogflow, BERT, GPT.

EXPLORING THE USE OF AI IN AUTOMATED DATA ANALYSIS AND PLANETARY

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This comprehensive explains the role of Artificial Intelligence (AI) it enhances the capabilities of space missions, that focus on its application in autonomous navigation, decision-making, and scientific discovery. The use of Artificial Intelligence tools has revolving in various types of science, which includes space exploration. From Earth based research of celestial bodies to space mission plan, the extensive use of AI in space exploration. This finding highlights the significant role, where AI plays in enhancing the efficiency, accuracy, and autonomy of space exploration, that contribute to the scientific advancements and discoveries in the realm of space. The survey of space has always enchanted human imagination, and advancements in technology have made space missions gradually feasible. AI has emerged as a promising tool for improving various aspects of space exploration, that ranging from satellite operations to data analysis and autonomous spacecraft.

Keywords: Artificial Intelligence, Space Exploration, Space Missions, Satellite Operations, Data Analysis, Robotics, Autonomous Spacecraft, Scientific Advancements.

ENHANCING NOISE RESILIENCE IN SMALL-SCALE QUANTUM CIRCUITS VIA CLASSICAL MACHINE LEARNING

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Quantum computing holds transformative potential for artificial intelligence (AI), but practical applications remain hindered by inherent noise and errors in near-term quantum devices. This

paper proposes a resource-efficient approach to quantum error mitigation by leveraging classical machine learning (ML) models, bypassing the need for complex quantum error correction protocols. We demonstrate how supervised learning techniques, such as neural networks and regression models, can predict and correct errors in noisy outputs from small-scale quantum circuits (2--5 qubits). Using quantum simulators (Qiskit, Pennylane) and classical ML frameworks (PyTorch), we train models on synthetic datasets comprising pairs of noisy and ideal circuit outputs, focusing on variational algorithms like QAOA and VQE. Our experiments on 2- and 3-qubit systems show that classical ML reduces depolarizing and gate errors by up to 35\%, achieving fidelity improvements comparable to standard error mitigation tools like IBM's Ignis. This work highlights the viability of classical AI as a transitional solution for noise management in pre-fault-tolerant quantum hardware, while requiring minimal quantum computing expertise. The methodology is validated through open-source code and reproducible simulations, offering a practical framework for researchers entering quantum-AI domains.

Keywords: Quantum error mitigation, Classical machine learning, Variational quantum algorithms, Noise resilience, Quantum simulators.

FRONT OFFICE MANAGEMENT SYSTEM

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The Front Office Management System is a comprehensive web-based solution developed to streamline and digitize student service workflows within Sri Shanmugha Educational Institutions. Traditional front office processes such as applying for bonafide certificates, ID cards, Hostel services, Original certificate requests and transport services often involved physical forms, manual approvals, and delays, resulting in inefficiencies and confusion. This system addresses those challenges by offering a centralized, transparent, and user-friendly platform accessible to both students and staff. Students are provided with secure login credentials by the administration and can submit requests through dynamic forms tailored to specific needs; for instance, selecting "ID Card" reveals additional fields for image upload, emergency contact, and address. Each

request undergoes a structured, multi-level approval process involving class advisors, mentors, transport officers, and executive director, with each level required to provide remarks for approval or rejection. Real-time status updates such as "Pending with Mentor" or "Approved by Advisor" keep students informed throughout the process, while staff benefit from a dashboard that simplifies request management. Built using React for the frontend, Node.js for backend logic, and MySQL for robust data storage, the system ensures scalability, security, and high performance. Features like intuitive navigation, real time tracking, and role-based access enhance usability and ensure smooth coordination between all users. By replacing manual paperwork with digital efficiency, the system significantly reduces delays, eliminates miscommunication, and fosters a connected administrative environment that enhances the student experience and improves institutional operations.

A STUDY ON CUSTOMER ACQUISITION STRATEGIES FOR HEROCARD.IN USING DIGITAL MARKETING CHANNELS

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This project outlines the marketing strategy for HEROCARD, a modern digital visiting card designed to replace traditional paper cards with a smart, eco-friendly, and easily shareable solution. HEROCARD allows professionals, entrepreneurs, and business owners to create stylish digital profiles that include contact details, social media links, business info, and more — all accessible via QR code or link. The marketing plan focuses on a hybrid approach: **online strategies** like social media advertising, influencer collaborations, WhatsApp marketing, and SEO are used to reach a digital-first audience, while offline methods such as posters, in-store demos, and direct promotions at networking events and business meetups ensure personal engagement. Together, these efforts aim to build brand awareness, drive downloads, and establish HEROCARD as the future of networking.

OAViT : A VISION TRANSFORMER FRAMEWORK FOR OCCLUSION - RESILIENT PERSON RE-IDENTIFICATION.

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Person re-identification (Re-ID) is a critical task in computer vision, aiming to match a target person across multiple camera views, often under challenging conditions such as occlusion. This project proposes an Occlusion-Aware Vision Transformer (OAViT) framework, specifically designed to enhance the robustness of person re-identification under both full and partial occlusion. The framework incorporates a Multi- Head Attention (MHA) module to effectively capture long-range dependencies and salient features, ensuring accurate identification even when large portions of the person's body are obscured. By leveraging the Vision Transformer's capability to model global relationships between image patches, the occlusion-aware module dynamically adjusts focus to non- occluded regions of the person, enabling the model to maintain high performance in occluded environments. Additionally, the framework integrates a feature refinement strategy that further improves the discriminative power of the learned features. Extensive experiments on benchmark datasets demonstrate the superior performance of our OAViT framework in handling occluded and non-occluded person re-identification, offering a significant improvement over state-of-the-art methods. Keywords— Person Re-Identification (Re-ID), Occlusion- Aware Vision Transformer (OAViT), Multi-Head Attention (MHA), Occlusion Handling, Feature Refinement Strategy, Part- Based Feature Aggregation, Occlusion Mask Prediction, Global- Local Feature Fusion, Consistency Learning, Long-Range Dependencies, Surveillance and Multi-Camera Systems.

REAL-TIME DDOS ATTACK DETECTION USING CYBER SECURITY-BASED ON RANDOM FOREST CLASSIFICATION

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Distributed Denial of Service (DDoS) attacks are among the most disruptive threats to modern digital platforms, impacting the availability and performance of websites, applications, and critical infrastructure. These attacks function by flooding a target system with overwhelming traffic from multiple compromised devices, known as botnets. Unlike traditional Denial of Service (DoS) attacks that stem from a single source, DDoS attacks are distributed and more difficult to detect and mitigate using conventional methods. As the frequency and complexity of these attacks grow, there is a pressing need for intelligent, real-time detection systems to ensure uninterrupted digital services. The project titled "Detection of DDoS Attacks Using Machine Learning Algorithms" proposes a machine learning-based approach to combat DDoS threats. The core of the system is built on the Random Forest algorithm, an ensemble learning technique known for its accuracy, robustness, and ability to process large-scale data efficiently. Machine learning, a subset of artificial intelligence, offers a dynamic approach to cybersecurity by enabling systems to learn from data patterns and predict future events without being explicitly programmed.The primary aim of this work is to develop a detection system that accurately distinguishes between legitimate and malicious network traffic using Random Forest. The project workflow involves key phases: data collection, preprocessing, feature extraction, model training, performance evaluation, and final deployment. The system begins with gathering a comprehensive dataset that includes both normal and DDoS traffic. Important features such as packet size, IP address, and request frequency are extracted and normalized for model training. The labeled dataset is then used to train the Random Forest model to recognize and classify traffic behavior. Hyperparameter tuning is conducted to enhance model accuracy and prevent overfitting. To validate the model's performance, various evaluation metrics such as precision, recall, F1-score, and a confusion matrix are used. These metrics help assess the system's ability to correctly detect actual attacks while minimizing false positives and negatives. Cross-validation techniques further ensure that the model generalizes well across unseen data. Once trained and evaluated, the model is deployed in a real-time simulation environment, where it continuously monitors incoming traffic. When a potential DDoS attack is detected, the system activates predefined mitigation strategies such as rate-limiting, traffic filtering, or generating alerts to administrators. One of the standout benefits of the Random Forest algorithm is its ensemble structure, which combines multiple decision trees to improve classification performance and reduce errors. It is particularly effective in handling noisy or incomplete data, which is common in real-world network environments. The model also highlights key traffic features that contribute to detection, offering insights for further security enhancement.

Compared to traditional detection methods, this approach offers improved scalability, accuracy, and adaptability, making it well-suited for use in large enterprise or cloud- based systems. It ensures better protection even when attack patterns mimic legitimate traffic. In conclusion, this project demonstrates that machine learning, especially the Random Forest algorithm, can significantly improve the detection and mitigation of DDoS attacks. This work lays a foundation for future exploration into more advanced techniques, such as hybrid models or deep learning, to further strengthen cybersecurity systems in an increasingly digital world.

BREAKING BARRIERS USING SENSE VERSE ASSIST

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Imagine a world where technology truly understands and empowers everyone. Introducing "Sense Verse Assist": Your Intelligent Companion in the Metaverse and Beyond. Sense Verse Assist isn't just another gadget; it's a personalized ecosystem designed with you in mind. Leveraging the cutting-edge power of AR/VR and the immersive Metaverse, it seamlessly integrates into your daily life, offering:1. See, Collaborate, Create: Step into holographic meetings, visualize complex data in 3D, and collaborate in shared virtual spaces, breaking down physical barriers.2. Visual Voice: Through advanced computer vision and machine learning, your signed language is instantly translated into spoken words, bridging communication gaps effortlessly.3.Emotional Intelligence: Sense Verse Assist understands your emotions through sentiment analysis, offering support and companionship tailored to your needs.4.Smart Senses: Stay aware of your surroundings with real-time alerts for room temperature changes, potential hazards, and security breaches, ensuring your safety and comfort.5.Anticipating Needs: Our intelligent system learns your patterns and proactively predicts what you need, making your day smoother and more intuitive.6.Effortless Routines: Seamlessly schedule your daily activities and receive timely reminders, empowering independence and organization.7.Learn and Connect: Ask questions and receive answers through clear sign language visualizations, opening up new avenues for learning and connection within the Metaverse.Sense Verse Assist: Bridging Worlds, Empowering Lives.This technology isn't just about innovation; it's about creating a more inclusive and accessible future for everyone.

Keywords: Sense Verse Assist, See, Collaborate, Create , Visual Voice, Emotional Intelligence, Smart Senses, Anticipating Needs, Effortless Routines, Learn and Connect For physical barriers.

SMART HEALTHCARE: SCALABLE AND EFFICIENT MEDICAL DIAGNOSIS SYSTEM

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The Smart Healthcare: Scalable and Efficient Medical Diagnosis System is designed to revolutionize healthcare by making medical diagnostics more accurate, accessible, and independent of human limitations. By harnessing the power of artificial intelligence, including machine learning, deep learning, and natural language processing (NLP), this system enables quick and reliable disease detection. It aims to bridge healthcare gaps, ensuring high-quality diagnostics even in remote or resource-limited areas, ultimately improving patient care worldwide. This system introduces several advanced features. Personalized Treatment Recognition tailors treatment plans based on individual health data, ensuring more effective care. Longitudinal Health Tracking continuously monitors patient health trends, helping doctors and individuals make informed decisions. Multilingual Support ensures accessibility by allowing AI- driven diagnostics in multiple languages, making healthcare more inclusive. Genetic Data Analysis personalized medicine by analyzing genetic information, providing targeted treatment recommendations. To enhance safety, the AI-powered Drug Interaction Checker identifies potential conflicts between medications, preventing harmful side effects. The system also builds on existing technologies. Multi-disease Diagnostic Capability enables AI to detect multiple diseases efficiently, while Predictive Analysis and Risk Scoring assesses potential health risks based on patient history. Explainable AI for Diagnosis Transparency ensures trust by providing clear reasons behind AI-generated diagnoses. Lastly, Deep Learning for Advanced Medical Imaging enhances the accuracy of interpreting medical images, such as MRIs and X-rays, aiding in faster and more precise diagnoses.By combining these AI-driven features, this system empowers healthcare providers and patients with data-driven insights, improving treatment accuracy, safety, and accessibility. Its scalable design ensures it can be

used globally, making high-quality medical diagnostics available to all. With the potential to transform healthcare, this system paves the way for a smarter, more efficient medical future.

Keywords: AI, Autonomous Diagnosis, Healthcare, Machine Learning, Diagnostics.

A DEEP LEARNING APPROACH FOR REAL-TIME BIKE FAULT DIAGNOSIS USING ACOUSTIC SIGNAL ANALYSIS

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In the era of smart mobility, early detection of vehicle issues is crucial for safety, performance, and cost-efficiency. This project introduces *SoundSense*, an intelligent fault diagnosis system that leverages deep learning and acoustic signal analysis to identify bike repair needs in real time. The system uses Convolutional Neural Networks (CNNs) trained on labeled bike sound datasets to classify various mechanical anomalies such as chain slack, engine knock, and brake pad wear. By applying signal processing techniques like Fast Fourier Transform (FFT) and Short-Term Fourier Transform (STFT), the model extracts time-frequency features that are used for accurate fault detection. The solution enables hands-free, installer-free diagnostics, empowering users with timely maintenance insights and reducing overall downtime. Experimental results demonstrate a high accuracy rate, highlighting the potential of audio-based diagnostics in transforming the bike repair and maintenance industry.

Keywords: Bike Fault Detection, Deep Learning, Convolutional Neural Network, Sound Classification, Acoustic Signal Processing, Fast Fourier Transform, Short-Time Fourier Transform, Real-Time Diagnostics, Predictive Maintenance, Intelligent Bike Repair System

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A COMPARATIVE ANALYSIS OF MACHINE LEARNING METHODS FOR LUNG CANCER SURVIVAL PREDICTION

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Lung cancer is one of the leading causes of cancer-related deaths worldwide, which highlights the necessity of accurate, data-driven solutions to help with prognosis and early identification. In this study, we assess multiple supervised machine learning algorithms for predicting survival outcomes in patients with lung cancer using a range of clinical datasets. Tumor size, pack-years and smoking history, demographics, blood biomarkers such as hemoglobin, creatinine, and white blood cell count, tumor location, ECOG performance status, and family medical history are among the many patient data that are contained in this dataset. During the data preparation process, we employed mean and mode imputation to handle missing values and min-max normalization to ensure uniform feature scaling.Models like AdaBoost, Gradient Boosting, and MLP Classifier were also added to broaden the performance comparison. The hyperparameters were adjusted using grid search, and the models were assessed using metrics such as accuracy, precision, recall, F1-score, and ROC-AUC. The results show that SVM, AdaBoost, and the MLP Classifier performed the best, effectively identifying all positive cases with high accuracy and perfect recall. Random Forest and Gradient Boosting also produced strong results with good balance and interpretability. On the other hand, the Decision Tree model tended to overfit and did worse overall. This work highlights how crucial it is to use state-of-the-art machine learning techniques in clinical settings in order to support earlier, more informed decisions on lung cancer therapy. In addition to demonstrating the need of selecting reliable algorithms for medical data, our findings highlight the use of ensemble and kernel- based models for managing complex, nonlinear relationships inherent in clinical datasets. Physician decision- making, false negative rates, and early intervention strategies could all be significantly enhanced by incorporating these techniques into useful diagnostic frameworks. Future studies could look at hybrid approaches, deeper neural architectures, and the integration of multi-modal data sources like radiological imaging or genomic profiles. Ultimately, by creating precise, scalable, and explicable prediction systems, our research confirms the growing importance of machine learning in precision medicine and its potential to revolutionize cancer treatment.

ANTI- UROLITHIASIS POTENTIAL OF BOERHAAVIA DIFFUSA

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Kidney stone disease is a common urological disorder characterized by the formation of hard mineral deposits in the kidneys. Conventional treatments include pharmacotherapy and surgical interventions, which can be costly and have potential side effects. Increasing attention has been directed toward herbal remedies due to their natural origin, lower cost, and fewer adverse effects. Numerous medicinal plants, such as Phyllanthus niruri, Boerhaaviadiffusa, Tribulus terrestris, and Crataevanurvala, have demonstrated antiurolithiatic, diuretic, and antioxidant properties. These herbs work through mechanisms such as inhibiting stone formation, promoting stone dissolution, and enhancing urinary flow. This study explores the role of herbal medicines in the prevention and management of kidney stones, highlighting their phytochemical constituents and therapeutic potential. Further clinical studies are needed to validate their efficacy and safety for integration into mainstream medical practice.

Keywords: Urolithiasis, Boerhaaviadiffusa, Calcium oxalate, Crystallyzation, Ethylene glycol.

EXTRACTION, CHARACTERIZATION, AND IN VITRO BIOACTIVITIES OF BIO-FUNCTIONAL LIPIDS FROM BLACK SEA URCHIN STOMOPNEUSTES VARIOLARIS

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Sea urchin gonads are a rich source of bioactive lipids with significant medicinal properties. This study focuses on the extraction of lipid fractions from the gonadal tissues of Stomopneustes variolaris, their biochemical characterization using spectroscopic techniques, and the evaluation of their in vitro biological activities.FT-IR spectroscopy confirmed the

presence of ester functional groups in the lipid fractions, while GC-MS analysis identified various fatty acids, with 13,16-octadecadienoic acid methyl ester (50.13%) and 9- octadecenoic acid methyl ester (46.84%) as the major components. Additionally, 1H NMR resonance spectra detected peaks corresponding to benzene ethyl and aromatic groups.The lipid fractions isolated from the gonads exhibited notable in vitro biological activities. Specifically, fractions S15 and S16 displayed strong bactericidal effects against Gram-positive bacteria (S. aureus, B. subtilis, P. aeruginosa) and Gram-negative bacteria (E. coli). Antioxidant assays, including DPPH and lipid peroxidation tests, revealed that fraction S11 exhibited higher antioxidant activity than S15. Furthermore, MTT assay results confirmed that fraction S11 demonstrated greater cytotoxic effects than S15 against HeLa cells.Based on these findings, it can be concluded that lipids extracted from the gonadal tissues of Stomopneustes variolaris possess multiple biological activities. Further clinical research on these biofunctional lipids could support their potential application in the development of novel pharmaceutical drugs for treating various diseases.

Keywords: Sea urchin; lipids; antibacterial activity; lipid peroxidation; cytotoxicity.

THE USE OF PHYTOMEDICINES IN THE TREATMENT OF PILES

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Piles, also known as hemorrhoids, are a common and distressing condition characterized by swollen veins in the lower rectum and anus, often causing pain, itching, and bleeding. While conventional treatments such as lifestyle modifications, pharmacological interventions, and surgical procedures are widely used, there is growing interest in phytomedicine as a natural and effective alternative for managing and curing piles. Medicinal plants and herbal formulations have been traditionally employed for centuries in various cultures to alleviate symptoms and promote healing. Phytochemicals such as flavonoids, tannins, alkaloids, and saponins exhibit anti-inflammatory, analgesic, venotonic, and wound-healing properties, making them particularly beneficial for piles treatment. Prominent herbs like *Witch Hazel (*Hamamelis virginiana), Horse Chestnut (Aesculus hippocastanum), Butcher's Broom (Ruscus aculeatus), and *Aloe* vera have demonstrated efficacy in reducing swelling, improving blood circulation, and providing symptomatic relief. This review explores the therapeutic potential of

phytomedicine in the management of piles, highlighting the mechanisms of action, clinical evidence, and safety profiles of key herbal remedies. As the demand for natural and holistic healthcare solutions rises, phytomedicine offers a promising avenue for the prevention, treatment, and long- term management of piles, with minimal side effects compared to conventional therapies. Further research and standardization of herbal formulations are essential to validate their efficacy and integrate them into mainstream medical practice.

Keywords: Piles, medicinal plants, prevention and treatment.

PREPARATION OF CONES FOR INSECT REPELLENT

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Chinese chaste tree is used to avoid insects in the farms and houses.Holy basil also used as mosquito repellent and an adaptogenic herb that can help relieve stress.A traditional medicinal plant used to treat a variety of ailments, used to common cold, cough, Chest pain and asthma.To make a cones using Chloroxylon swietenia barks ,Ocimum tenuiflorum leaves to avoid insects in the farms, fields and houses.The innovative cone contains limonene, germacrene,phytochemicals, volatile components, ursolic acid and etc.Ocimum tenuiflorum leaves, chinese chaste leaves,Chloroxylon swietenia leaves and barks are the ingredients.As the product in the solid cone shape, it is easy to use in the farms and fields.It repels the insects and flies.It is not harmful to inhale.It is cost effective and user friendly.

Keywords: Mosquito repellent;Chloroxylon swietenia ; phytochemicals; volatile components, chinese chaste leaves, holy basil.

SMART TABLET DISPENSER WITH IOT, FINGERPRINT,AND FACE LOCK AUTHENTICATION FOR ENHANCED MEDICATIONS ADHERENCE

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We present a novel tablet dispenser that integrates IoT connectivity, fingerprint and face lock authentication, and timed dispensing to improve medication adherence. The device ensures that patients receive their prescribed medication at the correct time, while preventing unauthorized access. The IoT connectivity enables real-time monitoring of medication levels, dispensing history, and patient adherence. The fingerprint and face lock authentication provide an additional layer of security, preventing tampering or misuse. The device is programmed to dispense medication at fixed times, sending alerts to patients and healthcare providers in case of missed doses. Our smart tablet dispenser has the potential to revolutionize medication management, improving patient outcomes, and reducing healthcare costs.

Keywords: IoT, tablet dispenser, fingerprint authentication, face lock authentication, timed dispensing, medication adherence, patient safety.

SMART HAPTIC BAND FOR STRESS AND ANXIETY MONITORING

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Anxiety is a prevalent mental health issue that can severely impact an individual's well-being. The proposed system presents a haptic band for anxiety detection and management using an Arduino Uno, GSR (Galvanic Skin Response) sensor, heartbeat sensor, LCD display, and vibration motor. The system continuously monitors physiological indicators related to anxiety, specifically the skin's electrical conductance and heart rate. When the system detects any anomalies or significant changes in these parameters, which are typically associated with heightened anxiety, the LCD display shows the status (e.g., "Anxiety Detected"). Simultaneously, the vibration motor is activated via a relay to provide calming sensory feedback to the user,

helping to alleviate the anxiety symptoms. The system is designed to be worn comfortably as a band, making it suitable for continuous monitoring and real-time anxiety intervention. This low-cost and portable solution aims to provide immediate relief by offering feedback when the user's anxiety levels are elevated, supporting mental well-being management in daily life.

AUTOMATIC EXTERNAL DEFIBRILLATOR USING MICROCONTROLLER

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Cardiac arrest and arrhythmias are leading causes of sudden deaths globally, often occurring without prior symptoms. Immediate defibrillation greatly increases survival chances in such emergencies. To meet this critical need for rapid response, this project proposes an Automatic Defibrillator system using cost-effective embedded technology. The device is designed to autonomously detect abnormal heart rhythms and deliver electric shocks without manual intervention, offering a reliable solution for both public and personal health safety. The system is built around the Arduino Uno microcontroller, functioning as the central processing unit. An ECG (Electrocardiogram) sensor continuously monitors the heart’s electrical activity in real time, displaying the data on a 16x2 LCD screen for clear visualization. When life-threatening abnormalities such as arrhythmias or sudden cardiac arrest are detected, the system activates a buzzer to alert nearby individuals and simultaneously energizes defibrillator electrodes through a relay module. These electrodes deliver a controlled electric shock aimed at restoring normal heart rhythm, ensuring timely and automated intervention. Compact and portable in design, the device is ideal for use in public spaces, ambulances, elderly care, and remote areas with limited medical access. Its affordability, ease of use, and autonomous operation highlight the potential of embedded systems in enhancing emergency healthcare. This project underscores the integration of biomedical engineering and electronics to develop smart, responsive technologies that can function independently during critical situations, paving the way for future innovations in accessible and life-saving medical devices.

SMART SPIROMETER FOR LUNGS USING ARDUINO

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Respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD) require continuous monitoring of lung function for effective management. This project presents the design and development of a low-cost, portable smart spirometer using Arduino technology. The device measures key pulmonary parameters, including Forced Vital Capacity (FVC) and Forced Expiratory Volume in 1 second (FEV1), using a differential pressure sensor connected to an airflow tube. The collected data is processed through an Arduino microcontroller and displayed on an LCD screen or transmitted to a smartphone or computer via Bluetooth or Wi-Fi. The system is designed to be user-friendly, accurate, and affordable, making it suitable for home-based monitoring and early detection of respiratory issues. This smart spirometer aims to enhance patient compliance, facilitate telemedicine, and support better respiratory health outcomes.

CLOUD - BASED HEARTBEAT MONITOR USING ESP32

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The cloud-based heartbeat monitoring system is an innovative biomedical application designed to continuously measure and monitor a person's heart rate in real time using Internet of Things (IoT) technology. This system is built around the ESP32 microcontroller, a lowpower, dual-core SoC with integrated Wi-Fi and Bluetooth capabilities, which serves as the core unit for data acquisition, processing, and transmission The MAX30100 sensor module, which integrates a pulse oximeter and heart-rate sensor, operates based on the principle of photoplethysmography (PPG). It emits infrared and red light into the fingertip and measures the variations in light absorption due to blood flow, allowing accurate detection of heart beats per minute (BPM). The ESP32 collects this analog data, filters it through digital signal processing techniques, and converts it into readable heart rate values. To provide user-friendly interaction, a 16x2 LCD display is used to show real-time heart rate readings locally.

SMART SALINE LEVEL MONITORING SYSTEM USING ESP32 AND MQTT-S

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Saline, one of the most popular intravenous (IV) therapy plays a major role in the management of patients who are critically ill. Surveillance of saline bottle level is very important because when the bottle is emptied and the needle is not removed from the vein then the blood flows outward into the bottle. In hospitals, the nurses or caretakers are responsible for monitoring the saline bottle level. Mostly, due to negligence and any unusual condition, the exact timing of removing the needle from the patient's vein is ignored which causes a serious casualty and may lead to death as well. Furthermore, remote monitoring is a need to provide telehealth services. To prevent the accident due to the ignorance of caretakers and to provide remote surveillance in telehealth services, we have proposed the cost-effective smart saline level monitoring device which includes the combination of sensor and Internet of Things (IoT) technologies. We have built this system by using load sensor and ultra-low power low cost ESP32 WiFi System on Chip (SoC) microcontroller. The load sensor converts the weight of the bottle to a specific voltage. The ESP32 microcontroller generates and publishes a specific message based on the voltage received from the sensor. To publish and present the messages to the devices (e.g. smartphone, tablet, laptop etc.) of subscribers like doctors, nurses or caretakers, we have used MQTT-S publish/subscribe protocol which runs over TCP. This proposed monitoring system fulfills the reliable delivery of messages to the subscribers which is very important for healthcare.

SMART WEARABLE POSTURE CORRECTION DEVICE USING ARDUINO

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Poor posture is a common issue, especially among students, office workers, and individuals who spend long hours sitting or using electronic devices. Prolonged poor posture can lead to musculoskeletal disorders, back pain, and other health complications. This project proposes the development of a Wearable Posture Correction System designed to monitor and improve a user's posture in real-time. The system integrates a set of posture-monitoring sensors, including

accelerometers and gyroscopes, embedded in a lightweight, comfortable wearable device. These sensors continuously track the alignment of the user's spine and body orientation. When poor posture is detected—such as slouching or leaning forward beyond a set threshold—the system provides instant feedback via vibration alerts, prompting the user to correct their posture. The device also includes Bluetooth connectivity to sync data with a mobile application for posture tracking and analysis. This application helps users monitor their daily posture habits, set personal goals, and receive posture improvement tips. The aim is to promote long-term behavioral change through consistent, non-intrusive feedback and self-awareness. The proposed system is cost-effective, user-friendly, and suitable for daily use by individuals of all ages. It has potential applications in workplace ergonomics, educational settings, and personal healthcare, contributing to the prevention of posture-related health issues and the promotion of a healthier lifestyle.

AUTOMATIC DRUG DISPENSER

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An Automatic Drug Dispenser is a smart healthcare device designed to enhance the accuracy, safety, and efficiency of medication administration. It is especially useful in hospitals, elderly care facilities, and for home-based patients. The primary goal of the system is to automate drug dispensing at predetermined intervals to minimize human error and ensure consistent medication adherence. This project focuses on the design and development of a programmable, microcontroller- based dispenser that can reliably store, schedule, and release medications. It addresses the common challenges faced in traditional manual drug administration, such as missed doses and incorrect timing, particularly among elderly individuals and patients with chronic illnesses. The core of the device features an Arduino Uno microcontroller integrated with a Real- Time Clock (RTC) module, which schedules the dispensing mechanism accurately. Medicines are placed in separate compartments inside a rotating carousel mechanism, which aligns the correct dose with a delivery port. When the scheduled time arrives, the system activates a buzzer and displays a notification on an LCD screen, prompting the user to take their medication. User-friendly programming allows caregivers or patients to set dosage times and medication types easily. The design emphasizes portability, making it suitable for use in both clinical and home environments. The device can be powered by either batteries or an AC

adapter for flexibility and reliability. Additional features may include user authentication, alarm systems, and real-time monitoring, which support safe usage. With IoT integration, healthcare providers or family members can receive alerts on medication compliance, refills, or errors. Some models also store dispensing logs in the cloud for future reference or clinical evaluation. This system increases patient autonomy, reduces dependency on memory or caregivers, and significantly decreases the likelihood of complications due to non-compliance. By offering real-time feedback and digital record-keeping, it ensures higher accountability and traceability in medication administration. Automatic drug dispensers are cost-effective, scalable, and simple to operate. Their ability to reduce healthcare burdens makes them a powerful tool in addressing the challenges posed by aging v populations and limited healthcare personnel. These devices contribute to better health outcomes, lower hospitalization rates, and a higher quality of life. As healthcare moves toward automation and personalized treatment, the role of such smart dispensers becomes increasingly vital. The continued development of this technology represents a major step forward in precision medicine and smart health infrastructure.

INTELLIGENT INFRARED SENSING WITH ESP32 MICROCONTROLLER

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The rapid advancement of Internet of Things (IoT) technologies has enabled real-time monitoring and management of environmental parameters such as temperature, pressure, and humidity. In this project, we present an IoT-enabled temperature monitoring system using the ESP32 microcontroller interfaced with a non-contact temperature sensor, OLED display, and a buzzer for alerting. The system continuously senses the temperature and updates it to an Android mobile application, "MQTT Dash," using the MQTT protocol. Whenever the measured temperature crosses a pre-set threshold, an immediate alert is triggered via the buzzer and a notification is sent through the IoT platform. The live temperature data is also displayed on an onboard OLED screen, allowing users to monitor the readings locally. This system is designed to be efficient, low-cost, and reliable for applications such as industrial temperature monitoring, healthcare, and home automation. This project presents the design and development of a smart non-contact thermometer using the ESP32 microcontroller. The device is capable of measuring human body temperature without physical

contact by employing the MLX90614 infrared temperature sensor. The primary objective is to create a cost- effective, efficient, and hygienic solution for temperature monitoring, especially vital during health crises like the COVID-19 pandemic. The ESP32 serves as the central controller, offering both high processing power and built-in wireless communication capabilities. The sensor readings are displayed in real time on a compact OLED screen, providing clear visibility.

NON-INVASIVE BLOOD GLUCOSE MEASUREMENT USING ARDUINO

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Non-invasive blood glucose measurement using Arduino UNO is an innovative prototype aimed at estimating glucose levels without drawing blood, using optical methods instead of conventional invasive techniques. This conceptual system replaces traditional finger-prick testing by employing a Near- Infrared (NIR) light source and photodiode or phototransistor sensor to detect variations in light absorption through human tissue. NIR light penetrates the skin and interacts with blood and tissue components; the reflected or transmitted light is then captured and analyzed. Since glucose has specific absorption characteristics in the NIR spectrum, changes in glucose concentration subtly affect the intensity of light received by the sensor. The Arduino UNO acts as the central microcontroller, reading the analog voltage from the photodetector, processing the signal, and estimating glucose levels based on a predefined calibration curve or mapping algorithm. The estimated glucose value is displayed on a 16x2 LCD and optionally sent to the serial monitor for real time observation. Standard libraries such as Wire.h for I2C communication and LiquidCrystal_I2C.h for display interfacing are used. Although the model does not provide medically precise glucose readings, it demonstrates how NIR spectroscopy can be integrated with microcontrollers for non invasive biosensing. The system is a valuable tool for educational and research purposes, offering insight into the principles of optical sensing, embedded electronics, and signal processing. Future iterations could include real-time calibration using machine learning algorithms, enhanced sensor sensitivity, or cloud connectivity to move closer to a wearable, accurate glucose monitoring solution.

SMART SALINE LEVEL MONITORING SYSTEM USING MICROPROCESSOR

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Intravenous (IV) fluid administration is a routine yet critical procedure in hospitals for delivering medications, hydration, and nutrients to patients. A common challenge faced by healthcare providers is the manual monitoring of saline fluid levels, which, if neglected, can result in the saline bag running dry. This may lead to the entry of air into the bloodstream a potentially life-threatening condition known as air embolism. To address this challenge, this project presents a Smart Saline Level Monitoring System using embedded electronics and IoT principles. The system comprises a load cell sensor, a HX711 analog-to-digital converter module, an ESP32 microcontroller, a 20×4 I2C LCD display, and a 12V buzzer. The load cell detects the real-time weight of the saline IV bag and transmits this data to the HX711 module, which amplifies and digitizes the signal. The ESP32 processes this data and calculates the remaining saline volume. This information is then displayed on the LCD screen, providing continuous visual feedback to medical staff. When the saline level drops below a critical threshold, the system automatically activates a buzzer to alert caregivers, prompting timely replacement of the Intra Venous bag. The entire setup is implemented on a breadboard using jumper wires and does not require any external software interface, making it ideal for low-resource healthcare settings. The system is scalable, cost-effective, and can be enhanced with additional features like Wi-Fi-based alerts or mobile app integration. Overall, this smart solution aims to reduce the burden on hospital staff, enhance patient safety, and minimize risks associated with saline depletion through real-time monitoring and automated alerting.

REAL TIME EMG SIGNAL ANALYSIS FOR MUSCLE ABNORMALITIES USING ARDIUNO

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The real-time electromyography (EMG) signal analysis system is an innovative biomedical

application designed to detect muscular abnormalities through continuous monitoring and analysis of muscle electrical activity. Built around the Arduino UNO microcontroller, this system captures surface EMG signals from biceps using EMG sensor modules V3.0 with cable and electrodes. These signals are indicative of neuromuscular function and can reveal patterns associated with disorders, fatigue, or improper muscle coordination. The EMG sensor detects electrical potentials generated by muscle contractions, which are then amplified, filtered, and digitized using the Arduino UNO. These raw signals are transmitted to a screen interface via serial communication, where they are processed in real time using specialized software ARDUINO IDE. Signal processing techniques like noise filtering, peak detection, and frequency domain analysis are applied to extract features critical for identifying abnormalities. Visual feedback is provided through a graphical user interface (GUI) on the screen, displaying real-time EMG waveforms and analytics to aid in interpretation. Threshold-based alert mechanisms can be implemented to notify users of irregular patterns that may indicate muscular dysfunction or fatigue. .Based on experimental testing, the resting muscle signal typically ranged between 150–300 (approx. 0.98–1.46V). During normal muscle activity, readings ranged from 300–500 (1.46–2.44V). An abnormal muscle activity threshold was defined at a reading of >500, corresponding to approximately 2.44V.This project integrates bio-signal acquisition, embedded systems, and computer-based analysis to offer a cost-effective and portable solution for muscle health assessment. It has potential applications in rehabilitation monitoring, sports science, ergonomic studies, and neuromuscular diagnostics, supporting tele-rehabilitation and remote health tracking.

OXYGEN SAVER BY INHALING AND EXHALING PROCESS USING ARDUINO

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The "Oxygen Saver by Inhaling and Exhaling Process using Arduino" is a microcontroller-based system designed to optimize oxygen usage for patients by delivering oxygen only during the inhalation phase. This project addresses the critical need to conserve medical oxygen, especially during health crises such as the COVID-19 pandemic when oxygen demand surged globally. The system works by detecting the user's breathing pattern using an air flow or pressure sensor connected to an Arduino microcontroller. During inhalation, the sensor detects a pressure change or airflow, triggering the Arduino to activate a relay that powers an oxygen pump or solenoid valve. When the

user exhales, the oxygen flow is automatically turned off, thus preventing unnecessary oxygen wastage. A 16x2 LCD is used to display real-time system status, such as sensor readings and pump operation. The setup also includes basic components like a breadboard, connecting wires, a DC power source, and optional buzzers or indicators. The device ensures that oxygen is delivered efficiently and economically, reducing overall consumption and extending oxygen cylinder life. The use of Arduino makes the system low-cost, programmable, and easy to modify. The proposed solution can be beneficial in hospitals, home care settings, and emergency situations. It promotes responsible resource usage and supports sustainable medical practices. The real-time control loop ensures responsive operation without requiring user interaction. The simplicity of the system allows for easy deployment, even in low-resource environments. This project serves as a practical example of how embedded electronics can contribute to life- saving healthcare solutions.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION FOR CHRONIC PAIN

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Transcutaneous electrical nerve stimulation (TENS) is a therapy that uses low- voltage electrical current for pain relief. TENS with a small, battery-powered machine about the size of a pocket radio. Usually, you connect two electrodes (wires that conduct electrical current) from the machine to your skin. The electrodes are often placed on the area of pain or at a pressure point, creating a circuit of electrical impulses that travels along nerve fibers. This project presents a microcontroller based high-voltage pulse generation system using the ESP8266 module, designed for controlled electrical stimulation applications. The system allows user-defined voltage adjustments through a push-button interface, which are monitored and processed by the ESP8266. An LCD display provides real-time feedback of the selected voltage levels. The microcontroller drives a MOSFET switching unit to regulate the input voltage supplied to a step-up transformer. The transformer increases the voltage to the required output level, which is then delivered to the electrodes. This setup ensures precise control over output voltage and timing, making it suitable for applications such as Transcutaneous Electrical Nerve Stimulation (TENS) or other bioelectronic interfaces. The integration of Wi-Fi-capable ESP8266 further enables potential remote monitoring and control capabilities

SMART SYRINGE INFUSED PUMP FOR ICU PATIENTS USING MICROCONTROLLER

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Syringe pump is a precision fluid-handling device designed to deliver or withdraw specific volumes of liquid at controlled flow rates. In this project, a syringe pump was developed with the aim of achieving accurate, programmable, and cost-effective fluid control suitable for applications in laboratories, medical fields, and research environments. The mechanism is powered by a stepper motor interfaced with a lead screw assembly, which transforms rotational motion to linear motion of the syringe plunger. A microcontroller regulates the motor's operation and input from the user, enabling real-time adjustment of parameters like flow rate, volume, and direction of fluid movement. The mechanical frame of the pump was fabricated from light materials that are tough enough to support stability and portability. A universal syringe holder was included to accommodate varying sizes of syringes for improved design flexibility. The user interface includes an LCD display and a keypad, via which the operator can comfortably enter and observe delivery parameters. Electronic components like the power supply and motor driver were chosen to optimize energy efficiency and stable performance. The software was constructed to permit exact motor stepping as well as implementing safety checks in the form of volume and time of operation limitations. Performance testing of the syringe pump was done with different sizes of syringes and flow rates. The test revealed that the pump is able to deliver liquids with an error rate of less than 5%, proving to be highly reliable and consistent. The flow was also smooth and constant even at low rates, which is vital for applications like microfluidics, drug delivery, and chemical titration.

TOXICITY ANALYSIS OF LAMBDA-CYHALOTHRIN IN ARTEMIA

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The widespread use of pesticides such as lambda-cyhalothrin in agriculture has raised environmental concerns due to their potential toxicity to non-target aquatic organisms. This study investigates the acute and sub-lethal effects of lambda-cyhalothrin on Artemia (brine

shrimp), a widely accepted model organism in ecotoxicology. The objectives include determining the LC50 value, assessing morphological and behavioral changes, and identifying possible DNA damage in Artemia following exposure. Artemia nauplii were exposed to varying concentrations of the insecticide, and mortality rates were recorded to estimate the LC50. Microscopic analysis was conducted to detect morphological abnormalities, and behavioral patterns were observed to assess neurotoxic responses. DNA fragmentation assays were performed to evaluate genotoxic effects. The data were statistically analyzed using GraphPad Prism, ensuring reliability and reproducibility. Preliminary findings indicate dose-dependent mortality and notable morphological and behavioral alterations. Evidence of DNA fragmentation suggests potential genotoxicity. This study highlights the need for thorough environmental risk assessment of pesticides and contributes essential data on the toxicity profile of lambda-cyhalothrin. The results aim to support more sustainable pesticide practices and stricter environmental regulations.

CARBONATED ASH PARTICLES FOR SUSTAINABLE BIOREMEDIATION

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This study investigates the degradation of Textile dye using carbonated ash particles of Galaxaura rugose by bioremediation. The carbonated ash particles were characterized by using UV-Visible spectroscopy, X-Ray Diffraction (XRD), and Fourier-Transform Infrared spectroscopy (FTIR). UV-Visible spectroscopy indicated the graphical representation in the range between 200-1100nm confirming the decrease in absorbance peak reveals that carbonated ash effectively breakdown the dye at certain wavelength. FTIR analysis detects the molecular vibrations in the sample and represent the functional groups like Hydroxyl and amine groups. XRD analysis represent the crystallinity structure of material and amorphous by the arrangement of atoms in the crystal lattice. In addition to that, Batch adsorption test conducted as control study to know the changes in pH in the observation of 0 to 180 minutes. The results highlight making it a promising matter for textile dye degradation. This study offers a sustainable solution for wastewater treatment compared to other chemical treatment.

OPTIMIZATION OF PHYCOCYANIN PIGMENT EXTRACTION FROM SPIRULINA

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The increasing demand for sustainable and eco-friendly alternatives to traditional plastics has led to a surge in research on bioplastics. Kappaphycus alvarezii, a red algae species, has emerged as a promising feedstock for bioplastic production due to its high carrageenan content. This study aims to optimize the extraction of carrageenan from K. alvarezii and assess the environmental impact of bioplastic production from this biomass. Optimize carrageenan extraction: Investigate the effects of different extraction methods, solvents, and conditions on carrageenan yield and quality. Develop bioplastic production process: Utilize the extracted carrageenan to produce bioplastics and optimize the production process. Environmental impact assessment: Conduct a life cycle assessment (LCA) to evaluate the environmental impacts of bioplastic production from K. alvarezii. Optimized carrageenan extraction: The study is expected to identify the most efficient extraction method and conditions for maximizing carrageenan yield and quality. Sustainable bioplastic production: The developed bioplastic production process is anticipated to be environmentally friendly, with reduced energy consumption and waste generation. Environmental benefits: The LCA is expected to reveal the potential environmental benefits of bioplastic production from K. alvarezii, including reduced greenhouse gas emissions and lower environmental impacts compared to traditional plastics.

GENE-EDITED CROPS FOR CLIMATE RESILIENCE: HARNESSING PRECISION BIOTECHNOLOGY TO SECURE FUTURE FOOD SYSTEM

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With rising temperatures, unpredictable rainfall, and a rise in pests and diseases that affect agricultural output, climate change is becoming a more serious threat to global food

security. A groundbreaking approach for quickly creating crop varieties with increased resistance to various stresses is provided by gene editing technologies, especially CRISPR-Cas systems. Recent developments in gene-edited crops that can resist biotic (such as fungal, bacterial, and insect attacks) and abiotic (such as drought, heat, and salinity) conditions are highlighted in the current work. Gene editing, as opposed to traditional breeding, allows for exact changes without adding foreign DNA, which frequently speeds up public acceptability and regulatory approval. Targeted genome alterations were used to create disease-resistant bananas, heat-resilient wheat, and drought-tolerant rice in earlier research. The paper also discusses ethical issues, the regulatory environment, and the necessity of providing smallholder farmers with fair access to gene editing technologies. The integration of genomics, high-throughput phenotyping, and systems biology is emphasized in order to guarantee inclusive and sustainable climate-smart agriculture. Compared to traditional breeding or genetically modified organisms (GMOs), gene editing offers several advantages, such as highly accurate targeted genetic modifications, quicker development of improved crop varieties, increased resistance to pests and diseases, decreased reliance on chemical pesticides, decreased need for water, fertilizer, and pesticides, and a contribution to a safe and sustainable global food system.

BIO-COATING OF BEESWAX CREAM FOR FRUITS AND VEGETABLES TO IMPROVE THEIR SHEL-LIFE

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In response to increasing concerns over food waste and safety, and the environmental impacts of traditional conservation methods, this review aims to explore the potential of bio-coatings in preserving the freshness of fruits and vegetables. Our primary objective is to provide a comprehensive analysis of recent advancements in bio-coating technologies, detailing their benefits in terms of enhancing food safety, prolonging shelf life, and reducing waste. The study presents the development and application of a natural beeswax-based cream designed to extend the shelf life and preserve the quality of fresh fruits and vegetables. The formulation utilizes beeswax as the primary component, combined with coconut oil, orange oil and natural emulsifiers, to create a protective barrier that reduces moisture loss, slows oxidation, and

inhibits microbial growth. Antimicrobial emulsion-based coating materials have been used extensively to inhibit the growth of these bacterial and fungal disease. Approximately 30% of fruits and vegetables are harmed or altered by insects, microorganisms and postharvesting conditions, during transport and preservation. To overcome these problems edible coating of beeswax cream is used as a barrier for protecting the fruits and vegetable. the formulation of beeswax-based emulsion coatings for fruits and vegetables using high-pressure homogenization (HPH) and organic coating materials. As a result, this biocoating of beeswax cream method is the safest, non-toxic, and most environmentally friendly method for extending the shelf life of fruit and vegetable.

DEVELOPMENT OF A NOVEL MYCOVIRUS BASED BIOFUNGICIDE FOR SUSTAINABLE CONTROL OF COLLETOTRICHUM *CAPSICI* IN TURMERIC (CURCUMA LONGA) CROPS

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Colletotrichum capsici, a highly virulent fungal pathogen, poses a significant threat to global turmeric production, resulting in substantial yield losses and economic burdens on farmers. The reliance on chemical fungicides has led to environmental pollution, health risks, and the development of resistant fungal strains. In response to the need for eco-friendly alternatives, this project aims to develop a groundbreaking mycovirus-based biofungicide for the sustainable control of C. capsici. By isolating and characterizing a mycovirus from C. capsici, we can harness its potential to specifically target and control the fungal pathogen, reducing the need for chemical fungicides. The development of a biofungicide formulation will involve rigorous testing to ensure efficacy, stability, and safety for humans, animals, and the environment. Upon successful completion, this project will provide a valuable tool for farmers, promoting eco-friendly disease management and sustainable agriculture practices. The expected outcomes include improved turmeric yields, reduced chemical fungicide usage, and enhanced food security. Furthermore, this innovative solution has the potential for widespread adoption in turmeric production, contributing to a more sustainable agricultural practice. This project aligns

with global efforts to reduce the environmental footprint of agriculture while ensuring food security for a growing population. The development of a mycovirus-based biofungicide will not only benefit turmeric production but also contribute to the broader field of sustainable agriculture.

FORMULATION OF ENERGY TABLETS USING BLUEBERRIES FOR NEURODEGENERATIVE DISEASE

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This project explores the development of a chewable tablet formulated with aqueous blueberry extract aimed at the prevention and early treatment of neurodegenerative diseases such as Parkinson's and Alzheimer's, while also serving as an immune-boosting supplement for broader use. The extract, rich in bioactive compounds, was subjected to extensive quality assessment, including analysis of its nutritional profile, antioxidant content, bioavailability, and stability. Anti-microbial and anti-inflammatory properties were evaluated to ensure safety and therapeutic relevance, particularly for elderly users with compromised immunity. Molecular docking studies were conducted to predict the interaction of key compounds with proteins associated with neurodegenerative disease pathways, confirming the extract's potential efficacy at a molecular level. Based on these findings, a user-friendly, chewable tablet was formulated using safe excipients to ensure ease of use for both older adults and children. The final product offers a natural, dual-purpose solution for cognitive support and immune health, combining the benefits of plant-based medicine with modern pharmaceutical techniques.

PHYTOCHEMICAL OPTIMIZATION OF DECOCTION-DERIVED HERBAL FORMULATIONS FROM ANDROGRAPHOLIDE FOR ENHANCED BREAST CANCER THERAPEUTICS USING GREEN CHEMISTRY APPROACHES

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Breast cancer remains the leading malignancy among women globally, accounting for significant morbidity and mortality due to its aggressive progression and frequent metastasis Despite significant advancements in diagnostic technologies and therapeutic strategies, the limitations of conventional treatments marked by severe adverse effects, prohibitive costs, and challenges in personalized care underscore the urgency for alternative and adjunctive interventions with enhanced safety profiles. In this context, herbal compounds with inherent anti-cancer, anti-inflammatory, and antioxidant properties emerge as a compelling area of exploration in breast cancer therapeutics. This study delves into the molecular mechanisms underpinning the efficacy of herbal formulations in suppressing breast cancer cell proliferation, emphasizing the bioactive constituents of *Andrographis paniculata*, *Nigella sativa*, *Panax ginseng*, *Allium sativum*, and other botanicals renowned for their pharmacological attributes. A comprehensive methodology encompasses the identification and extraction of herbal components via the decoction method, formulation optimization, and rigorous physicochemical characterization. Crucial evaluations include solubility, stability, pH, particle size distribution, and anti-cancer efficacy assessed through in vitro and clinical studies. Of particular significance, *Andrographolide*, a diterpenoid lactone derived from *Andrographis paniculata* exhibits robust anti-proliferative activity, induces apoptosis, and modulates immune responses in breast cancer cell lines. This investigation integrates traditional medicinal knowledge with contemporary scientific frameworks to pioneer a potent herbal therapeutic formulation for the long-term management of breast cancer. The initial findings underscore the promise of herbal-based interventions as effective complements or alternatives to standard therapies, offering a holistic and sustainable approach to mitigating the disease burden. To solidify these outcomes, further clinical trials and the establishment of standardized protocols for widespread application are imperative.

SUSTAINABLE PROCESS TECHNIQUES FOR COMPOSTING PLASTICS AS ENERGY RECOVERABLE SOURCES AND FUEL PRODUCTION: NEXUS OF ENERGY INTEGRATION THROUGH THE PRODUCTS

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Plastic Waste Is A Serious Global Issue Owing To Its Non-Biodegradable Nature And Growing Concentration In Landfills And Oceans. An Attractive Alternative Is The Utilization Of Plastic Waste To Generate Valuable Fuels And Chemicals Using A Variety Of Thermochemical And Biological Technologies. This Study Shows A Overview Of The Principal Technologies Applied To Plastic-To-Fuel Conversion, Such As Pyrolysis, Gasification, Partial Oxidation, Catalytic Upgrading, Gas-To-Liquid (Gtl) Processes, And Novel Biological Treatments. Pyrolysis Is The Most Researched Process, Yielding Liquid Oil, Gas, And Char By The Thermal Decomposition Of Plastics In The Absence Of Oxygen. Plastic Wastes Are Transformed Into Syngas By Gasification Through A Low Level Of Oxygen Or Steam At Elevated Temperatures. Liquefaction Dissolves Plastics With Solvents Or Breaks Down Using Catalysts Into Liquid Fuel At A Moderate Environment. Catalytic Processes Intensify The Selectivity And Efficiency Of Material Conversion Into Fuel Through The Use Of Zeolites, Silica–Alumina, And Metal-Based Catalysts. Biological Processes Are Receiving Interest For Their Green Approach, Although They Are In The Initial Stages Of Development. The Study Emphasizes The Energy Yields, Product Composition, And Limitations Of Each Process, Including Process Cost, Emissions, And Feedstock Complexity. With Increasing Global Demand For Sustainable Energy And Waste Minimization, These Technologies Have Tremendous Potential In Promoting Circular Economy Practices And Minimizing The Environmental Footprint Of Plastic Waste.

Keywords:Plastic, Pyrolysis, Gasification, Catalytic Upgrading, Biological Technologies, Sustainable Energy.

PREPARATION OF FACE MASK USING ACTIVATED CHARCOAL OF WILD ALMOND FRUIT SHELL

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The Increasing Requirements For Sustainable And Eco-Friendly Skincare Products Have Led To The Exploration Of Natural Materials For Cosmetic Applications. This Study Focuses On The Preparation And Utilization Of Activated Carbon Which Is Derived From Wild Almond (Sterculia Foetida) Fruit Shells As A Key Ingredient In A Natural Face Mask Formulation. Wild Almond Shells Were Collected, Washed, Dried, And Carbonized At High Temperatures, Followed By Chemical Activation Using Calcium Chloride, Sodium Chloride To Enhance Surface Area And Porosity. The Resulting Activated Carbon Was Ground Into A Fine Powder And Incorporated Into A Face Mask Blend Containing Natural Binding And Hydrating Agents Such As Honey, Aloe Vera Gel, And Essential Oils. The Prepared Face Mask Was Evaluated For Its Adsorptive Capacity, Texture, Ph, And Skin Compatibility. Results Demonstrated That The Activated Wild Almond Shell Powder Effectively Absorbed Excess Oil, Impurities, And Toxins From The Skin While Maintaining A Smooth And User-Friendly Consistency. The Formulation Also Showed Good Stability And No Adverse Skin Reactions During Preliminary Testing. This Study Suggests That Wild Almond Shell-Derived Activated Carbon Is A Viable, Sustainable, And Low-Cost Alternative For Use In Cosmetic Skincare Products, Particularly In Detoxifying And Clarifying Face Masks.

PREPARATION OF BIOPLASTIC FORM STERCULIA FOETIDA LEAVES

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The Growing Environmental Concerns Regarding Petroleum-Based Plastics Have Driven The Search For Sustainable Alternatives, With Bioplastics Emerging As A Promising Solution. This Study Explores The Potential Of Sterculia Foetida Leaves As A Raw Material For

Bioplastic Production, Leveraging Their Natural Polymeric Content, Including Cellulose, Hemicellulose, And Lignin. The Research Focuses On The Extraction And Modification Of Biopolymers From Sterculia Foetida Leaves To Develop A Biodegradable Plastic Film. The Methodology Involves Hydrolysis, Plasticization, And Cross-Linking Processes To Enhance Mechanical Strength, Flexibility, And Water Resistance. Various Plasticizers Such As Glycerol And Citric Acid Are Incorporated To Optimize Film Properties. The Bioplastic Films Are Characterized Using Fourier Transform Infrared Spectroscopy (Ftir) To Analyze Functional Groups, Scanning Electron Microscopy (Sem) To Study Surface Morphology, And Tensile Strength Testing To Evaluate Mechanical Properties. Water Absorption And Biodegradation Studies Are Also Conducted To Assess The Environmental Viability Of The Developed Material.The Results Indicate That Sterculia Foetida Leaf-Derived Bioplastics Exhibit Promising Mechanical And Biodegradable Properties, Making Them A Potential Alternative To Conventional Plastics. This Research Contributes To The Advancement Of Eco-Friendly Materials And Highlights The Feasibility Of Utilizing Plant-Based Resources For Sustainable Packaging Solutions. Further Studies Can Explore Scalability, Cost-Effectiveness, And Industrial Applications Of Sterculia Foetida Bioplastics.

Keywords: Bioplastics, Sterculia Foetida, Biodegradable Polymer, Green Chemistry, Sustainable Packaging.

CHEMICAL TREATMENT OF USED LUBRICANT OIL

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This Study Investigates The Chemical Treatment Of Used Lubricant Oil (Ulo), Focusing On Enhancing Its Recyclability And Reducingitsenvironmental Impact Through An Optimized Solvent Extraction Process. Ulo, Commonly Used In Automotive And Industrial Applications, Degrades Over Time Due To Oxidation, Contamination, And The Accumulation Of Harmful Substances Such As Heavy Metals (E.G., Lead, Zinc, Copper), Sulfur Compounds, And Various Additives. These Contaminants Impair Theoil'sperformance, Making It Unsuitable For Reuse Without Proper Treatment. Effective Chemical Treatment Is Essential For Restoring Its Lubricatingproperties And Ensuring Its Environmentally Responsible Recycling. The Research Evaluates Various Chemical Treatment Techniques, Includingsolvent Extraction, Acid-Base

Treatment, Adsorption, And Hydrocracking. Specifically, The Study Focuses On Solvent Extraction Using A Ternary Solvent System Consisting Of 1-Butanol, Isopropyl Alcohol (Ipa), And Either Methyl Ethyl Ketone (Mek) Or Methyl Isobutyl Ketone (Mibk). Two Solvent Combinations Were Assessed: (I) Mek-Based (25% Mek, 25%Ipa, 50%1-Butanol) And (Ii) Mibk-Based (25% Mibk, 25% Ipa, 50%1-Butanol), Eachtested At Solvent-To-Ulo Ratios Of 1:1.5 And 1:2.5. Laboratory-Scaleexperiments Examined The Effects Of Solvent Composition, Solvent-To-Oil Ratio, And Temperature On Oil Recovery Efficiency And Contaminant Removal. Results Demonstrated That The Mek-Based System (50%1-Butanol/25%Ipa/25% Mek) Provided Optimal Sludge Separation And Contaminant Reduction, With A Solvent-To-Oil Ratio Of 3:1 And An Extraction Temperatureof 25°C Yielding The Best Results. Following Extraction, The Ulowas Further Refined Through A Vacuum Distillation Process. The Entire Re-Refining Processwas Simulated For A Ulo Capacity Of 2200 Kg/H Using Aspen Plus™, Employing Four Pseudo-Components (Saturate, Monoaromatic, Diaromatic, And Polyaromatic) And The Non- Random Two-Liquid (Nrtl) And Universal Quasi-Chemical Activity Coefficient (Uniquac) Models To Describetheliquid–Liquid Equilibrium (Lle). Simulation Results Showed Strong Agreement With Experimental Data, Confirming The Effectiveness Of The Solvent Mixture. Further Analysis Of Sludge Composition Indicated That Oil Recoveryandcontaminant Removal Efficiency Were Directly Influenced By The Percentageof 1-Butanol In The Solvent Mixture. The Study Found That Mekandipaconcentrations Should Not Exceed 25% Each, While 1- Butanol At 50%Servedas The Most Effective Base Solvent. This Research Provides An Optimized Chemical Treatment Process That Improves The Recyclability Of Ulo, Minimizes Environmental Impact, Andcontributes To Sustainable Waste Management. The Findings Offer Aviablepathway For Enhancing The Re-Refining Industry By Reducing Wasteandmaximizing Oil Recovery Through Solvent Extraction And Vacuumdistillation.

Keywords: Lubricant Oil, Purification, Chemical Treatment.

MARTYNIA ANNUA: A PROMISING NON-EDIBLE FEEDSTOCK FOR SUSTAINABLE BIODIESEL PRODUCTION

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This Study Investigates The Potential Of Martynia Annua L. Seeds As A Viable Source For Bio-Oil Extraction And Subsequent Conversion Into Biodiesel Through Transesterification. M. Annua L. Seeds, Rich In Oil Content, Offer A Promising Alternative For Sustainable Biodiesel Production. The Extraction Process Involves Optimizing Parameters Such As Solvent Type, Extraction Time, And Temperature To Achieve Maximum Oil Yield. Subsequently, Transesterification, A Widely Used Method For Biodiesel Production, Is Employed To Convert The Extracted Bio-Oil Into Biodiesel. Various Catalysts And Reaction Conditions Are Explored To Enhance The Efficiency And Yield Of The Transesterification Process. The Physicochemical Properties Of The Produced Biodiesel Are Analyzed To Ensure Compliance With International Standards. Overall, This Research Aims To Contribute To The Development Of A Sustainable And Environmentally Friendly Alternative To Conventional Diesel Fuel.

Keywords: Bio-Oil, Bio-Diesel, Martynia Annua, Transesterification, Soxhlet Extraction.

PRODUCTION OF BIOETHANOL FROM WASTE PADDY

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The Rising Global Demand For Sustainable Energy Has Intensified Research Into Renewable Biofuels, Particularly Bioethanol Derived From Lignocellulosic Biomass. This Study Focuses On The Conversion Of Paddy Waste An Abundant Agricultural Residue Into Bioethanol Through A Multi-Stage Biochemical And Separation Process. The Core Objective Is To Assess The Influence Of Biomass Composition, Specifically The Relative Proportions Of Cellulose And Hemicellulose, On Ethanol Yield. A Detailed Process Model Was Developed

Using Aspen Plus Simulation Software Under Controlled Conditions (1 Bar, 25°C), Incorporating Key Unit Operations Such As Hydrolysis, Fermentation, Distillation, And Purification. A Dedicated Co_2 Discharge Unit Was Also Integrated To Address Emissions From The Fermentation Stage. The Results Reveal That Biomass With Higher Cellulose Content Significantly Enhances Ethanol Production Efficiency Compared To Hemicellulose-Rich Feedstock. This Study Underscores The Importance Of Strategic Biomass Selection, Highlighting Paddy Straw As A Promising Feedstock For Optimizing Bioethanol Yields And Improving The Overall Economic And Environmental Viability Of Lignocellulosic Biofuel Production.

STUDY ON PARTIAL REPLACEMENT OF CEMENT BY USING MAGNESITE CHIMNEY DUST

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In response to the growing demand for alternative construction materials and the pursuit of enhancing the strength of cement mortar, researchers have increasingly explored potential substitutes for cement. This study examines the feasibility of incorporating Magnesite Chimney Dust as a partial replacement for cement in mortar mixtures. Mortar cubes measuring 70.6 mm on each side were prepared using a 1:3 mix ratio and tested for compressive strength after curing periods of 7, 14, and 28 days. Magnesite Chimney Dust was used to replace cement at varying levels ranging from 10% to 50%. The highest compressive strength achieved was 56.6 N/mm² at a 10% replacement level after 28 days of curing. A general decline in compressive strength was observed with increasing percentages of Magnesite Chimney Dust. However, the 10% replacement level met the 28-day compressive strength requirement of over 53 N/mm², as specified by IS 1489 (Part 2) and IS 1991 (Part 1), making it suitable for use in building construction.

TREATMENT OF LAKE WATER USING NATURAL COAGULANT

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Investigation on surface water treatment using thumbai leaf, nochi leaf and alum stone as natural coagulants. The implementation and careful adaptation of treatment plants is currently the most common method for enhancing water quality, especially for large-scale supplies. Nowadays, natural coagulants are used for water treatment due to their environmental friendliness. thumbai leaf, nochi leaf and alum stone are the known natural coagulants used for water. The main goal of this study was to evaluate the removal efficiency of color, turbidity, TSS, COD, and BOD from surface water by utilizing the blended powder of thumbai leaf, nochi leaf and alum stone. In this study also, pH, stirring speed of the jar test, coagulant dosage, and settling time were also considered as influencing factors on the removal percentages. The maximum pollutants removal efficiency was obtained from alum stone like as removed color (86%), turbidity (46%), TSS (85%), COD (81%), and BOD (88%) at different operating parameters at optimum condition. Optimum coagulant dosage 1.0g/100ml.

EXPERIMENTAL INVESTIGATION ON BRICK WITH PARTIAL REPLACEMENT OF SAND BY USING PAPER SLUDGE

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Concrete blocks are widely used in construction due to their high compressive strength. With growing urbanization, there is a rising concern regarding the shortage of raw materials and the increase in waste. This study investigates the feasibility of using paper sludge as a partial replacement for sand in brick production. Experimental tests including compressive strength, water absorption, and shape analysis were conducted. The results show that while compressive

strength slightly decreases with increased sludge content, the eco-friendly nature and cost-effectiveness of these bricks offer potential for sustainable construction.

MITIGATION OF LANDSLIDES USING ARC GIS AND RISK CALCULATION

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Landslides are natural hazards that cause significant damage to infrastructure, property, and human life. The increasing frequency of landslides due to climate change and human activities necessitates effective mitigation techniques and risk assessment methods. This paper explores various landslide mitigation techniques and presents a detailed approach to risk analysis using ArcGIS. By integrating remote sensing data, Digital Elevation Models (DEMs), and Geographic Information System (GIS) tools, we assess landslide susceptibility and propose strategies to minimize risks.

FEM ANALYSIS OF NATURAL AND STEEL FIBRE REINFORCED GEOPOLYMER CONCRETE RCC BEAMS

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The increasing environmental concerns associated with the production of ordinary Portland cement (OPC) have driven research toward sustainable alternatives in the construction industry. Geopolymer concrete (GPC), synthesized using industrial by-products such as fly ash and ground granulated blast furnace slag (GGBS), offers a promising eco-friendly substitute with desirable

mechanical and durability properties. This thesis presents a comprehensive finite element method (FEM) analysis of reinforced cement concrete (RCC) beams cast using geopolymer concrete and further enhanced with natural and steel fibres as secondary reinforcement. Natural fibres such as kenaf, known for their biodegradability and tensile characteristics, along with steel fibres, were incorporated into the geopolymer matrix to investigate their individual and combined effects on structural performance. Four beam configurations were analyzed: a control beam (without fibres), a beam reinforced with natural fibres, a beam reinforced with steel fibres, and a hybrid beam reinforced with both types of fibres. FEM simulations were conducted using ANSYS software, replicating realistic boundary conditions and static loading scenarios to evaluate stress distribution, deflection behavior, and ultimate load-carrying capacity. The simulation results revealed that fibre reinforcement significantly enhanced the structural integrity and energy absorption capacity of the beams. The hybrid fibre-reinforced beam exhibited the most favorable performance, demonstrating increased stiffness, reduced deflections, and improved resistance to cracking. This study underscores the potential of integrating natural and synthetic fibres into geopolymer concrete to develop high-performance, sustainable structural elements. The use of FEM further enables accurate prediction and optimization of beam behavior, contributing to the advancement of green construction technologies

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INNOVATIVE APPROACHES IN PAVEMENT ENGINEERING: A REVIEW OF SUSTAINABLE MATERIALS AND PERFORMANCE-BASED DESIGN

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Pavements' functionality, longevity, and sustainability are essential to the development of contemporary infrastructure. Pavement engineering must use cutting-edge materials and design techniques as traffic loads rise and climate change issues become more pressing. With an emphasis on performance-based design, life-cycle cost analysis, and sustainable materials, this article provides a thorough discussion and analysis of recent developments in pavement construction. The utilization of recycled materials, modified binders, and green technologies including rubberized pavements, geopolymer binders, and warm mix asphalt are all emphasized. Prior research's case studies and experimental findings demonstrate how well these methods

perate to prolong service life, lessen their negative effects on the environment, and improve maintenance plans.

EXPERIMENTAL STUDY ON CLAY BRICK BY PARTIAL REPLACEMENT OF CLAY WITH DOLOMITE POWDER

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This study explores the feasibility of partially replacing clay with dolomite powder in the manufacturing of clay bricks. The primary objective is to assess whether dolomite powder can enhance the physical and mechanical properties of traditional bricks while contributing to sustainable construction practices. Bricks were produced with varying proportions of dolomite powder mixed with clay, and standard tests were conducted to evaluate parameters such as compressive strength, water absorption, and efflorescence. Results indicate that the inclusion of dolomite powder improves compressive strength and reduces water absorption up to an optimal replacement level. Additionally, the efflorescence levels remained within acceptable limits. These findings suggest that dolomite powder is a viable alternative material that can enhance brick performance and contribute to more ecofriendly construction methods.

STABILIZATION OF BLACK COTTON SOIL BY USING CRUMB RUBBER POWDER WITH LIME

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This study investigates the stabilization of expansive black cotton soil using crumb rubber powder (CRP) as a partial additive, combined with a constant 2% lime content. Black cotton soils pose significant challenges in civil engineering due to their high shrink-swell potential and low loadbearing capacity. To improve their geotechnical properties, CRP was incorporated at

varying proportions of 0%, 2%, 4%, 6%, and 8% by weight of dry soil, while maintaining the lime content at 2%. Laboratory tests, including Atterberg limits, unconfined compressive strength (UCS), California Bearing Ratio (CBR), and standard Proctor compaction tests, were performed to evaluate the effects of stabilization. The results indicated that the combined use of CRP and lime significantly improved soil strength and stability, with optimal performance observed at a specific CRP dosage. This study highlights the potential of utilizing waste rubber as a sustainable and effective soil stabilizer, contributing to both environmental conservation and infrastructure enhancement.

EXPERIMENTAL STUDY ON THE MECHANICAL PERFORMANCE OF ENGINEERED CEMENTITIOUS COMPOSITES WITH PVA FIBER

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The mechanical performance of Engineered Cementitious Composites (ECC) with Polyvinyl Alcohol (PVA) fibers is examined in this work. Assessing the compressive and direct tensile strengths of ECC mixtures with different PVA fiber concentrations is the main goal of the study. Extensive experimental analyses were carried out, including mechanical testing, microstructural assessments, and mix design optimization. The findings show that adding PVA fibers greatly improves ECC's ductility and tensile strength, with particular fiber volume fractions showing the best results.

AN ASSESSMENTOF THE FACTORS CAUSING TIME DELAY ON RESIDENTIAL BUILDING CONSTRUCTION

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In moment's global economy, the Domestic structure sedulity is one of the nippy-growing sectors. design directors place a high significance on quality. For a civil architect, quality issues can be exceedingly frustrating. owners and engineers are concerned about quality issues that have grown wider than anticipated in this terrain. It's the primary purpose of this disquisition to discover and examine the factors that determine the quality of construction. Time operation, vacuity of resources, financial issues, labours, environmental conditions, paraphernalia and outfit used, lack of safety, collaboration of actors, design, lack of communication, selection of contractor, examination, canons and morals, execution, and top operation support are the linked factors from the literature. In order to more understand why construction systems in Trichy were delayed during the Covid- 19 epidemic, this study and exploration have been put together. After carrying data from a check of a wide spectrum of Trichy- predicated construction professionals, this study looked into the pivotal causes of detainments. predicated on an significance index, this study set up the most current reasons of detainments in Domestic structure systems, and the primary conclusions from the data might help the construction sedulity more understand not only the major causes of detainments but also how to limit them through applicable planning.

LEVERAGING PREDICTIVE ANALYTICS TO ENHANCE OPERATIONAL EFFICIENCY AT THE CALIFORNIA STATE UNIVERSITY, NORTHRIDGE STUDENT RECREATION CENTER

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At California State University, Northridge (CSUN), they have a student recreation center (SRC) that provides a place for students to build their physique, health, and collaborative sports among students, alumni, faculty, and the public, but the functionality of the recreation center faces a very drastic fluctuation in their member flow compared to the weekdays and weekend. This fluctuation of member flow during the weekdays and weekend affects many things, like the operation of the facility, staff scheduling, and underutilization of the facility, which results in high levels of operation costs. This case study uses the data of the Student Recreation Center from fall 2014 to 2024 to identify trends and patterns from the past to

forecast. This project uses statistical data and a data analysis approach to the past data to create a new forecasting model that predicts fall 2025-member entry to plan the facility operations and staffing levels. Final recommendations and results of this project enhance the effectiveness of the operational framework while the quality of the service is a priority.

SCRAP STEEL SLAG AS COARSE AGGREGATE IN AMBIENT TEMPERATURE CURED GEOPOLYMER CONCRETE

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This study is to investigate the feasibility of substituting the virgin natural coarse aggregate in Class F Fly ash built ambient temperature cured geopolymer concrete by steel slag collected from scrap steel re-rolling mills. First the rerolled scrap steel slag formed coarse aggregate was investigated to comply with the specifications of IS 383: 2016 to be used as coarse aggregate as per the test methods laid down by IS 2386 : 1963. Then short term experimental work was carried to evaluate the fresh concrete properties and mechanical strength outputs of ordinary strength geopolymer concrete using rerolled scrap steel slag made coarse aggregate. The result indicates that the evaluated properties of the rerolled scrap steel slag coarse aggregate used are within specifications laid by Bureau of Indian Standards and the fresh concrete and compressive strength performance of geopolymer concrete specimens built with rerolled scrap steel slag as whole of coarse aggregate is acceptable.

CROSS-PLATFORM REPUTATION GENERATION SYSTEM USING ASPECT BASED SENTIMENT ANALYSIS

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The Active Growth of Internet-Based Applications Such As Social Networks And E-Commerce

Websites Leads People To Generate A Tremendous Amount Of Opinions And Reviews About Products And Services. Thus, It Becomes Very Crucial To Automatically Process Them. Over The Last Ten Years, Many Systems Have Been Proposed To Generate And Visualize Reputation By Mining Textual And Numerical Reviews. However, They Have Neglected The Fact That Online Reviews Could Be Posted By Malicious Users That Intend To Affect The Reputation Of The Target Product. Besides, These Systems Provide An Overall Reputation Value Toward The Entity And Disregard Generating Reputation Scores Toward Each Aspect Of The Product. Therefore, We Developed A System That Incorporates Spam Filtering, Review Popularity, Review Posting Time, And Aspect-Based Sentiment Analysis To Generate Accurate And Reliable Reputation Values. The Proposed Model Computes Numerical Reputation Values For An Entity And Its Aspects Based On Opinions Collected From Various Platforms. Our Proposed System Also Offers An Advanced Visualization Tool That Displays Detailed Information About Its Output. Experiment Results Conducted On Multiple Datasets Collected From Various Platforms (Twitter, Facebook, Amazon,Etc..) Show the Efficacy of The Proposed System Compared With State-Of-The-Art Reputation Generation Systems. .

AI-BASED NEST PARADISE- AN INTELLIGENT HOME SERVICE ECOSYSTEM

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Ai-Based Nest Paradise Reimagines Home Service Solutions Through The Lens Of Artificial Intelligence, Transforming A Traditional Cross-Platform Mobile Application Into An Intelligent Ecosystem. This Ai-Driven Platform Not Only Connects Service Providers With Users But Also Leverages Machine Learning, Smart Verification, And Predictive Analytics To Enhance User Trust, Efficiency, And Safety—Particularly With An Ai-Powered Women's Safety Mechanism. Ai-Based Nest Paradise Is An Intelligent Home Service Solution Developed As A Crossplatform Application For Android And Ios. It Uses Artificial Intelligence (Ai) To Optimize Service Matchmaking, Job Allocation, And User Engagement. The Platform Fosters Employment Opportunities By Allowing Both Educated And Uneducated Workers To Register,

And Showcases Their Skills Through Ai-Curated Profiles And Intelligent Rating Algorithms. Beyond Functional Services, The System Ensures A Secure Environment Via Ai-Powered Background Verification And Realtime Safety Alerts. A Standout Feature Is The Integration Of A Smart Women Safety System, Enhanced Through Embedded Ai And Iot-Based Modules. Ai-Based Nest Paradise Transcends The Traditional Service App Model By Embedding Ai Into Its Core Architecture. Through Intelligent Matchmaking, Smart Safety Systems, And Adaptive Ui/Ux, It Provides A Futuristic, Secure, And Accessible Home Service Platform. This Initiative Empowers Workers, Ensures User Trust, And Enhances Safety Through Continuous Ai-Driven Innovation.

SMART ATTENDANCE SYSTEM AND NOTIFICATION SYSTEM USING DEEP LEARNING AND MODERN IOT TECHNOLOGIES

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Educational Institutions Often Struggle with Maintaining Accurate And Efficient Attendance Records Due To The Limitations Of Traditional Methods Such As Manual Roll Calls, Paper-Based Registers, And Basic Biometric Systems. These Conventional Systems Are Time-Consuming, Error-Prone, And Particularly Vulnerable To Proxy Attendance, Leading To Administrative Inefficiencies And A Lack Of Accountability. To Overcome These Challenges, This Paper Introduces A Smart Attendance System And Notification Management Framework That Utilizes Deep Learning And Modern Iot Technologies To Automate The Process Of Attendance Tracking While Enhancing Communication Between Institutions And Stakeholders. The Project Employs Advanced Computer Vision Techniques Through Convolutional Neural Networks (Cnns) And Transfer Learning Models Like Facenet, Vggface, And Mtcnn To Enable Real-Time Facial Recognition Of Students.

Keywords :Smart Attendance System, Facial Recognition, Convolutional Neural Networks, Facenet ,Vggface, Realtime Attendance Monitoring, Rfid Integration, Proxy Attendance Prevention.

LEARNING MANAGEMENT SYSTEM

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The Growing Need for Accessible and Scalable Education Has Accelerated the Adoption of Learning Management Systems (LMS) In Academic And Professional Environments. This Project Presents Furious Learners, A Robust Full-Stack Lms Designed Using React.Js For the Frontend, Node.Js And Express.Js For the Backend, And Mongodb For Data Storage. The System Features Role-Based Access Control for Students, Instructors, And Administrators, Supporting Custom Flows for Registration, Authentication, And Dashboard Functionalities. Students Gain Access To Course Modules That Include Embedded Video Content With Conditional Access Logic, Whereby Watching A Video Fully Unlocks The Next Module. Features Such as Certificate Generation, Real-Time Instructor Messaging, And Cloud- Based File Uploads Using Multer And Cloudinary Are Integrated for Comprehensive Learning Support. The Project Also Implements an Otp-Based Signup Mechanism and Differentiated Registration Flows for Students and Instructors, Capturing Educational Metadata to Personalize User Experience. Adopting the Mvc Architecture And Restful Api Conventions Ensures The System Is Modular, Scalable, And Maintainable. This Lms Demonstrates How Modern Web Technologies Can Effectively Support Digital Pedagogy and Improve Student Engagement. Future Enhancements Include Ai-Driven Recommendations and Real-Time Learning Analytics.

GATE PASS MANAGEMENT SYSTEM

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The Gate Pass Management System Is A Secure And User-Friendly Web-Based Application Designed To Digitize And Streamline The Gate Pass Approval Process For Students,

Staff, And Visitors In A College Environment. The System Comprises Three Key Modules—Student, Staff, And Security—Each With Their Own Registration And Login Portals, Authenticated Using The Official College Email Id And Password. During Registration, Students Provide Details Such As Sin Number, Name, Email, Department, Type (Hosteller/Day Scholar), Phone Number, Address, And Date Of Birth. Staff Members Register With Their Staff Code, Name, Designation (Class Advisor, Hod, Principal, Warden, Etc.), And Other Contact Details. Security Personnel Also Register With Their Essential Credentials. Once Logged In, Students Can Apply For A Gate Pass By Submitting A Form That Includes The Reason, Date, And Time Of Exit. The Request Is Forwarded Via Email In A Hierarchical Approval Chain Starting With The Class Advisor, Then The Hod, Warden (If The Student Is A Hosteller), And Finally The Principal. Each Approver Reviews And Updates The Request Through Their Dashboard. Upon Final Approval, The Request Appears In The Security Dashboard, Allowing The Student To Leave The Campus After Verification. Similarly, Staff Members Can Apply For Gate Passes. Class Advisors Route Their Request Through The Hod And Principal, While Other Staff Like System Admins, Lab Technicians, Librarians, And Wardens Submit Directly To The Principal. Once Approved, The Security Verifies The Gate Pass At The Gate. For Visitors, The Security Module Includes A Visitor Pass Form Where The Security Staff Enters The Visitor's Name, Phone, Email, Visit Purpose, And The Details Of The Concerned Staff. The Request Is Sent Via Email To The Concerned Staff Member For Approval. If Accepted, The Visitor Is Granted Entry. This System Enhances Transparency, Reduces Manual Paperwork, And Ensures A Structured, Secure Approval Workflow Across the Campus.

GRAINET: A DEEP LEARNING APPROACH FOR AUTOMATED GRAIN QUALITY ASSESSMENT

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Rice Grain Quality Is A Complex Trait When Compared To Other Staple Crops Because It Is Primarily Consumed As A Whole Grain. Although Quality Is Considered Secondary To Yield, Breeders Are Increasingly Interested In Quality To Align With Consumer Preferences. During The Post Harvesting Stages, The Grains Are Manually Graded Into Different Grades And Are Sold At Nam (National Agriculture Market), An Online Portal Introduced By The

Government To Connect All The Farmers Online With The Traders To Obtain Optimum Price For Their Crop Production As Well As Grain Quality Decides Pricing. In Order To Obtain A Profitable Yield, Grain Quality Is The Major Factor To Be Considered. Quality Of Pre-Processed Food Grains, Detecting The Defected Grain Is A Critical Aspect And Evaluation Of Grain Quality Is A Challenging Task In The Agricultural Industry. The Classical Approach To Assessing Grain Quality Is Examined Manually Through Visual Inspection, Even More Challenging For Experts Or Trained Personnel. To Address These Challenges, Computer Vision Techniques Play A Crucial Role In Grain Quality Analysis. To Assist This, The Proposed Methodology “Grainet” Uses An Automatic Grain Quality Assessment System, Which Aids In Accurately Analyzing Grains And Determining Their Grade Quality. Initially, Grain With Varying Quality Grade Images Are Acquired From Different Sources. Acquired Images Are Then Subjected To Preprocessing Techniques. Pre-Processed Images Are Then Sent To Two-Fold Segmentation Which Is Used To Perform A Bounding Box On The Input Image. Features Of The Grain Such As Size, Color Are Extracted And Classification Into Different Classes Is Performed. Experimental Results Significantly Show The Proposed Model Achieves Average Accuracy Of 98% And Also Compared With Baseline Machine Learning.

HR MANAGEMENT

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The HR On-Boarding And Off-Boarding Management System Is A Comprehensive, Web-Based Platform Developed To Streamline And Automate The Entire Lifecycle Of Employee Management Within Academic Institutions, Addressing The Limitations Of Traditional Manual Hr Practices That Often Lead To Data Inaccuracies, Inefficiencies, And Communication Delays. This System Eliminates The Dependency On Scattered Excel Sheets And Manual Documentation By Offering A Centralized Solution That Manages Recruitment, Onboarding, Resignation Processing, Salary Tracking, Asset Assignment, And Document Handling, All Through User-Specific Dashboards Tailored To Different Roles Such As Hr

Personnel, Heads Of Departments (Hods), Principals, System Administrators, And Employees Themselves. The Recruitment Module Facilitates End-To-End Hiring By Allowing Administrators To Manage Job Postings, Review Applications, And Initiate Selection Procedures, Followed By Automated Offer Communications To Selected Candidates. When A New Employee Is Onboarded, Their Information Is Immediately Visible To Administrative Users, Enabling Prompt Asset Allocation And Initiation Of Responsibilities, While An Automated Email System Ensures Timely Communication. Similarly, The Resignation Process Follows A Structured Multi-Level Approval Chain—Beginning From The Employee And Proceeding Through The Hod, Principal, Hr, And System Admin—Ensuring A Transparent And Accountable Exit Procedure That Includes Notice Period Management And Asset Retrieval. The System Also Supports Secure Upload And Retrieval Of Important Documents, Personalized Access To Salary Details, And Real-Time Visibility Into Hr Operations, Promoting Data Integrity, Transparency, And Operational Efficiency. Additionally, It Enhances Coordination Among Departments, Reduces Manual Workload, And Improves Decision-Making Through Real-Time Dashboards And Notifications. Designed With Scalability In Mind, This System Is Adaptable For Future Enhancements Such As Mobile Accessibility, Ai-Powered Analytics For Performance Evaluation And Attrition Prediction, And Cloud-Based Support For Managing Hr Functions Across Multiple Campuses, Thereby Laying A Strong Foundation For A Smarter, More Efficient, And Digitally Empowered Human Resource Environment.

SEMANTIC FRAMEWORK FOR EFFICIENT DATA INTEGRATION IN ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) Systems Increasingly Rely On Diverse, Large-Scale Datasets For Training And Decision-Making. However, The Integration Of Heterogeneous Data From Disparate Sources Poses Challenges In Terms Of Consistency, Semantic Interoperability, And Retrieval Efficiency. This Paper Proposes A Semantic Framework Based On Ontologies For Efficient Data Integration And Retrieval In Ai Systems. The Framework Leverages Owl Ontologies, Rdf Data Representation, And Sparql Querying To Semantically Enrich And Unify

Data Sources. The Architecture Is Evaluated Across Multiple Domains Including Healthcare, E-Commerce, And Academia. Results Demonstrate Improvements In Semantic Precision, Recall, And Integration Efficiency, Highlighting The Framework's Potential For Real-World Ai Applications. Artificial Intelligence (Ai) Has Transformed Industries By Enabling Systems To Simulate Human Reasoning, Make Decisions, And Process Massive Amounts Of Data. However, The Utility Of Ai Systems Is Heavily Contingent Upon The Availability And Quality Of Integrated Data. Ai Applications Typically Source Data From Heterogeneous Formats—Relational Databases, Xml/Json Apis, Flat Files—Making Semantic Alignment And Data Retrieval A Formidable Challenge. Traditional Data Integration Methods Often Involve Syntactic-Level Matching, Which Lacks The Semantic Depth Necessary For Ai Tasks. To Bridge This Gap, Ontology-Based Data Integration Has Emerged As A Robust Paradigm. Ontologies, Which Define Shared Vocabularies And Logical Relations In A Domain, Offer A Way To Semantically Unify And Access Data. This Paper Presents A Semantic Framework For Efficient Data Integration In Artificial Intelligence, Which Uses Ontology Engineering, Semantic Data Representation, And Intelligent Querying To Enable Context-Aware, Consistent, And Scalable Data Integration.

Keywords:Artificial Intelligence, Ontologies, Semantic Web, Data Integration, Rdf, Sparql, Owl, Knowledge Representation.

SMART FOOD ORDERING SYSTEM

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The Smart Food Ordering System Is An Innovative Solution Designed To Enhance The Efficiency Of Food Ordering And Delivery Within Sri Shanmugha Educational Institutions. Traditional Canteen Systems Often Lead To Long Queues, Extended Waiting Times, And Mismanaged Orders, Causing Inconvenience For Both Students And Canteen Staff. This System

Aims To Digitize And Streamline The Entire Food Ordering Process, Making It More Organized And User-Friendly. The Platform Is Built With Three Key Modules: Admin, Canteen Staff, And User (Student And Faculty). The Admin Module Allows Administrators To Manage Food Menus. The Canteen Staff Module Enables Canteen Workers To Receive And Process Orders Efficiently, Updating The Order Status Step By Step And Ensuring Real-Time Updates Of Available Food Items. The User Module Provides Students With An Intuitive Interface To Browse Menus, Place Orders, Select Pickup Times, And Track Their Order Status In Real-Time. The Platform Incorporates Flutter For The Frontend, Node.Js For Backend Processing, And Mysql For Data Storage, Ensuring A Seamless And Scalable Experience. To Facilitate Real-Time Communication Between Users And Canteen Staff, The System Integrates Web Sockets, Allowing Instant Order Updates. Additionally, An Otp-Based Verification System Ensures That Food Orders Are Collected By The Correct User. Students Can Choose Between Online Payment (Gpay) And Cash Transactions, Providing Flexibility And Convenience. The Dynamic Management Of Food Availability Prevents Ordering Out-Of-Stock Items, Reducing Confusion And Frustration. By Automating And Optimizing The Food Ordering Workflow, This System Eliminates Unnecessary Delays, Enhances Order Accuracy, And Minimizes Congestion In The Canteen. The Smart Food Ordering System Fosters A Digitally Connected, Efficient, And Modern Campus Environment, Significantly Improving The Overall Dining Experience For Students And Canteen Staff Alike.

AI-DRIVEN GRIEVANCE REDRESSAL SYSTEMS FOR CIVIC ISSUES: A COMPREHENSIVE SURVEY

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With the exponential growth of urban populations and the increasing complexity of civic administration, efficient grievance redressal has become a cornerstone of good governance. Traditional manual systems are plagued by delays, lack of transparency, and limited scalability. Recent advances in Artificial Intelligence (AI), particularly Natural Language Processing (NLP) and machine learning, have enabled the development of intelligent, automated grievance

redressal systems that promise faster, more accurate, and citizen-centric complaint handling. This survey paper reviews the evolution of grievance redressal systems, analyzes the state-of-the-art in AI-powered solutions-including multilingual chatbots, automated classification, sentiment analysis, and predictive analytics-and discusses their architectures, methodologies, and real-world deployments. We compare methodologies and performance across more than 16 recent studies, identify key challenges such as data bias, explainability, and interoperability, and outline future directions for scalable, inclusive, and transparent civic grievance management.

Keywords:grievance redressal, e-government, complaint management, NLP, machine learning, chatbots, urban governance, explainable AI

REAL TIME CRIME PATTERN BY USING PREDICTIVE INTELLIGENCE &VISUALIZATION

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Crime is a critical issue affecting societies worldwide, and analyzing crime patterns plays a key role in helping law enforcement agencies take proactive measures. This project, Crime Rate Analysis Using Data Science, utilizes machine learning and data visualization to study crime trends, identify high-risk areas, and predict future crime occurrences.Historical crime datasets containing details such as crime type, geographic location (latitude/longitude), and time of occurrence are used. Data preprocessing includes handling missing values and feature extraction (year, month, hour). Exploratory Data Analysis (EDA), performed with tools like Seaborn, Matplotlib, and Pandas, reveals hidden patterns and distributions. A Random Forest Classifier is used to classify crime types based on temporal and spatial features, achieving high accuracy using an 80/20 train-test split. Additionally, interactive heatmaps generated with Folium highlight crime-prone regions, allowing law enforcement to prioritize critical zones. This system provides actionable insights to support strategic policing and public policy. Future improvements may include deep learning for crime forecasting, real-time crime data integration, and AI- powered crime alert mechanisms.

A DEEP LEARNING YOLO BASED PLANT PATHOLOGY DIAGNOSIS WITH GENERATIVE AI

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The health and vitality of trees are crucial for ecological balance and biodiversity. Early detection of tree diseases can facilitate timely intervention, preventing widespread damage. This study proposes an AI-powered tree disease detection system by leveraging the YOLO convolutional neural network architecture. The methodology involves collecting high-resolution images of tree leaves, employing preprocessing techniques such as resizing, normalization, and augmentation to enhance model robustness. A pre-trained YOLO model is fine-tuned for disease classification, undergoing rigorous training and validation using accuracy, precision, recall, and F1-score metrics. To improve user accessibility, a chatbot interface is integrated, allowing arborists, foresters, and environmentalists to upload images, receive disease diagnoses, and access treatment recommendations interactively. The chatbot also provides continuous learning capabilities, refining its knowledge base with updated disease information. The proposed system offers a scalable and automated approach to precision agriculture and environmental monitoring, fostering sustainable practices for ecosystem preservation. Future research may explore IoT integration for real-time environmental assessments, further enhancing predictive capabilities.

Keywords:Tree disease detection, YOLO, Convolutional Neural Networks (CNN), Image classification, Precision agriculture, Environmental monitoring, Deep learning, Chatbot interface, Transfer learning, Sustainable ecosystem management, IoT integration.

ANALYSIS AND PREDICTION OF CIBIL SYSTEM USING MACHINE LEARNING

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An existent's creditworthiness is substantially determined by their Credit Information Bureau(India) Limited(CIBIL) score, so directly impacting loan authorizations and fiscal credibility. This work presents a thorough study and prophetic modeling of the CIBIL scoring system applied with machine literacy approaches. To more grasp how credit scores are told, we probe important behavioral and fiscal aspects including credit history, loan types, credit use, and prepayment patterns. We construct prophetic models suitable to estimate an existent's CIBIL score with great delicacy by combining supervised literacy algorithms including Random Forest, Support Vector Machines, and grade Boosting. likewise important for offering practical perceptivity for consumers and pocket institutions is our study of features. The findings show how machine education might better credit scoring's efficacity and openness.

Keywords: Cibil Score, Credit Scoring, Machine Learning, Credit Risk Analysis, Predictive Modeling, Financial Behaviour.

A MODULAR AI PIPELINE FOR NARRATIVE VIDEO GENERATION WITH CUSTOM CHARACTER AND PROPERTY UPLOAD AND CONSISTENCY PRESERVATION ACROSS SCENES

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This paper presents a novel multimodal generative AI framework which translates narrative text to expressive video and audio scenes. Natural language processing, text to image diffusion models and text to speech synthesis are used for generating character consistent and context aware multimedia stories. For that, it includes automated scene segmentation, prompt generation for context aware image generation, uploading personalized characters and properties, generation of characters that are identity and prompt aware. Expressive narration also adds to a complete visual experience. In addition to top integration of advanced prompt engineering, diffusion based image synthesis, keeping consistency in each scene, speech generation for which one that's expressive from the context and emotionally engaging. The important key features

include the character stylization, scene coherence, context retention, and the review interface for final video assembly. The results of this research show how much of the storytelling and creative scope in multitasking work activities can be automated with its multimodal AI.

Keywords:Generative AI, diffusion models, text generation, GPT, multimodal generation.

DEEP REINFORCEMENT LEARNING BASED MALICIOUS URL DETECTION

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An AI-powered tool called the Automated Academic Research Assistant was created to help students and academics conduct research more efficiently. By employing sophisticated natural language processing (NLP) with Transformer models such as BERT and T5, the system can process intricate user inquiries, extract pertinent keywords, and retrieve relevant papers from a custom dataset of scholarly articles. To enable focused investigation, it groups papers according to subtopics using clustering techniques like K-Means. The assistant creates clear, excellent summaries of paper abstracts that highlight important conclusions and techniques. By generating research timelines according to user deadlines and paper complexity, it also automates task scheduling. This tool, which can be accessed through a Flask or Streamlit interface, improves research efficiency, minimizes manual labor, and facilitates interdisciplinary academic endeavors by offering customized recommendations.

LEVERAGING NLP FOR CONSTRUCTING CANCER KNOWLEDGE GRAPHS

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The integration of Natural Language Processing (NLP) with Knowledge Graphs (KGs) has revolutionized cancer research by transforming unstructured biomedical data into structured and queryable insights. Initially grounded in manual curation and rule-based systems, early cancer

KGs drew from foundational ontologies, such as UMLS and MeSH. Progress accelerated with the emergence of tools such as SemRep and PubTator and later deep learning models such as BioBERT and SciBERT, enabling the automatic extraction of gene-drug-disease relationships from vast biomedical literature and clinical data. Currently, these NLP-powered KGs support a range of critical applications, such as drug repurposing, personalized therapy recommendation, clinical decision support, biomarker discovery, subtype classification, side effect prediction, and automated clinical trial matching. They also facilitate literature summarization and novel hypothesis generation by connecting latent associations in cancer biology. Key contributors to this evolution include academic institutions (e.g., Stanford BMIR, Korea University), government agencies (e.g., NIH/NLM), and industry (e.g., IBM Watson, GSK, Allen Institute for AI). Modern developments incorporate large language models and graph neural networks to enable real-time updates, deep semantic reasoning, and multimodal integration of genomic, phenotypic, and clinical trial data. Cancer knowledge graphs serve as a central infrastructure for precision oncology, enabling data-driven discovery and personalized treatment pathways. These innovations mark a shift from static databases to dynamic AI-powered systems that not only answer clinical questions but also drive new research directions. This convergence of NLP and KGs offers a powerful paradigm for addressing the complexity of cancer and accelerating translational research

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SELF-SUPERVISED LEARNING FOR IOT ANOMALY DETECTION

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The rapid proliferation of Internet of Things (IoT) devices has led to an unprecedented volume of sensor data streams, posing significant challenges for timely and accurate anomaly detection. Traditional supervised anomaly detection methods often require extensive labeled datasets, which are costly and impractical to obtain in dynamic IoT environments. This research presents a comprehensive study on self-supervised representation learning techniques tailored for anomaly detection in IoT sensor data streams. By leveraging intrinsic data properties without relying on external labels, self supervised learning enables the extraction of robust and meaningful representations that improve detection performance and generalization across

diverse IoT applications.The paper reviews current self-supervised approaches and proposes a novel methodology incorporating domain-specific pretext tasks designed to capture temporal and contextual dependencies in sensor data. Experimental evaluations conducted on multiple public and proprietary IoT datasets demonstrate that the proposed method outperforms existing baselines in precision, recall, and scalability. These findings highlight the potential of self supervised learning to address key limitations of traditional anomaly detection systems, particularly in scenarios with limited annotations and evolving data distributions.The implications of this work extend to real-time monitoring and fault detection in critical IoT infrastructures, providing a foundational step toward more adaptive and efficient anomaly detection frameworks.

DISEASE SURVEILLANCE AND EARLY OUTBREAK DETECTION USING REAL-TIME DATA

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This project is a web-based healthcare management system designed to make it easier for users to register, manage their medical records, and receive real-time health updates. Developed using Flask and SQLite, with strong authentication measures in place, the system ensures that users' personal and medicalinformation remains safe and private. It offers a straightforward, user-friendly interface that anyone cannavigate without hassle.When users register, they provide important details such as their name, age, contact information, and occupation. They can also upload medical reports, which the system stores securely using best practices for file handling. This ensures that sensitive documents are protected but remain easily accessiblewhenever users need them.The platform supports different types of users, including regular users and an administrator, each with role-specific access. While users can add, view, or delete their medical records as needed, the administrator manages a special "Running Message" feature. This feature broadcasts crucial health updates, including both text and multimedia content, helping to keep everyone informed. Additional functionalities include the ability to visualize reports and proactive communication of health precautions. Overall, the system emphasizes scalability, data security, and a user-centered design. It serves as a valuable tool for healthcare providers and

individuals alike, helping to efficiently manage medical records and improve communication between patients and healthcare professionals.

THE ERA OF AI: TRANSFORMING INDUSTRIES AND BEYOND

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This presentation explores the transformative impact of Artificial Intelligence (AI) across various sectors and its evolving role in shaping the modern world. Tracing its roots from the 1950s to the present, it highlights key milestones in AI development, including major innovations like deep learning and natural language processing. The presentation examines AI's widespread application in healthcare, finance, manufacturing, transportation, and retail, emphasizing its advantages such as improved efficiency, accuracy, and personalization. It also contrasts AI with traditional software and related fields like machine learning and data science. Furthermore, the synergy between AI and cloud computing is discussed, illustrating how platforms like Azure, AWS, and Google Cloud facilitate scalable and collaborative AI deployment. Looking forward, the presentation outlines future trends including generative AI, ethical AI, and hyper automation. Ultimately, it emphasizes the need for industries and individuals to embrace AI's capabilities and prepare for its integration into daily life and business operations.

SMART COMBAT HELMET ADD-ONS FOR MODERN ARMY OPERATIONS

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The Smart Combat Helmet Add-ons project aims to revolutionize modern military gear by integrating advanced modular technologies into standard army helmets. This innovative system enhances soldier survivability, communication, health monitoring, and operational awareness on

the battlefield. The helmet includes multiple add-on modules such as a Heads-Up Display (HUD) for real-time navigation and targeting, a 360° situational awareness camera system, bone-conduction communication units, and embedded biosensors for health and fatigue monitoring. A robust navigation system powered by GPS and inertial sensors aids in precise movements, while smart power management units—comprising solar and kinetic chargers nsure extended operational use. The use of lightweight, high-strength materials like Kevlar, carbon fiber, and graphene enhances both ballistic protection and wearer comfort, while phase-change cooling pads and memory foam padding ensure ergonomic design and thermal regulation. These helmet enhancements not only improve individual soldier performance and safety but also contribute to more coordinated and efficient military operations. Designed for modularity, scalability, and future upgrades, the smart helmet add-ons demonstrate high impact in defense technology advancement.

Keyword:Smart Helmet, Army Add-ons, HUD, Soldier Health Monitoring, Tactical Communication, Ballistic Protection, Military Wearable Tech, Augmented Reality, Battlefield Navigation, Situational Awareness

REAL TIME DATA COLLECTION FOR SUSTAINABLE RESOURCE MANAGEMENT

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Real-time data collection for sustainable resource management is made possible by the Internet of Things (IoT), which has become a game-changing technology for environmental monitoring. But as loT implementations spread over environmental areas, data integrity and authenticity become crucial issues. The sustainability objectives that these systems are intended to promote are also compromised by inaccurate or manipulated data, which also misleads environmental policies.Because of resource-constrained devices and open communication channels, existing environmental loT systems frequently lack secure authentication mechanisms and are vulnerable to data manipulation, illegal access, and cyber-physical attacks.In this study, a lightweight, blockchain-enabled authentication architecture tailored for environmentally conscious loT installations is put forth. To guarantee tamper-proof data storage and transmission, the architecture makes use of a decentralised ledger and elliptic curve encryption (ECC) for effective device authentication. Integrating edge computing improves data validation at the source while reducing energy use. The suggested system is a scalable and sustainable

solution for safe environmental Internet of Things applications since it dramatically increases data integrity, minimises attack surfaces, and keeps computational overhead low, according to experimental research.

NEXT-GEN CLASSROOM TOOLS: VOICE-ENABLED SMART TABLES FOR INTERACTIVE LEARNING AND AUTOMATION

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Technological progress has brought significant changes to the educational sector, leading to the development of innovative tools like the smart table—an interactive, multi-functional device designed to enrich classroom experiences for both students and teachers. This study introduces a newly enhanced version of the smart table, focusing on features that support collaborative learning and automation within the classroom. The updated model is equipped with built-in microphones that allow students to engage in discussions with greater clarity and enable teachers to record their lessons. These recordings are automatically transcribed into text and stored, ensuring that absent students can access and review missed content. Additionally, the smart table features a self-attendance system, enabling students to register their presence through a user-friendly interface. The paper also examines the supply chain process involved in the development and distribution of the device. While the smart table offers notable benefits such as improved content retention, interactive learning, ease of managing classroom tasks, and better communication, certain limitations persist. High implementation costs and a general reluctance to adopt new technologies remain obstacles, particularly in institutions such as the University of Bridgeport. Nonetheless, the smart table holds great promise in transforming traditional educational practices and making learning more accessible, personalized, and effective.

Keywords — smart table, educational technology, classroom automation, voice-to-text transcription, student attendance, supply chain.

LEVERAGING AI AND IOT FOR SUSTAINABLE BUSINESS MODELS

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In the contemporary business landscape, the integration of cutting-edge technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) has emerged as a crucial driver for achieving sustainability. As global concerns about climate change, resource scarcity, and environmental degradation escalate, businesses are under increasing pressure to adopt sustainable practices. This paper explores how AI and IoT can be strategically utilized to develop and implement sustainable business models across various sectors. Artificial Intelligence, with its capabilities in data analysis, predictive modeling, and automation, allows organizations to make informed decisions that enhance operational efficiency and reduce waste. For instance, AI-powered analytics can identify inefficiencies in production processes, optimize supply chains, and enable demand forecasting, thereby minimizing resource usage and lowering the carbon footprint. On the other hand, IoT devices facilitate real-time data collection from physical assets, enabling continuous monitoring and control. This interconnected network of smart sensors and devices ensures that businesses can track energy consumption, emissions, and equipment performance in real-time. When combined, AI and IoT create intelligent systems that offer deep insights into sustainability metrics. In manufacturing, smart factories use AI and IoT to automate processes, monitor environmental conditions, and ensure compliance with sustainability regulations. In agriculture, precision farming techniques, powered by these technologies, optimize water usage, monitor soil health, and increase crop yields with minimal environmental impact. Similarly, in urban infrastructure, smart grids and energy-efficient buildings utilize AI and IoT to reduce electricity usage and improve resource management. Furthermore, these technologies also play a pivotal role in shaping sustainable consumer behavior.Businesses can use AI-driven customer insights to design eco-friendly products and services, while IoT-enabled devices can encourage consumers to track and reduce their energy usage. This not only improves brand value but also fosters a culture of sustainability among end-users. However, the adoption of AI and IoT for sustainable growth is not without challenges. Data privacy, high initial investment costs, lack of skilled labor, and technological integration issues can pose significant barriers. Therefore, it is essential for businesses to develop comprehensive strategies that include capacity building, stakeholder engagement, and

collaboration with technology providers and regulators. This paper concludes that leveraging AI and IoT offers a promising pathway for businesses striving for sustainability. By embracing these adaptive technologies, organizations can not only achieve environmental goals but also gain competitive advantages, enhance customer satisfaction, and drive long-term profitability.

AI BASED SMART FEEDER SYSTEM FOR PET ANIMALS USING IOT

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In the modern era, pet care has become increasingly challenging due to the busy lifestyles of pet owners. This paper proposes the design and implementation of an IoT-based Smart Pet Feeder system integrated with real-time monitoring capabilities. The system ensures timely feeding of pets and enables remote monitoring using a camera module and a mobile application interface. The core components of the system include an ESP32 microcontroller, a servo motor for controlled food dispensing, and an ESP32-CAM for live video streaming. The feeder can be remotely operated through a dedicated mobile app, allowing pet owners to monitor feeding schedules and interact with their pets from anywhere. Notifications are also sent when a pet is detected near the feeder, ensuring engagement and feeding accuracy. This smart solution promotes pet health, reduces the workload on owners, and ensures efficient feeding management. Experimental results demonstrate the system's reliability, scalability, and user-friendliness, making it a practical solution for modern pet care.

Keywords:IoT, Smart Pet Feeder, Real-Time Monitoring, ESP32, Servo Motor, ESP32-CAM, Remote Control, Mobile Application, Pet Care Automation, Smart Home.

COGNITIVE CLARITY LEVERAGING VISUAL LEARNING FOR PROFESSIONAL GROWTH

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IOT-Driven Visual Learning: Enhancing Education Through Smart Connectivity. Grounded in multiple intelligences and cognitive load theory, IOT-enabled visual learning leverages interconnected smart devices to deliver visual content—images, graphs, videos, and spatial layouts—in real time. At its core is a compact chip, capable of billions of operations per second, embedded in projectors, wearables, or potentially, future neural interfaces like NEURALINK. This technology transforms classrooms into interactive environments, simplifies teaching, and deepens student understanding, especially in subjects like math and science. As we move toward more immersive, tech-integrated education systems, key factors such as data security, intuitive user interfaces, and cost and time efficiency remain central to its successful implementation.

Keywords**:** Neuralink, Data Security, Intuitive User Interface, And Cost And Time Efficiency

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SMART WATER MANAGEMENT USING INTERNET OF THINGS (IOT)

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This paper investigates the application of Internet of Things (IoT) technology in the domain of water management to enhance efficiency and sustainability. Traditional water management systems often suffer from limitations such as inaccurate monitoring, inefficient distribution, and inadequate response to leaks. Leveraging IoT devices, sensors, and communication networks, this study proposes a comprehensive framework for smart water management. By deploying sensors to collect real-time data on water quality, consumption patterns, and infrastructure conditions, the system enables proactive monitoring and control. Through advanced analytics and remote actuation, anomalies such as leaks can be swiftly detected and addressed, leading to optimized resource allocation and reduced wastage. The integration of IoT facilitates a holistic approach to water management, enabling stakeholders to make informed decisions and promote responsible water usage practices. This abstract provides a succinct overview of the methodology, functionalities, and potential advantages of implementing IoT in water management systems, highlighting its significance in addressing the challenges of water scarcity and sustainability.

SMART IOT AND AI-DRIVEN SYSTEM FOR AUTONOMOUS SURFACE WATER WASTE MANAGEMENT

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This paper presents the design and development of an AI-powered IoT system for autonomous surface water waste management. Combining machine learning techniques with real-time sensor networks and unmanned surface vehicles (USVs), the system performs waste detection, classification, and removal with minimal human oversight. Ultrasonic sensors, cameras, and

GPS modules feed environmental data into an edge-AI processing unit, enabling on-the-spot decision-making and adaptive path planning. A cloud-based dashboard allows stakeholders to visualize data trends, track system performance, and deploy targeted interventions. Through simulations and pilot deployments, the system demonstrates robust functionality in dynamic aquatic environments. This innovative solution represents a scalable and cost-effective approach to maintaining water quality and protecting aquatic life

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AUTONOMOUS WASTE COLLECTION VEHICLE: NAVIGATING REGULATORY CHALLENGES AND COMPLIANCE

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Autonomous systems are increasingly transforming urban operations, with municipal waste collection standing out as a promising use case due to its repetitive and labor-intensive nature. This paper explores the integration of autonomous vehicle technology into waste management, focusing on the complex regulatory and operational challenges that shape deployment. Despite advances in robotics and vehicle autonomy, widespread adoption is hindered by fragmented legal, safety, labor and environmental regulations across jurisdictions. A

comprehensive analysis of international, national, and regional policy frameworks reveals key inconsistencies and regulatory gaps. Drawing on case studies from North America, Europe and Asia, and insights from stakeholders—including urban planners, legal experts and technology developers—this study examines both enablers and barriers to adoption. It also addresses critical design and deployment issues such as liability, cybersecurity, data governance and integration with smart city infrastructure. The paper concludes with practical recommendations for aligning innovation with regulation through adaptive governance, risk management, ethical system design and public engagement. The findings aim to support the development of autonomous waste systems that are technically sound, legally compliant and publicly accepted.

Keyword: Autonomous Vehicles, Urban Waste Collection, Regulatory Compliance, Smart Cities, Risk Management, Adaptive Governance , Robotics in Public Services .

AN INTELLIGENT SURVEILLANCE APPROACH VIA LoRa SENSOR INTEGRATION FOR TWO WHEELERS

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The project aims to develop a vehicle motion tracking and monitoring system utilizing LoRa (Long Range) wireless communication technology. This system is designed to provide real- time tracking and monitoring of vehicle movement, location, and other vital parameters, offering a reliable and efficient solution for fleet management, logistics, and transportation industries without relying on GSM networks.LoRa technology is well- suited for this application due to its long-range communication capabilities, low power consumption, and cost-effectiveness. It operates on license-free frequency bands, allowing data transmission over several kilometers, which is ideal for remote or rural areas where GSM coverage is limited or unavailable. The system architecture includes LoRa-enabled GPS trackers installed on vehicles, strategically placed LoRa gateways to receive data, and a central server or cloud platform to collect, process, and store the information. Users can access a dashboard via web or mobile applications for real-time monitoring and alerts.

AUTONOMOUS RIVER CLEANING ROBOT

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This paper presents the design, development, and implementation of an autonomous river cleaning robot developed to mitigate the adverse effects of water pollution caused by floating solid waste. The proposed system is a comprehensive integration of mechanical structure, electronic circuitry, and embedded programming to facilitate both manual and autonomous operation. The robot employs a catamaran-type hull structure that enhances buoyancy and stability on the water surface. A motor-driven conveyor belt mechanism is deployed to collect floating debris from the water body efficiently. The navigation system of the robot comprises GPS modules for route tracking and ultrasonic sensors for obstacle detection and avoidance, thereby enabling semi-autonomous movement across designated areas. The system is powered by rechargeable batteries, which are further supported by solar panels to enhance operational sustainability and reduce dependence on external power sources. Experimental validations were conducted in controlled water bodies, which demonstrated the robot's capability to collect waste effectively and navigate with minimal human intervention. The outcome of this project emphasizes the practicality and scalability of automated solutions in environmental conservation efforts. Future work will focus on integrating AI-based vision systems for real-time waste classification and enhancing path planning algorithms for better autonomy in dynamic aquatic environments.

Index Terms—Autonomous robot, river cleaning, water pollution, GPS navigation, ultrasonic sensors, Arduino, conveyor system, solar energy

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A REAL-TIME DRIVER DROWSINESS DETECTION SYSTEM USING FACIAL LANDMARK RATIOS AND COMPUTER VISION

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Driver drowsiness is a significant contributor to road accidents, impairing essential sensory, cognitive, and psychomotor abilities necessary for safe driving. While several drowsiness detection systems have been developed in recent years, many still require improvements in terms of accuracy, efficiency, cost, speed, and accessibility. Traditional systems primarily rely onvehicle-based features, such as lane tracking and steering control behaviour, to detect drowsiness. However, these systems often overlook direct driver behaviour signals. This project proposes a novel approach that focuses on monitoring facial features, specifically eye and mouth closure statuses, using computer vision technology to assess driver fatigue. The system employs a Face Detector to locate the driver's face and extract facial landmarks. Using two algorithms, fixed thresholding and dynamic frame thresholding, the system calculates two key parameters: The Eye Aspect Ratio (EAR) and the Mouth Opening Ratio (MOR). These parameters are crucial for identifying signs of drowsiness, such as eye closure and yawning. When the system detects abnormal EAR or MOR values, it alerts the driver through sound or voice messages, prompting them to take a break and prevent potential accidents. Additionally, the system is designed to detect hand gestures, such as nodding or covering the mouth, which are common human responses to combat sleepiness. This non-invasive, camera based solution offers a practical and efficient means of monitoring driver fatigue, with no need for physical contact with the driver. By providing real-time alerts, the system aims to reduce road accidents caused by drowsy driving and enhance road safety. Its simplicity, ease of implementation, and effectiveness make it a valuable tool in improving driver awareness and preventing accidents. Keywords: Driver drowsiness detection, Eye Aspect Ratio (EAR), Mouth Opening Ratio (MOR), Facial landmarks, Deep learning, Convolutional Neural Networks (CNN), Computer vision, Safety alerts, Real-time monitoring, Driver behavior analysis.

BEYOND THE BLOCKCHAIN: EMERGING SECURITY CHALLENGES AND REGULATORY SHIFTS IN CRYPTOCURRENCIES

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This article delivers an up-to evaluation of cryptocurrency security challenges, building on systematic investigations of prior systems and integrating developments from 2020 to 2025.

The evolving threat landscape is examined, including the rise of sophisticated illegal activities such as ransomware, scams, and advanced hacking techniques. The article highlights the impact of stricter regulatory responses, focusing on Know Your Customer (KYC), Anti-Money Laundering (AML) measures, and new oversight of decentralized finance (DeFi) and stablecoins. It explores advancements in blockchain intelligence and the growing tension between privacy and regulatory compliance, as privacy-enhancing technologies face increased scrutiny. DeFi-specific vulnerabilities, such as smart contract exploits and flash loan attacks, are analyzed alongside persistent consumer concerns about custodial risks and platform reliability. By synthesizing the latest data and emerging research, this article offers a timely perspective on the multifaceted security and regulatory challenges facing the cryptocurrency ecosystem, and outlines priorities for future research and policy development.

Keywords: Cryptocurrency, Blockchain, Security, DeFi, Regulatory Compliance, KYC, AML, Smart Contracts, Privacy, Stablecoins.

IDENTIFYING FRAUDULENT CREDIT CARD TRANSACTIONS USING EL&ML ALGORITHMS

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Credit card fraud continues to be a critical issue in the financial industry, leading to considerable financial damage. This project investigates the application of Machine Learning (ML) and Ensemble Learning (EL) algorithms to detect suspicious credit card transactions. Various supervised models such as Decision Trees, Random Forest, and Gradient Boosting are implemented and optimized. Due to the imbalanced nature of transaction data, oversampling techniques like SMOTE are applied to enhance prediction capability. The performance of each model is measured using metrics like precision, recall, F1-score, and ROC-AUC. Findings show that ensemble models provide higher accuracy and reliability compared to single classifiers. The research supports the development of smarter, more secure fraud detection systems in banking and finance.

IMPLEMENTING WAZUH OPEN SOURCE SECURITY INFORMATION AND EVENT MANAGEMENT (SIEM) SYSTEM FOR ENHANCED THREAT DETECTION AND INCIDENT RESPONSE

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The increasing complexity of modern IT infrastructures and the ever-evolving threat landscape have made it essential for organizations to implement robust security monitoring and incident response capabilities. Security Information and Event Management (SIEM) systems have emerged as a crucial component of an organization's security posture, providing real-time monitoring, threat detection, and incident response capabilities. This project focuses on implementing Wazuh, an open-source SIEM solution, to enhance threat detection and incident response capabilities.Wazuh is a widely-used, open-source SIEM solution that provides a comprehensive platform for monitoring and analyzing security-related data from various sources, including logs, network traffic, and system events. Its real-time monitoring capabilities enable organizations to identify potential security threats and incidents, while its threat intelligence features provide valuable insights into known threats and vulnerabilities. Additionally, Wazuh's compliance management features help organizations meet regulatory requirements and industry standards.The primary objective of this project is to deploy Wazuh and integrate it with various data sources, including logs, network traffic, and system events. This will enable real-time monitoring and analysis of security-related data, providing valuable insights into potential security threats and incidents. The project will also involve configuring alerts and notifications to notify security teams of potential threats, ensuring timely incident response and minimizing the impact of security breaches.The expected outcomes of this project include improved threat detection, enhanced security visibility, and compliance management. Wazuh's real-time monitoring and threat intelligence capabilities will enable organizations to identify potential security threats and incidents, while its compliance management features will help organizations meet regulatory requirements and industry standards. The project's outcomes will be beneficial for organizations seeking to enhance their cybersecurity posture and improve their incident response capabilities.The significance of this project lies in its ability to demonstrate the effectiveness of Wazuh as an open-source SIEM solution. By leveraging Wazuh's capabilities, organizations can enhance their threat detection and incident response capabilities, ultimately

strengthening their cybersecurity posture. The project's outcomes will provide valuable insights into the implementation and configuration of Wazuh, serving as a reference for organizations seeking to deploy similar solutions.In conclusion, implementing Wazuh open-source SIEM solution is an effective way to enhance threat detection and incident response capabilities. By providing real-time monitoring, threat intelligence, and compliance management, Wazuh enables organizations to identify and respond to security threats effectively. This project will demonstrate the effectiveness of Wazuh in detecting and responding to security incidents, providing valuable insights into its implementation and configuration. The project's outcomes will be beneficial for organizations seeking to enhance their cybersecurity posture and improve their incident response capabilities.

HYBRID CLOUD SECURITY MODEL: TEE-ASSISTED ATTRIBUTE BASED ENCRYPTION

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With the rapid adoption of cloud storage services, ensuring the confidentiality, integrity, and controlled access of sensitive data has become a critical challenge for enterprises. Traditional encryption methods protect data at rest and in transit but fall short when data needs to be processed or shared securely in untrusted environments. This project proposes a hybrid cloud security framework that combines Trusted Execution Environments (TEE) and Attribute-Based Encryption (ABE) to address these challenges effectively. The proposed system leverages Attribute-Based Encryption to enforce fine-grained access control policies, ensuring that only authorized users with specific attributes can decrypt and access sensitive data. Additionally, TEE-enabled secure enclaves (such as Intel SGX or AWS Nitro Enclaves) are utilized to perform computations on encrypted data without exposing plaintext to the cloud service provider, thus maintaining data confidentiality even during processing. This hybrid approach enhances security by mitigating insider threats, unauthorized data access, and data leakage risks. The solution is designed to be scalable for enterprise-level deployment, ensuring efficient key management, policy enforcement, and minimal performance overhead. Through this project, a

prototype cloud storage system will be developed to demonstrate secure data storage, controlled access, and confidential processing using the integrated TEE and ABE framework.

CROSS-PLATFORM REPUTATION GENERATION SYSTEM USING ASPECT BASED SENTIMENT ANALYSIS

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The active growth of Internet-based applications such as social networks and e-commerce websites leads people to generate a tremendous amount of opinions and reviews about products and services. Thus, it becomes very crucial to automatically process them. Over the last ten years, many systems have been proposed to generate and visualize reputation by mining textual and numerical reviews. However, they have neglected the fact that online reviews could be posted by malicious users that intend to affect the reputation of the target product. Besides, these systems provide an overall reputation value toward the entity and disregard generating reputation scores toward each aspect of the product. Therefore, we developed a system that incorporates spam filtering, review popularity, review posting time, and aspect-based sentiment analysis to generate accurate and reliable reputation values. The proposed model computes numerical reputation values for an entity and its aspects based on opinions collected from various platforms. Our proposed system also offers an advanced visualization tool that displays detailed information about its output. Experiment results conducted on multiple datasets collected from various platforms (Twitter, Facebook, Amazon) show the efficacy of the proposed system compared with state-of-the-art reputation generation systems.

FAKE PRODUCT DETECTION USING OPENCV SYSTEM

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Counterfeit products have become a growing concern across various industries, leading to significant economic losses and risks to consumer safety. This project presents a computer vision-based solution for fake product detection using OpenCV, an open-source computer vision library. The system captures images of products through a camera or image input and processes them using OpenCV techniques such as feature extraction, template matching, edge detection, and image segmentation. By comparing key visual features like logos, barcodes, packaging details, and serial numbers with a pre-verified database of authentic products, the system identifies discrepancies that indicate potential counterfeiting. The lightweight and efficient nature of OpenCV makes it suitable for real-time deployment on devices ranging from desktops to embedded systems. This solution aims to provide a cost-effective and scalable method for enhancing product authenticity verification in sectors like pharmaceuticals, electronics, and consumer goods.

VOICE CONTROL ASSISTANT WITH VR SIMULATION

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This project focuses on the development of a Voice-Controlled Assistant integrated with Virtual Reality (VR) simulation, aiming to provide an immersive and interactive user experience. The assistant uses advanced speech recognition and natural language processing techniques to interpret user commands and perform tasks seamlessly within a virtual environment. By combining voice control with VR, the system allows users to navigate, control objects, and interact with digital spaces hands-free, enhancing accessibility and engagement. This innovative approach enables practical applications in smart homes, virtual training, education, gaming, and healthcare. The project serves as a platform to explore and implement various cutting-edge technologies such as AI, VR, speech processing, and real-time simulation, helping learners to practice and master modern technology concepts effectively.

TAMIL NADU HERITAGE NAVIGATOR: AN AI-DRIVEN MULTILINGUAL CULTURAL COMPANION

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The Tamil Nadu Heritage Navigator is an AI-powered, voice-assisted, multilingual system designed to transform the cultural tourism experience in Tamil Nadu. The solution integrates state-of-the-art artificial intelligence technologies, including Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), and advanced natural language processing (NLP) techniques, to provide real-time, context-aware insights into the state's historical and cultural landmarks. Addressing challenges such as linguistic diversity, lack of localized information, and limited accessibility, the system enables natural, voice-based interactions in multiple regional and global languages. It features dynamic personalization based on user preferences, location data, and query intent, thereby offering a highly tailored and immersive exploration experience. Deployed on scalable cloud infrastructure, the application ensures low-latency responses and continuous availability, supporting both on-site and remote access. Additionally, the project emphasizes cultural preservation by digitizing heritage arratives and enhancing public engagement through technology. The Tamil Nadu Heritage Navigator serves as a model for applying AI to regional tourism, fostering inclusive and informed travel while safeguarding intangible cultural assets.

HACKING THE HUMAN: THE PSYCHOLOGY BEHIND SOCIAL ENGINEERING ATTACKS

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Social engineering represents one of the most formidable threats in modern cybersecurity, not because of technological sophistication, but due to its exploitation of human psychology. Unlike traditional cyberattacks that target software vulnerabilities, social engineering attacks

rely on deception, emotional manipulation, and trust-building to compromise individuals and organizations. By manipulating cognitive biases, emotional responses, and behavioral tendencies, attackers are able to bypass security protocols and gain unauthorized access to sensitive information. This paper explores the psychological underpinnings that make social engineering so effective, including the roles of authority, reciprocity, fear, and social proof. It also examines a range of social engineering tactics—from phishing and pretexting to deepfake-enabled impersonation—and provides real-world case studies to demonstrate their impact. In addition, the paper analyzes emerging trends such as AI-driven social manipulation, discusses the ethical and legal challenges in both offensive and defensive applications, and proposes advanced mitigation strategies. By understanding the human factors at the heart of these attacks, cybersecurity professionals can better equip themselves to anticipate, detect, and counteract social engineering threats.

MEDICAL DATA ANALYSIS ON HEART PATIENTS USING DEEP LEARNING FOR ENHANCING SECURITY

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In the data analysis area, the Convolutional Neural Network (CNN) technique emerges as a promising approach for the analysis of medical data. Medical data encompassing diverse patient attributes, including demographics, medical history, and lifestyle factors, undergo meticulous pre- processing before CNN clustering. By grouping patients into clusters based on similarities in their medical profiles, CNN facilitates the identification of distinct subpopulations with varying cardiovascular risk profiles. Main phases of this analysis encompass feature selection, model training, and evaluation, culminating in the deployment of validated CNN models into clinical practice. The integration of CNN within healthcare workflows promises to furnish clinicians with actionable insights for tailored patient management strategies, thereby enhancing treatment efficiency and patient outcomes. Moreover, CNN's interpretability and computational efficiency render it a valuable tool for disentangling intricate relationships within medical data, forcing advancements in health informatics and personalized medicine. This paper deals with medical data analysis to provide solutions for making decisions and secure medical data.

Keywords: Medical Data, Deep Learning, Neural Networks, Data Analysis, Health informatics.

LATENCY CHALLENGES AND OPTIMIZATION IN CLOUD GAMING

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Cloud gaming, also known as game streaming, represents a paradigm shift in the gaming industry by shifting the computational and rendering tasks from local devices to remote cloud servers. This model offers the promise of ubiquitous gaming experiences, eliminating the need for high-end hardware and enabling cross-device gameplay. However, this convenience comes at a cost—latency, the delay between a player's input and the corresponding on-screen action, poses a critical barrier to widespread adoption and user satisfaction. This paper presents a comprehensive study on the sources, impacts, and optimization strategies associated with latency in cloud gaming systems. We begin by analyzing the architecture of cloud gaming platforms, breaking down the latency into its constituent components: input capture and encoding, network transmission, server-side processing and rendering, video encoding, and finally, video decoding and display at the client end. Each of these stages introduces specific latency factors that collectively determine the overall user experience. We classify latency into three primary categories: Client-Side Latency – including input capture delay, decoding time, and display latency. Network Latency – affected by bandwidth, jitter, congestion, and physical distance between client and server. Server-Side Latency – covering game engine processing, video rendering, and encoding time. The impact of latency is particularly pronounced in fast-paced and real-time multiplayer games, where even delays as low as 50–100 milliseconds can disrupt gameplay and reduce player engagement. To address this, the paper reviews a variety of optimization techniques, such as: Edge Computing and Cloudlets – reducing physical distance by deploying servers closer to users. Latency Hiding Techniques – including speculative execution, client-side prediction, and buffering. Adaptive Bitrate Streaming and Video Compression – improving transmission efficiency without degrading visual quality. Quality of Service (QoS) and Network Slicing – ensuring stable and prioritized data delivery over shared networks.AI-based Prediction Models – anticipating player inputs to reduce perceived latency. Hardware Acceleration – using GPUs, FPGAs, and custom chips for faster encoding and decoding

INTELLIGENT POULTRY SURVEILLANCE AND FEDDING SYSTEM POWERED BY IoT

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The integration of Internet of Things (IoT) technology is significantly transforming the agricultural sector, and poultry farming is one area experiencing notable advancements. Efficient environmental monitoring and automated feeding are essential for ensuring bird health and achieving high productivity. This project introduces a smart IoT-based system for monitoring and managing poultry environments and feeding processes. The system is composed of interconnected devices, including environmental sensors, feed level detectors, actuators, and a central control unit. Key parameters such as temperature, humidity, and ammonia concentration are continuously tracked using appropriate sensors installed within the poultry house. Additionally, feed bin sensors monitor the availability of food to prevent shortages. All collected data is transmitted wirelessly to a centralized control system, which analyse the information and responds using predefined control logic. This automated setup adjusts environmental conditions and feeding mechanisms in real time, maintaining optimal conditions for bird growth and welfare. The inclusion of machine learning algorithms enhances the system's capability by enabling predictive analytics, allowing early detection of potential issues and ensuring timely corrective actions. Furthermore, the system supports remote monitoring through wireless communication and mobile notifications, allowing farmers to oversee operations from any location. By reducing manual labour, improving efficiency, and promoting sustainable farming practices, this IoT-based solution offers a modern approach to poultry farm management.

DEVELOPMENT OF SENSOR-BASED TRAFFIC MANAGEMENT SYSTEM FOR EMERGENCY AMBULANCE SERVICES

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When it comes to saving lives, every second is crucial, and emergency response time is very crucial. But, traffic jams and the absence of real-time patient monitors can significantly slow down the arrival of medical help. Our project introduces an innovative IoT-based system for ambulance tracking and patient monitoring, specifically designed to reduce the response time, by combining GPS, GSM/4G, biosensors, and a microcontroller, this system allows for the real- time tracking of ambulance locations and continuous monitoring of patients' health. Additionally, it has automated traffic light control and Vehicle-to-Vehicle (V2V) communication, which helps to clear the way(traffic) for ambulances and reduces delays. The ultimate aim of this proposed system is to enhance emergency healthcare by providing hospitals with timely data, ensuring they are well-prepared for incoming patients.

AN EFFECTIVE INTRA PREDICTION ALGORITHM FOR HEVC CODEC

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High-Efficiency Video Coding (HEVC), or H.265, provides much better video compression compared to its earlier version, H.264. Importantly to note its computational complexity, particularly in the area of intra-prediction, is an issue. This talk introduces a very thought full optimized intra-prediction algorithm to minimize time-consuming Coding Unit (CU) size selection and Prediction Unit (PU) mode selection in HEVC. The method relies on image texture complexity to make intelligent decisions, which significantly enhances efficiency with little detriment to video quality.

Keywords: Video compression, quality assessment, convolutional neural networks, machine learning, bitrate estimation, AI-driven video processing.

A STUDY ON THE IMPACT OF AI AND AUTOMATION IN MARKETING

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The integration of artificial intelligence (AI) and automation into marketing has fundamentally reshaped how brands create content, engage consumers, and make strategic decisions. This paper explores two interrelated dimensions of AI in marketing: the impact of generative AI on content creation and brand identity, and the ethical implications of AI-driven decision-making in customer interactions. With tools like ChatGPT, DALL·E, and Jasper becoming widely adopted, marketing content is now produced at scale, yet questions arise regarding its authenticity, brand voice consistency, and consumer trust. At the same time, AI-powered personalization and automated decision systems raise ethical concerns related to transparency, bias, and user autonomy. Drawing on a mixed-methods approach—combining consumer surveys, interviews with marketing professionals, and case study analysis—this study evaluates how AI influences both the creative and ethical dimensions of modern marketing. The findings highlight the need for clear ethical frameworks and governance to ensure responsible use of AI while preserving brand identity in an increasingly automated landscape. This paper contributes to academic discourse by bridging marketing innovation with ethical accountability in the AI era.

AI ON WATCH: DETECTING GENDER-BASED ANTI-SOCIAL BEHAVIOUR IN PUBLIC TRANSPORT USING DEEP LEARNING

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Promoting women's active involvement in economic, educational, and social domains depends on ensuring secure and inclusive public transportation. This study explores how machine learning—particularly deep learning—can help detect behaviours that negatively influence women's sense of safety while commuting. We conduct a detailed scoping review of current research focused on using deep learning models to identify anti-social behaviour in public transit settings. Using a systematic review framework, we analyse existing approaches, summarizing the benefits and limitations of automating such behaviour detection. In addition, we evaluate the availability and suitability of video and audio datasets used for training relevant detection algorithms. The review reveals the practicality and promise of deep learning technologies in

recognising anti-social acts, offering valuable insights for researchers, system developers, and transit authorities. Our analysis not only confirms the technical feasibility of these models but also highlights their role in shaping safer commuting environments. By identifying key gaps and challenges, our work aims to inform and inspire future research on the development and deployment of advanced AI-driven monitoring systems. Ultimately, this study contributes to the ongoing efforts to enhance passenger safety, particularly for women, in public transport networks through the intelligent use of surveillance data and machine learning innovations.

REAL-TIME DDoS ATTACK DETECTION IN NETWORK DATAUSING LSTM

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Distributed Denial of Service (DDoS) attacks pose a critical threat to the stability and accessibility of online services by overwhelming target systems with excessive traffic, making them inaccessible to legitimate users. As these attacks become more sophisticated and frequent, traditional rule-based detection methods struggle to respond effectively, especially in real-time scenarios. This project explores the use of machine learning, specifically the Random Forest algorithm, to improve the detection and classification of DDoS attacks. Random Forest is an ensemble learning method that constructs multiple decision trees during training and outputs the class that is the mode of the classes of the individual trees. By analyzing key features of network traffic such as packet size, source and destination IP addresses, traffic rate, and request frequency the algorithm can distinguish between normal and abnormal behavior with high accuracy. The proposed system continuously monitors incoming traffic, processes it through the trained Random Forest model, and flags suspicious patterns indicative of a DDoS attack. This approach not only enhances the precision of detection but also reduces false positives, enabling timely mitigation actions. Ultimately, the integration of machine learning techniques into cyber security frameworks strengthens the resilience of digital infrastructures against evolving threats and ensures better availability of online platforms.

DESIGN AND IMPLEMENTATION OF REMOTE ACCESS ATM SECURITY SYSTEM USING INTERNET OF THINGS

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As an essential element of the next generation Internet, Internet of Things (IoT) has been undergoing an extensive development in recent years. In addition to the enhancement of people's daily lives, IoT devices also generate/gather a massive amount of data that could be utilized by machine learning and big data analytics for different applications. Our project proposes a secured ATM (Automated Teller Machine) system using a card scanning system along with LINK system for improved security. Usual ATM systems do not contain the LINK feature for money withdrawal. If an attacker manages to get hold of ATM card and the pin number, he may easily use it to withdraw money fraudulent. So our proposed system supports the ATM card scanning system along with an LINK system. This user may scan his card and login to the system. But after user is through with this authentication, he may view details but is asked to enter LINK as soon as he clicks money withdrawal option. At this stage the system generates and sends a LINK to the registered mobile number to that particular user. The password is generated ad sent to the user mobile phone. He now needs to enter the LINK in the system in order to withdraw money. This our system provides a totally secure way to perform ATM transactions with two level security structure.

ENHANCED MARITIME SAFETY FISHERMEN'S BORDER ALERT SYSTEM

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Fishing is a vital livelihood for many coastal communities worldwide, yet it carries significant risks, especially when fishermen unknowingly cross international maritime borders. These accidental incursions often lead to legal troubles, conflicts, and safety hazards. This project proposes an IoT-based border alert system designed to enhance maritime safety for fishermen.

By integrating GPS technology and sensor modules into fishing boats, the system enables continuous real-time tracking of the vessel's location. A connected smartphone application displays live positioning data and triggers alerts when a boat approaches restricted waters. The system provides timely audio-visual warnings to the fishermen, helping them stay within safe zones. Furthermore, the solution includes an autonomous return mechanism that activates once the vessel nears or crosses a maritime boundary, steering it back to permitted waters. This automation minimizes human error and reduces the chance of entering prohibited zones. The use of cloud services ensures that all positional and alert data is logged and accessible for future analysis or evidence. Additionally, the system supports emergency SOS signals in case of distress. The proposed model is cost-effective, scalable, and ideal for developing regions. Its deployment can lead to a significant reduction in accidental border violations and enhance the overall safety of fishermen. By combining IoT, GPS, and mobile connectivity, this system represents a practical and innovative approach to safeguarding maritime operations.

IOT BASED SMART AGRICULTURE MONITORING SYSTEM USING LORA

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India, being predominantly an agriculture-based nation, necessitates robust security and monitoring systems to protect and enhance agricultural productivity. This study presents a precision agriculture framework utilizing Wireless Sensor Networks (WSNs) integrated with Internet of Things (IoT) technologies and wireless communication protocols. The system comprises low-power, autonomous sensor nodes designed for flexible deployment across various crop types, soil conditions, and regional environments. The proposed structure includes energy-harvesting mechanisms to optimize energy usage and extend the operational lifespan of both sensor nodes and the overall network. Experimental deployment involved sensor nodes equipped to monitor key environmental parameters such as soil moisture, temperature, humidity, and light intensity. These nodes transmit real-time data to a centralized base station, which was also tested under actual field conditions to validate the system's performance. The results demonstrate the system's effectiveness in providing reliable environmental monitoring, thereby supporting efficient water usage, crop health assessment, and long-term sustainability of

agricultural practices.

ESP32- POWERED REAL TIME ENGINE MONITORING WITH PREDICTIVE FAULT DETECTION

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The proposed project aims to enhance road safety and vehicular health monitoring through an integrated system powered by the ESP32 microcontroller. This system actively monitors the behavior of two-wheeler drivers using multiple sensors: an IR sensor ensures helmet compliance and measures speed, a gas sensor detects alcohol consumption, a MEMS sensor identifies abnormal tilting or slope, and a GPS module enables real-time location tracking. In the event of risky behavior—such as riding without a helmet, speeding, driving under the influence, or navigating hazardous inclines—the system immediately sends alerts, including live location updates, to a connected mobile device. This allows for real-time intervention and improves safety in dynamic traffic environments. A virtual LCD displays real-time diagnostics while a buzzer warns users of critical issues like overheating or excessive vibrations. Data is stored on an SD card for historical analysis and model training, improving predictive accuracy over time. The ESP32 facilitates wireless communication via Wi-Fi or Bluetooth to a mobile application, ensuring continuous updates and remote access to the vehicle's engine health and performance insights.

ENHANCED SAFETY IN HIGH-RISK MOUNTAIN ROUTES

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Traffic control is difficult in the hill station because there is no control system in the hill station.

Many times, breakdowns of vehicles take place on hill roads while driving. So hill assist control is technology which helps in driving a vehicle on hill roads safely. It helps the vehicle to stop rolling back from its position. This movement also invites accidents to occur due to bad driving skills, blind turns, over speeding, etc. Also, during the peak time of holidays, abrupt climate change occurs and leads to heavy rainfalls, which are the major cause of landslides. As a result, the loss of life of travellers and blocked roads affecting transportation of necessary goods occur in hilly areas which affect the development and living of other people. LORA (Long Range communications) systems may be a better solution to detect, monitor and prevent these accidents and landslides. The LORA system consists of sensors, actuators, a powerful microcontroller, and a network interface. This system detects and monitors accidents and landslides and informs the command centre about the location. Implementation of the LORA system helps us to lower the accident rate and easily locate the affected areas of landslides using global service for connectivity. Any vehicle is stuck or in an accident in a hairpin bend means vehicles from both directions are stuck in the hair-pin bend, then it will lead to heavy traffic as well as wasting time. Our project will overcome these issues. We proposed using the camera sensor to monitor the traffic signs. Our sensor detects the classification of vehicle type in the hairpin bend. Once detected, then the sensor transfers the signal to the light sensors in the mountain foundation and top entrance of the mountain Ing, alerting the vehicle drivers that there is a breakdown or accident in the hairpin bend. This early warning system aims to enhance road safety and reduce the likelihood of further incidents. By providing timely alerts, we hope to minimize congestion and ensure a smoother flow of traffic through these challenging terrains. This system will also contribute to improving driver awareness, encouraging them to exercise greater caution in hazardous areas. Ultimately, our goal is to create a safer driving environment that benefits all road users, especially in regions prone to difficult driving conditions. By fostering a culture of vigilance and responsibility among drivers, we aim to reduce the number of accidents and enhance overall road safety. In doing so, we hope to instill a sense of community and shared responsibility, where each road user plays a part in creating a safer journey for everyone. Everyone has a role to play in this endeavor, from government agencies implementing better signage and road maintenance to individuals committing to safe driving practices. Together, we can pave the way for a future where every journey is not only safer but also marked by a greater sense of mutual respect and consideration among all who share the road. This collective effort fosters a culture of accountability, encouraging each person to acknowledge their impact on road safety. By prioritizing communication and awareness, we can

significantly reduce accidents and enhance the overall driving experience for everyone involved.

PELTIER BASED AIR-COOLING SYSTEM: DESIGN AND IMPLEMENTATION

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This paper presents the design and implementation of a compact air cooling system using Peltier modules (thermoelectric coolers). The aim is to create an efficient cooling device suitable for small-scale environments, using solid- state heat pumps without relying on conventional refrigerants. Key components include a Peltier module, heat sink, fan, temperature sensors, and a power management circuit. The system's performance is evaluated based on cooling efficiency, temperature drop, and energy consumption. Results demonstrate effective cooling in enclosed spaces, with practical applications in electronics and personal comfort systems.

QUANTUM-DOT CELLULAR AUTOMATA-BASED FULL ADDER DESIGN: COMPREHENSIVE REVIEW AND PERFORMANCE COMPARISON

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This paper presents a comprehensive review of Quantum-Dot Cellular Automata (QCA)-based full adder designs, an emerging paradigm in nanoscale computing. QCA offers a promising alternative to traditional CMOS technology by enabling ultra-dense, low-power, and high-speed logic circuits. We systematically analyze existing full adder architectures developed using QCA, evaluating their structural designs, logical implementations, and functional accuracy. Key performance metrics such as cell count, area, latency, power consumption, and fault tolerance are compared across various designs. The advantages and limitations of majority gate-based, minority gate-based, and hybrid QCA adders are critically discussed. Emphasis is placed on the trade-offs between design complexity and performance efficiency. Recent innovations, including multilayer and fault-resilient QCA full adders, are highlighted. Potential applications

and scalability issues of QCA-based arithmetic circuits are also considered. This review aims to guide researchers towards optimized QCA full adder designs for future nanoelectronic systems. The paper concludes by outlining future research directions and design challenges in QCA technology.

OPTIMIZING CIRCUIT PERFORMANCE AND POWER THROUGH TIMING ERROR-AWARE CLOCK CONTROL

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Modern semiconductor devices are increasingly vulnerable to timing errors due to their high operating speeds and low supply voltages. Even minor disturbances can disrupt clock synchronization, leading to system failures. To address this, a new error-tolerant method has been proposed that offers quick error correction with minimal hardware complexity, enhancing reliability without the drawbacks of traditional, delay-heavy solutions. As semiconductor technology continues to scale, the impact of external noise and process variations on circuit timing has become more pronounced. Traditional error-handling methods often add complexity and delay, making them less efficient for high-speed systems. The newly proposed approach simplifies error correction by using a lightweight, real-time mechanism, making it better suited for modern, compact, and energy-efficient semiconductor designs. The proposed error-tolerant technique offers a simple yet effective solution to timing issues in advanced semiconductor circuits. By eliminating the need for complex clock-based mechanisms, it ensures faster error correction and improved system stability, making it ideal for next-generation electronic devices.

VEHICLE TO VEHICLE COMMUNICATION BASED SPEED CONTROL SYSTEM FOR COLLISION AVOIDANCE USING CAN AND WIRELESS TECHNOLOGY

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The rapid growth of the automobile industry and the increasing need for road safety have driven the development of advanced communication technologies to enhance vehicle performance and prevent collisions. One such innovative approach is the "Vehicle-to-Vehicle (V2V) based Speed Manipulation System for Collision Avoidance using Wi-Fi and CAN Technology." This project aims to develop an intelligent system that enables real-time communication between vehicles to prevent accidents by manipulating speed and maintaining safe distances. The proposed system integrates wireless communication technology (Wi-Fi) and Controller Area Network (CAN) protocols to facilitate effective data exchange between vehicles. The primary objective is to detect potential collisions by continuously monitoring speed, distance, and other crucial parameters and then dynamically adjusting the vehicle speed to mitigate collision risks. The integration of Wi-Fi and CAN technology ensures fast, reliable, and secure data transmission between interconnected vehicles, creating a robust V2V communication network. The system employs ultrasonic sensors and wireless modules to detect obstacles and classify them as movable or immovable. Once an obstacle is detected, the system processes the data and shares it with nearby vehicles via Wi-Fi, enabling them to take precautionary measures. The CAN bus plays a pivotal role by facilitating internal communication between vehicle subsystems, allowing seamless integration of speed manipulation mechanisms. Upon receiving data about potential hazards, the vehicle automatically adjusts its speed based on the nature of the obstacle and the proximity of other vehicles. This real-time decision-making is crucial for preventing collisions, especially in high-traffic areas or unpredictable environments. One significant feature of this system is its ability to monitor and control the physical parameters of the vehicle, including speed, temperature, and gas levels. The system continuously scans the surroundings and assesses the vehicle's operational status to maintain optimal safety standards. If gas levels exceed safe limits or the temperature rises abnormally, the system triggers an automatic response to control the speed or even halt the vehicle if necessary. This proactive approach ensures vehicle safety and enhances passenger security by minimizing the risk of accidents caused by technical malfunctions.

DESIGN OF LOW POWER REVERSIBLE VEDIC MULTIPLIER USING URDHVA TRIYAGBHYAM SUTRA IN QUANTUM DOT CELLULAR AUTOMATA

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Quantum Dot cellular automata (QCA), the promising next generation computation solves the many issues of conventional Metal oxide Semiconductor Field Effect Transistor like scaling down, high power consumption and heat dissipation in switching cycles. The reversible gates like Peres gate and Controlled NOT gate of Quantum Computing are utilized in this work in order to achieve zero power dissipation in digital circuit design. The 2X2 Vedic Multiplier designed using Urdhva Triyagbhyam sutra has been constructed using Quantum Dot cellular cells and simulation is performed using QCA Designer tool and the energy dissipation analysis is performed using QCADesigner-E tool. The design comparatively has less garbage outputs and occupies low cell count with reduced clock cycles.

WEARABLE SENSOR WITH ARTIFICIAL INTELLIGENCE TO PREVENTION OF FALL FOR ELDERLY PEOPLE

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Fall detection is a major challenge in the public healthcare domain, especially for the elderly as the decline of their physical fitness, and timely and reliable surveillance is necessary to mitigate the negative effects of falls. This paper develops a novel fall detection system based on a wearable device. The system monitors the movements of human body, recognizes a fall from normal daily activities by an effective quaternion algorithm, and automatically sends request for help to the caregivers with the patient's location.

SOC-BASED CONTROL STRATEGY FOR A MULTIPHASE INTERLEAVED CONVERTER IN OPTIMIZING EV FAST-CHARGING FOR LI-ION, NI-CD, AND NI-MH BATTERIES

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The rising popularity of electric vehicles (EVs) has led to increased demand for DC rapid charging stations. This paper proposes a novel state-of-charge (SOC) based control strategy for a three-phase interleaved buck converter employed in EV fast-charging systems, utilizing a SOC-based PI controller to monitor the battery's state and adjust the charging current accordingly, ensuring safe operating ranges and preventing overcharging and overheating. The control method dynamically adjusts the number of active converter phases based on the real-time battery SOC, prioritizing battery health by limiting high current operation during critical charge stages (below 20% and above 80% SOC) for Lithium-ion (Li-ion), Nickel-Cadmium (Ni-Cd), and Nickel-Metal Hydride (Ni-MH) batteries. The proposed three-phase interleaved DC-DC converter dynamically adjusts its operation based on SOC, enabling a fast charging algorithm with constant current modulation to maximize efficiency across the entire charging range (0% to 99% SOC) for various battery types. The paper investigates charging speed, power losses, and efficiency using a simulated 7.2 kW converter with a 4.8 kWh battery built in MATLAB/SIMULINK, aiming to optimize battery performance throughout the charging process.

HYBRID ELECTRIC VEHICLES BATTERY MANAGEMENT AND FAST CHARGING PREDICTION ANALYSIS USING MACHINE LEARNING

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The growing adoption of Electric Vehicles (EVs) has placed significant emphasis on efficient battery management and fast charging capabilities. Effective battery management ensures optimal performance, longevity, and safety, while fast charging provides convenience to users. This project focuses on using the Random Forest (RF) algorithm to predict and optimize battery performance during fast charging scenarios, addressing key challenges such as battery State of Charge (SOC), State of Health (SOH), and charging time prediction. The study aims to develop a robust predictive model that can forecast battery behaviour in real-time during fast

charging, using data-driven insights from various battery parameters such as voltage, current, temperature, and historical charging patterns. By leveraging the power of Random Forest, an ensemble machine learning algorithm known for its accuracy and ability to handle complex, non-linear relationships, the model predicts critical factors such as charging time and battery health under different charging conditions

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HYBRID RENEWABLE ENERGY BASED HYBRID ELECTRIC VEHICLE CHARGING AND PREDICTIVE SYSTEM WITH MONITORING USING IOT

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The Utilization of Internet-of-things (IoT) in checking the introduction of electric vehicle battery. Doubtlessly an electric vehicle totally depends upon the wellspring of energy from a battery However, the proportion of energy gave to the vehicle is reducing consistently that prompts presentation debasement. In Additionally, EV produces amazing advantages the extent that energy saving and common affirmation. EVs utilized battery-powered battery which is lithium particle battery. It is more modest to be contrasted and lead corrosive. EV conventionally has limited extent of making an excursion on account of battery size and body structure. By and by, a critical clarification that confines the utilization of EV is the security of existing battery advancement .This project describes the application of Internet-of-things (IoT) in monitoring the performance of electric vehicle battery. It is clear that an electric vehicle totally depends on the source of energy from a battery. this is a major concern for battery manufacture. In this work, the idea of monitoring the performance of the vehicle using IoT techniques is proposed, so that the monitoring can be done directly.

DESIGN OF MPPT WITH VOLTAGE AND CURRENT MONITORING SYSTEM USING IOT RENEWABLE ENERGY APPLICATION

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In this paper, the increasing demand for renewable energy underscores the necessity for advanced systems that enhance energy extraction and facilitate remote monitoring and control. This project introduces the development of a Maximum Power Point Tracking (MPPT) system utilizing a LUO converter, integrated with an Internet of Things (IOT)-based voltage and current monitoring platform via the Blynk IOT cloud. The LUO converter is selected for its high efficiency and continuous input/output current characteristics, ensuring optimal power extraction from photovoltaic (PV) panels under varying environmental conditions. A Perturb and Observe (P&O) MPPT algorithm is implemented to dynamically adjust the converter's duty cycle, ensuring operation at the panel's maximum power point. To augment the system's functionality, real-time voltage, current, and power data are collected using appropriate sensors and processed through a microcontroller. This data is transmitted to the Blynk IOT platform via Wi-Fi, enabling users to remotely monitor the PV system's performance through a mobile application or web dashboard. The platform also supports alerts and historical performance data, assisting in maintenance and energy management decisions. The system architecture emphasizes cost-effectiveness, scalability, and user-friendly interfaces, making it suitable for residential, agricultural, and small industrial applications.

IMPLEMENTING MPPT TECHNIQUES FOR ENHANCED PHOTOVOLTAIC EFFICIENCY

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Scanning probe microscopy investigations have extensively used graphite as a substrate due to its chemical inertness and ease of cleaving. The atomically flat surface of graphite has provided an ideal platform for surface scientists to deposit various kinds of materials of interest for imaging and examining. The natural graphite surface is also worthy of further understanding as it consists of a variety of defects [1], among which superlattice

structure is reported to be found on graphite surfaces, and its origin is not yet completely understood [2]. It is of general interest and wide applicability to have a simplistic model for theoretical interpretation of scanning tunnelling microscope (STM) images of graphite, and even molecular dynamic simulations on graphite [3]. Here we describe a model of graphite which is easy to comprehend and simple to implement (fig.1 and fig.2). This model simulates the atomic density of graphite layers, which in turn correlates with the local density of states. The mechanism and construction of such a model is explained with all the necessary details which are not explicitly reported before. This model is applied in investigating the corrugation conservation phenomenon and rippling fringes of the superlattice which we observed on graphite [4]. The "odd-even" transition along the atomic rows of a superlattice is simulated (fig.3), and this result is discussed with reference to other reports in the literature [5]. A comparison is made with the result of Cee [6] about the validity of the moiré rotation pattern assumption.

BIDIRECTIONAL DC-DC CONVERTER FOR ELECTRIC VEHICLE BATTERY CHARGING APPLICATIONS

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This paper presents the design and implementation of a bidirectional DC-DC converter for electric vehicle (EV) battery charging applications, focusing on efficient power transfer and energy management. The bidirectional converter allows for both charging the EV battery from the grid and discharging the battery back to the grid or load, enhancing the vehicle's integration into smart grid systems. The converter employs advanced control strategies, including Maximum Power Point Tracking (MPPT) for efficient charging and voltage regulation to ensure safe and optimal battery performance. The system is designed to handle varying input and output voltages while minimizing losses and improving energy efficiency. Simulation results demonstrate that the proposed converter achieves high efficiency, fast response times, and stable operation under different load and voltage conditions. The proposed solution offers a cost-effective, compact, and scalable solution for EV charging infrastructure, contributing to the development of sustainable and intelligent energy systems.

ENERGY MANAGEMENT AND POWER CONDITIONING IN WIND-SOLAR HYBRID SYSTEMS USING POWER ELECTRONICS INTERFACES

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This paper presents an energy management and power conditioning strategy for wind-solar hybrid systems, utilizing power electronics interfaces to ensure efficient energy conversion, storage, and distribution. The proposed system integrates wind and solar energy sources with a bidirectional DC-DC converter and a centralized controller for optimal energy flow management. The power electronics interface facilitates maximum power point tracking (MPPT) for both sources, ensuring efficient energy harvesting under varying environmental conditions. A priority-based energy management algorithm is implemented to decide the energy source based on availability and demand, balancing renewable energy production and minimizing reliance on storage or the grid. The system's effectiveness is validated through simulations, demonstrating improved energy efficiency, reduced power loss, and enhanced system stability. This approach is particularly beneficial for off-grid and microgrid applications, providing a cost-effective solution for reliable, renewable energy integration and sustainable power supply management.

DESIGN AND IMPLEMENTATION MPPT USING BIO-INSPIRED OPTIMIZATION FOR RENEWABLE ENERGY APPLICATION

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Maximizing power extraction from photovoltaic (PV) systems under fluctuating environmental conditions remains a major challenge, particularly during partial shading, which introduces multiple local maxima on the power-voltage (P–V) curve. Conventional Maximum Power Point Tracking (MPPT) techniques such as Perturb and Observe (P&O) and Incremental Conductance often struggle to distinguish the global maximum from local peaks, leading to decreased energy efficiency. This project introduces a novel MPPT approach based on the Adaptive Seagull Optimization Algorithm (ASOA), specifically designed for solar PV systems operating under partial shading conditions. ASOA is a bio-inspired meta heuristic algorithm that mimics the intelligent migratory and hunting behaviors of seagulls. The adaptive mechanism incorporated

into this algorithm significantly improves its convergence speed, balances exploration and exploitation, and enhances its ability to accurately identify the Global Maximum Power Point (GMPP), even in complex and variable shading environments. The proposed MPPT controller continuously monitors the output of the PV system and dynamically adjusts the operating point using the ASOA algorithm. Unlike traditional methods, ASOA explores a broader solution space and adapts its search strategy in real time, effectively avoiding entrapment in local maxima. Its robust and adaptive nature makes it highly suitable for conditions with irregular irradiance caused by factors such as moving clouds, surrounding buildings, or vegetation. The system is modeled and simulated in MATLAB/Simulink, with performance evaluated in terms of convergence speed, tracking accuracy, and total power output. Simulation results demonstrate that the ASOA-based MPPT method outperforms conventional approaches by offering faster convergence, improved energy efficiency, and minimal oscillations around the maximum power point. Even under rapidly changing environmental conditions, ASOA maintains high tracking performance, indicating its potential for real-time embedded system applications.

INTEGRATED POWER ELECTRONIC CONVERTER FOR MOTOR DRIVE AND BATTERY MANAGEMENT IN EVS

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This paper presents the design of an integrated power electronic converter that simultaneously manages the motor drive and battery system in electric vehicles (EVs). The proposed converter integrates a bidirectional DC-DC converter with an inverter to control the electric motor and manage battery charging and discharging processes. This integration reduces the overall system size, complexity, and cost while improving efficiency. The converter utilizes advanced control algorithms, such as field-oriented control (FOC) for motor drive and maximum power point tracking (MPPT) for efficient battery management. A key feature of the design is the bidirectional power flow capability, enabling regenerative braking and energy recovery. Simulation and experimental results demonstrate the converter's ability to optimize power delivery, maintain battery health, and improve overall vehicle performance. The proposed solution offers a compact, cost-effective, and efficient approach to managing power in modern electric vehicles, contributing to improved energy utilization and sustainability.

INTEGRATING SMART ENERGY HARVESTING AND AUTOMATION IN ELECTRIC VEHICLES: ADVANCING SUSTAINABILITY, EFFICIENCY, AND PERFORMANCE

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This paper presents the development and evaluation of an electric vehicle (EV) system that integrates smart energy harvesting technologies with advanced automation to enhance sustainability, energy efficiency, and driving performance. The study underscores the significance of sustainable energy solutions, positioning EVs as a pivotal element in the shift toward environmentally friendly transportation. A comprehensive review of current challenges in EV energy management is provided, alongside an exploration of innovative solutions such as photovoltaic systems, regenerative braking, and thermoelectric harvesting. The role of automation—including autonomous driving systems and intelligent charging infrastructure—in augmenting EV capabilities is examined. The research methodology encompasses data collection on existing energy harvesting systems, analysis of automation technologies, and case studies illustrating successful integration. A comparative analysis highlights the benefits and trade-offs of various system configurations. The results demonstrate the synergies between energy harvesting and automation, revealing improvements in energy efficiency, extended driving range, and reduced environmental impact. Technical limitations, regulatory challenges, and potential solutions are also discussed. The paper concludes with future research directions and recommendations, offering insights for policymakers, researchers, and industry stakeholders aiming to advance the integration of smart energy harvesting and automation in next-generation EVs.

SMART GATE DRIVER DESIGN FOR SIC MOSFETS IN HIGH- FREQUENCY POWER CONVERTERS

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This paper presents the design of a smart gate driver for Silicon Carbide (SiC) Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFETs) in high-frequency power converters. SiC MOSFETs are ideal for high-power, high-frequency applications due to their superior efficiency and thermal performance, but their efficient switching requires a precise and robust gate driving system. The proposed smart gate driver utilizes adaptive control techniques to optimize the gate drive voltage, switching speed, and protection features, ensuring reliable operation at high switching frequencies. The driver is designed to handle the unique challenges of SiC MOSFETs, such as high dv/dt, di/dt, and switching losses, while minimizing switching delays and improving efficiency. The paper includes detailed simulations and experimental results demonstrating the performance of the proposed gate driver in a high-frequency power converter. The design is suitable for applications in electric vehicles, renewable energy systems, and industrial motor drives, providing a scalable solution for advanced power conversion systems.

IMPLEMENTATION OF A SMART GRID-INTEGRATED RENEWABLE ENERGY MANAGEMENT SYSTEM

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This paper presents the design and implementation of a smart grid-integrated renewable energy management system aimed at optimizing energy utilization and improving grid stability. The proposed system integrates solar and wind energy sources with a bidirectional power converter and an intelligent energy management controller. Real-time monitoring and control are achieved using IoT-based communication and a centralized microcontroller platform. The controller employs a priority-based load scheduling algorithm and maximum power point tracking (MPPT) to maximize energy harvesting and ensure efficient energy distribution. Additionally, the system supports grid interaction for surplus energy export and backup power during grid outages. Simulation and experimental results validate the system's performance under dynamic load and generation conditions. The proposed architecture enhances the reliability and efficiency of renewable energy integration while promoting sustainability and grid resilience. This solution is scalable and applicable to residential, commercial, and remote microgrid applications.

INTEGRATION OF SOLAR POWER WITH BLDC MOTOR DRIVES USING A ZETA CONVERTER

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This paper presents an innovative approach for integrating solar power with Brushless DC (BLDC) motor drives using a Zeta converter. The Zeta converter, known for its high voltage conversion ratio and inherent continuous input and output current, is employed to efficiently interface the solar photovoltaic (PV) system with the BLDC motor drive. The system utilizes Maximum Power Point Tracking (MPPT) to maximize the solar energy harvested, ensuring optimal power delivery to the BLDC motor under varying environmental conditions. A detailed control strategy is implemented for both the Zeta converter and the BLDC motor to achieve stable and efficient operation, even during fluctuations in solar power generation. Simulation and experimental results confirm the feasibility of the proposed system, showing improved energy efficiency, reduced power losses, and stable motor performance. This integration offers a cost-effective and sustainable solution for renewable energy-driven motor applications in industries and electric vehicles.

EFFICIENCY ENHANCEMENT IN BRUSHLESS DC MOTORS USING FUZZY LOGIC CONTROLLERS

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This paper proposes a fuzzy logic controller (FLC)-based approach to enhance the efficiency and dynamic performance of Brushless DC (BLDC) motors in variable load and speed conditions. Traditional control methods often struggle to maintain optimal motor efficiency under fluctuating operating conditions. The proposed FLC dynamically adjusts the motor's duty cycle and switching patterns based on real-time input parameters such as speed error and current

variations. By replacing conventional PI controllers, the FLC offers improved torque response, reduced ripples, and lower energy consumption. The system is modeled and simulated in MATLAB/Simulink, and performance is evaluated against standard control techniques. Results demonstrate a significant improvement in overall efficiency, faster response time, and better load-handling capability. This approach is particularly suitable for electric vehicles, robotics, and other applications demanding precise and energy-efficient motor control. The study validates fuzzy logic as a reliable, intelligent control method for modern BLDC motor-driven systems.

LANDSLIDE HUMAN DETECTION

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Landslides are disastrous natural events that frequently affect in significant casualties and property loss. Timely discovery and deliverance of survivors trapped under debris is critical. This paper presents a new approach for detecting live humans in landslide- affected areas using thermal cameras combined with thermal image comparison ways. The system identifies mortal thermal autographs and movement patterns by assaying infrared imagery over time. The proposed system enhances discovery delicacy in low visibility surroundings similar as thick fog, darkness, or when individualities are incompletely buried, offering a precious tool for hunt and deliverance operations. The proposed methodology proved to be an effective tool for landslide analysis, especially in the field of exigency operation, when it's frequently necessary to gather all the required information in dangerous surroundings as fast as possible, to be used for the planning of mitigation measures and the evaluation of dangerous scripts.

SMART METERING AND TANK MONITORING FOR SUSTAINABLE RURAL WATER DISTRIBUTION

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In this paper, we propose an IoT- grounded water distribution system approach to cover the position of water in overhead tank, inflow rate of water, volume and leakage of water in a water channel system grounded on the measures accumulated from the inflow measures and as well as proper distribution of the water resource. In civic and pastoral areas, the homemade operation of water distribution system is being replaced. numerous pastoral areas face irregular water force and destruction due to homemade monitoring and unbridled distribution. An IoT- grounded system ensures effective water operation by automating monitoring and control. unstable water distribution leads to dearths in some areas and destruction in others. Smart metering and automated faucets optimize operation, help overconsumption, and insure fair distribution. Traditional styles warrant translucency and bear homemade trouble. IoT- grounded results give real- time tank position and water quality monitoring, with remote access via LoRa, displays, or pall dashboards, reducing functional costs and perfecting decision- timber.

SMART MUFFLER SYSTEM USING ACTIVE NOISE CANCELLATION

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In Day to day life our environment is getting more and more polluted and it is affected by noisier. Our people also adapted with this harsh environment so we need a new type of absorption material which is adaptive with this environment and which can be used in our vehicles to reduce the amount of noise produce by it. One of the type of absorptive material is silicon carbide foam and sound absorption material. For reducing the amount of noise emitted by the exhaust of an internal combustion engine. This noise is reduced as the transmission loss (TL) when the muffler increases. Various types of components are present in the mufflers like foam, sound absorption materials, silicon carbide filter etc., which can reduce the noise. This paper explains about TL characteristics and also different methods.

Keywords: Silicon carbide foam, fibrous materials, filter

FUSED DEPOSITION MODELLING (FDM) OF CARBON FIBER

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Fused Deposition Modelling (FDM), the most common type of additive manufacturing, is a subset of material extrusion. Recently, Carbon Fibre- Poly Ethylene Terephthalate Glycol (CFPETG) composites with FDM have demonstrated amazing material qualities in the automotive and aerospace industries. The behaviour of the printed specimen, its functionality, consistency, and dimensional stability in the current system is dictated by the process parameters. The present study investigates diverse infill patterns, specifically Tri-Hexagonal, Triangle, and Zig-Zag material characterisation studies. The proposed study evaluates the tensile, flexural, impact, and hardness strength of 3D-printed and annealed samples in FDM-manufactured CFPETG components. The mechanical properties of CFPETG samples were improved by choosing the suitable Tri-Hexagonal pattern for the infill. Additionally, the proposed study is juxtaposed with the current Acrylonitrile Butadiene Styrene (ABS) 3D-printed specimens. The answer to this discovery provides valuable guidance for developing functional components via the implementation of CFPETG.

Keywords: FDM, CFPETG, Infill Patterns

PREPARATION OF NUTRIENT ENRICHED PAPADS BY USING SEAWEEDS

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This Study Focused On The Development Of Nutritious And Sustainable Seaweed Infused Papads, A Traditional First-Generation Snack. By Incorporating Nutrient Rich Green Seaweed, Also Known As Sea Lettuce, The Project Successfully Produced Vegan Papads Fortified With Bioactive Compounds. Utilizing The Papadification Technique, The Papads Were Formulated Using Green Seaweed, Rice Flour, Wheat Flour, And Locally Sourced Ingredients. The Inclusion Of Green Seaweed In The Formulation Contributed To Improved Nutritional Benefits, Such As Better Blood Sugar Regulation And Enhanced Digestive Health. Rice And Wheat Flour Were Used To Improve The Texture And Appearance Of The Final Product. Regular Salt Was

Replaced With Moringa Salt To Help Combat Oxidative Stress And Support Overall Well-Being. Ingredient Quantities Were Optimized Using Design Expert Software, With A Maximum Of 30 Experimental Runs Conducted To Determine The Most Effective Formulation. Comprehensive Sensory Analysis Was Carried Out To Evaluate The Taste, Aroma, Appearance, Texture, And Physical Properties Such As Weight, Diameter, And Thickness Of The Prepared Papads. Nutritional Profiling Was Conducted To Assess Total Carbohydrate, Protein, And Fat Content. Sensory Evaluations Were Also Performed To Gauge Consumer Acceptance. The Findings Confirmed That The Seaweed-Infused Papads Were Not Only Well-Accepted But Also Demonstrated Promising Potential As An Innovative, Nutrient-Dense Food Product. This Project Successfully Contributed To Promoting Public Health And Advancing Sustainable Resource Utilization.

AUTOMATED PORTABLE THERMAL WARMER

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One of The Significant Problems At House And Commercial Scale Is The Invasion Of Pests In Grain Storage. Several Methods Such As Fumigation And Sun Drying Have Been In Practice. But The Methods Tend To Have Degradation Of Grain Quality By Excess Nutritional Or Moisture Loss. Freezing Or Low Temperature Storage Is Considered To Be An Effective Method But Cannot Be Used Widely In Household And Commercial Scales As It Is Expensive. The Automated Portable Thermal Warmer Presents An Innovative Approach To Grain Storage Through Controlled Heat Treatment At 35-40°C. This Temperature Range Effectively Eliminates Common Pests While Preserving Grain Quality, Addressing Two Critical Storage Challenges Simultaneously. The System Features A Multi-Layered Design With Digital Temperature Control, Ensuring Consistent Heating Regardless Of External Conditions. Testing Demonstrates Significant Advantages Over Traditional Sun Drying, Including Optimal Moisture Maintenance (14-15%), Better Texture Preservation, Color Retention, And Superior Cooking Properties. Key Benefits Include Reduced Grain Hardness (61.48g Vs 103.41g In Sun-Dried Samples), Preserved Carbohydrate Content (66.6 Mg/G Vs 65.8 Mg/G), And Improved Water Absorption Ratios Closer To Untreated Grain. The Technology Eliminates The Need For Chemical Pesticides While Providing Consistent Results Independent Of Weather Conditions.

This Portable Solution Represents A Significant Advancement In Grain Preservation Technology, Offering An Environmentally Friendly, Labor-Saving Approach To Ensure Food Security With Minimal Quality Compromise.

DEVELOPMENT OF NUTRITIONAL ENRICHED ENERGY BAR

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The Increasing Demand for Convenient And Nutritionally Balanced Foods Has Driven The Development Of Various Functional Products, Including Nutritional And Energy Bars. This Study Focuses On The Formulation And Evaluation Of A Nutritional Energy Bar Designed To Provide Essential Nutrients While Ensuring Ease Of Consumption. The Process Involves Selecting High-Quality Ingredients Such As Oats, Muesli, Cornflakes, Cashews, And Raisins, Followed By Roasting, Mixing With A Sugar Syrup, And Subjecting The Bars To Either Baking Or Freezing For Final Consistency. The Bars Undergo Analysis For Moisture Content And Water Activity To Assess Their Stability And Quality Attributes. The Findings Contribute To The Growing Trend Of Health-Focused Snack Alternatives That Cater To Modern Dietary Needs.

BETAL AND TULASI BASED EDIBLE COATING FOR PRESERVATION USING BLUE LED(HURDLE TECHNOLOGY)

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The Increasing Demand for Natural Preservation Methods in The Meat Industry Has Led To The Exploration Of Plant-Based Edible Coatings, Such As Those Derived From Betel (Piper Betel) And Tulsi (Ocimum Sanctum) Leaves. The Effectiveness of An Edible Coating Made from These Leaves in Preserving Meat, Utilizing Hurdle Technology That Combines the Antimicrobial Properties of Betel And Tulsi With The Effects Of Blue Led Light. Betel and Tulsi Leaves Are Known for Their Natural Antimicrobial and Antioxidant Properties, Enhancing Meat Preservation. The Use of Blue Led Light Further Enhances Microbial Control, Working

Synergistically with The Edible Coating to Inhibit Bacterial Growth, Reduce Spoilage, And Extend Shelf Life. This Indicate That the Betel-Tulsi Coating with Blue Led Application Significantly Reduces Microbial Load While Maintaining Meat Quality Over an Extended Period. This Approach Eco-Friendly Alternative to Synthetic Preservatives In Meat Preservation, Contributing To Food Safety And Sustainability In The Industry.

HERBAL DRINK

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In Recent Times, There Has Been A Noticeable Surge In The Popularity Of Herbal Sarbath, A Traditional Beverage Originating From South Asia. Manufacturers Are Offering A Diverse Range Of Flavors To Cater To This Growing Demand. However, Concerns Have Been Raised Regarding The Presence Of Unhealthy Additives Such As Artificial Coloring Agents, Preservatives, Sweeteners, And Flavors In Some Commercially Available Sarbaths. Excessive Consumption Of Sugar Can Contribute To Weight Gain, While Certain Chemicals May Pose Risks To Health. In Response To These Concerns, There Is A Burgeoning Interest In Developing A Healthier Alternative By Incorporating A Blend Of Five Herbal Leaves, Vetiver (A Tall Perennial Grass), Mint, Tulsi, And Aloe Vera. Our Goal Is To Craft A Revitalizing And Nourishing Beverage That Harnesses The Nutritional And Medicinal Properties Of These Carefully Selected Herbs.

Keywords: Herbal Sarbath, Additives,Health Concerns,Medicinal Herbs.

DEVELOPMENT OF A SOLAR-POWERED EVAPORATIVE COOLING CHAMBER FOR EXTENDING SHELF LIFE OF PERISHABLE PRODUCE

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In Developing Countries, A Significant Proportion Of Fresh Fruits And Vegetables Are Lost After Harvesting Due To Inadequate Storage Facilities And High Ambient Temperatures. This

Project Focuses On Designing And Evaluating A Low-Cost, Ecofriendly Solar-Powered Evaporative Cooling Chamber (Ec Chamber) Aimed At Reducing Postharvest Losses In Perishable Produce. The Chamber Operates On The Principle Of Evaporative Cooling, Where Water Evaporates From A Wet Surface And Absorbs Heat From The Surrounding Environment, Thereby Reducing The Internal Temperature And Increasing Humidity. The Chamber Was Constructed Using Locally Available Materials Such As Burnt Bricks, Sand, Bamboo Mats, And Jute Cloth. A Small Solar Panel Was Used To Power A Submersible Pump That Circulates Water Over The Cooling Pads To Maintain Continuous Wetness. The System Also Incorporates A Natural Ventilation Mechanism To Enhance Airflow And Evaporation Efficiency. These Microclimatic Conditions Significantly Slowed Down Wilting, Fungal Growth, And Ripening, Thereby Extending The Shelf Life Of The Produce By 3–5 Days. The Design Can Be Further Improved Through Automation, Temperature Sensors, And Iot-Based Monitoring For Smarter Postharvest Management.

DEVELOPMENT AND SENSORY EVALUATION OF NUTRIENT-DENSE SEAWEED-INFUSED PAPADS USING PAPADIFICATION TECHNIQUE

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This Study Focused on the Development of Nutritious and Sustainable Seaweed- Infused Papads, A Traditional First-Generation Snack. By Incorporating Nutrient-Rich Green Seaweed, Also Known as Sea Lettuce, The Project Successfully Produced Vegan Papads Fortified With Bioactive Compounds. Utilizing the Papadification Technique, The Papads Were Formulated Using Green Seaweed, Rice Flour, Wheat Flour, And Locally Sourced Ingredients. The Inclusion of Green Seaweed In The Formulation Contributed To Improved Nutritional Benefits, Such As Better Blood Sugar Regulation And Enhanced Digestive Health. Rice and Wheat Flour Were Used to Improve the Texture and Appearance Of The Final Product. Regular Salt Was Replaced with Moringa Salt to Help Combat Oxidative Stress and Support Overall Well-Being. Ingredient Quantities Were Optimized Using Design Expert Software, With A Maximum Of 30 Experimental Runs Conducted to Determine the Most Effective Formulation. Comprehensive Sensory Analysis Was Carried Out to Evaluate the Taste, Aroma, Appearance, Texture, And

Physical Properties Such as Weight, Diameter, And Thickness of The Prepared Papads. Nutritional Profiling Was Conducted to Assess Total Carbohydrate, Protein, And Fat Content. Sensory Evaluations Were Also Performed to Gauge Consumer Acceptance. The Findings Confirmed That the Seaweed-Infused Papads Were Not Only Well- Accepted But Also Demonstrated Promising Potential As An Innovative, Nutrient-Dense Food Product. This Project Successfully Contributed To Promoting Public Health And Advancing Sustainable Resource Utilization.

Keywords: Seaweed, Papadification, Taste, Smell, Appearance, Texture, Sensory Analysis.

DEVELOPMENT OF TERTIARY PACK FROM AGRO WASTE EVENTUALLY – A CATTLE FEED

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The Art And Science Of Enclosing And Containing Goods For Usage, Distribution, Storage, Preservation, And Confinement Is Known As Packaging. Virgin Wood Pulp Can Be Used To Make Tertiary Cardboard Packs. A Dopting Virgin Wood Can Be Avoided From An Environmental Standpoint By Adopting A Substitute. Expanded Use Of Wastepaper, Non-Wood Fiber Plants, Increasing Use Of Forest Waste, And Other Environmental Materials Can All Help Meet The Growing Demand For Woody Supplies. On The Other Hand, In Order To Meet The Growing Demands Of The Rapidly Expanding Population, Agricultural Wastes Are Produced Every Day. 620 Million Tons Of Agricultural Waste Are Produced In India Each Year. The Management Of Agricultural Waste Can Be Used To Produce Energy And Feed Cattle. Creating An Environmentally Friendly, The Goal Of This Project Is To Turn Agricultural Wastes, Mostly Natural Fibers From Rice Husk, Banana Peel, And Saccharum Offcinarum (Sugarcane Leaf), Into An Environmentally Acceptable Paperboard Material. Consequently, Less Virgin Wood Pulping Material Will Be Needed, And Paperboard Will Be Used As Cow Feed. Cattle May Be Able To Consume The Agricultural Waste Used To Make Cardboard. The Main Ingredients Used As Cow Feed Are Sugar Cane Leaf, Rice Husk, And Banana Peel, All Of Which Make Excellent Diet Feed. These Materials Serve As A Good Source Of Nourishment And Are Non-Toxic To Cattle. Its Easy Degradation, When Not Used As Cattle Feed, Lowers The Pollution

Caused By The Materials Used In Packaging. Organic, Biodegradable, Agricultural Wastes May Reduce The Environmental Pollution.

Keyword:Tertiary Packaging, Agriculture Waste, Saccharum Offcinarum,Oryza Sativa , Musa Paradisiaca , Environment Pollution.

DEVELOPMENT OF NUTRIENT ENRICHED BARS

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Development of a nutritional bar incorporating black rice sunflower seeds sesame seed dates and palm sugar alms to create a health oriented snack that is both nutritious and appealing Black ice known for its high anthocyanin content and antioxidant properties serves as a nutrient-dense base The inclusion of sunflower seeds Enhances the nutritional profile by providing a rich source of protein healthy fats vitamins and minerals such as magnesium and zinc Palm sugar is utilized as a natural sweetener offering a low-glycemic index alternative to refined sugars making the bar suitable for health-conscious consumers This project focuses on formulating the optimal ratio of ingredients to achieve a desirable texture flavour and nutrient balance while maintaining the functional benefits of each component.The resulting nutritional bar aims to provide a healthy convenient and natural snack option that caters to the grouing demand for functional foods in the mark.

Keywords : Glycemic Index, Dense Base , Nutrient Profile ,Flavour

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DEVELOPMENT OF ORGANIC FOOTWEAR FROM WHEAT STRAW

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This study explores the innovative use of wheat straw, an agricultural byproduct, in the

sustainable manufacturing of temple socks. Traditionally discarded or burned, wheat straw contains valuable cellulose fibers that can be processed into biodegradable textiles. The research focuses on extracting and refining these fibers through eco-friendly mechanical and chemical treatments, followed by blending them with natural or recycled fibers to enhance durability and comfort. The resulting material is soft, breathable, and suitable for use in temple socks, which are typically worn in sacred spaces requiring cleanliness and respect. This approach not only provides an environmentally friendly alternative to synthetic textiles but also adds value to agricultural waste, supporting rural economies and reducing environmental pollution. The project demonstrates the feasibility of integrating traditional practices with sustainable innovation in textile manufacturing.This project focuses on developing orthopedic, foot-comforting footwear integrated with natural fiber socks. Wheat straw, an abundant agricultural byproduct, is utilized for its multiple benefits. To enhance its strength, the straw is treated with starch extracts derived from corn and potato. A blend of aloe vera gel and starch is applied to improve the flexibility and handling of the straw. The extraction of natural fibers from the straw and their conversion into socks is currently in the developmental phase of the project.

Keyword: Wheat Straw, Cellulose Fibre, Orthopedic, Starch.

DEVELOPMENT OF NUTRACEUTICAL JELLY FOR SUPPORTING PCOS MANAGEMENT

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Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder affecting millions of women worldwide, characterized by hormonal imbalances (hyperandrogenism), Ovulatory dysfunction, hirsutism, infertility, insulin resistance and chronic inflammation. This study explores the development of nutraceutical jellies as a novel, user-friendly approach for PCOS management. These jellies incorporate evidence-based bioactive ingredients, including *Gelidium amansii* (Agar – Agar), and herbal extracts such as *Sesamum indicum* (Sesame seeds), *Cucurbita maxima* (Pumpkin seeds), *Trigonella foenum-graecum* (Fenugreek), *Cinnamomum verum* (Cinnamon), *Aloe barbadensis Miller* (Aloe vera), *Beta vulgarius* (Beetroot juice). They are chosen for their synergistic roles in improving insulin sensitivity, regulating androgen levels and

alleviating systemic inflammation. The research focused on ingredient selection, formulation optimization, sensory evaluation and preliminary efficacy testing. The appropriate quantities of the ingredients were homogenized and casted in a molding tray to shape the jelly. Several trials were carried out to constitute the jelly with perfect consistency and maximum nutritional outcome. The jelly was then tested for various parameters including quantitative and qualitative. Results revealed that the developed jellies maintain the bioactivity of the ingredients, deliver a highly palatable consumer experience, and hold significant promise for improving metabolic, hormonal and reproductive health in women with PCOS. This study highlights the potential of functional food products in addressing lifestyle and metabolic disorders. Future work will focus on clinical validation, stability assessment, scalability, and exploring consumer adoption to advance the application of nutraceutical jellies for personalized health management.

Keywords: PCOS, Nutraceuticals, Functional food, Women's health, Personalized nutrition.

GUEST MANAGEMENT SYSTEM

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In educational institutions such as colleges, managing guest visits plays a crucial role in maintaining campus security, accountability and administrative efficiency. Traditionally, colleges have relied on manual logbooks or registers to track visitor information. These methods are not only time-consuming and inefficient but also vulnerable to human error, data loss and misuse. To address these limitations, this project proposes the development and implementation of an advanced Guest Management System (GMS) tailored specifically for a college environment. The Guest Management System is a web-based or mobile-compatible platform designed to streamline the entire process of guest entry, approval and tracking. It provides a secure, transparent and automated solution for handling guest visits from the moment a guest is invited or arrives on campus to their final checkout. The system pre-register online by filling out a digital form with guest personal details, purpose of visit, date and host information. Upon submission, the host and the college administration receive notifications to approve or reject the request. On the day of the visit, verified guests can check in at the college gate using OTPs or

digital ID authentication. The security staff can instantly view guest details and validate their credentials without relying on paper records. The system records entry and exit times, generates visitor badges and sends automatic alerts to the concerned host. Additionally, an emergency alert mechanism can notify authorities of any suspicious activity or unauthorized entries. The admin dashboard provides insights through data visualization, logs and downloadable reports. It enables staff to monitor daily, weekly or monthly guest inflows, identify frequent visitors and analyse visit trends. The system also supports blacklist or watchlist features to prevent entry of flagged individuals. Technologically, the solution can be built using React.js for the frontend, Node.js for the backend and MySQL for the database. Role-based access control, SSL encryption and secure authentication protocols ensure that data is protected at every layer of the application. By integrating this system, colleges can eliminate manual processes, reduce waiting times at entry points and improve the overall guest experience. More importantly, it significantly enhances campus safety by ensuring that only authorized visitors gain access. In the long term, the Guest Management System can be scaled to integrate with other institutional systems such as student attendance, security surveillance and emergency response networks. This project demonstrates the effective application of modern technology in addressing real- world administrative challenges within educational institutions.

CLASS COMMITTEE AND FEEDBACK MANAGEMENT

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The Class Committee Meeting and Feedback Management System is a web-based platform developed to streamline and digitalize the class committee meeting process and feedback collection in educational institutions. The system includes five types of users: Academic Director, Executive Director, HOD (Head of Department), Staff, and Students. Each user has access to specific features based on their role. The Academic Director can login, schedule meetings, and when a meeting is created, email notifications are sent to the respective staff and students based on department, year, and role. They can also post feedback questions filtered by department and role, view only the overall feedback ratings of students and staff, and download reports with overall scores. Additionally, they can view upcoming meeting schedules and see

Minute s o f Meeting with filters for staff/student questions and responses submitted by HOD s. The Executive Director has access to view all upcoming meetings posted by the Academic Director, see both overall and individual ratings of staff and students, and download detailed reports. They can also access the Minutes of Meeting and review action taken responses given by the HODs. The HO D can log in, view department -specific meetings, check questions posted by the Academic Director filtered by department and role, and submit action taken responses. These responses are displayed in the dashboards of the Academic and Executive Directors under the Minutes of Meeting section. Staff and Students can login and view their respective role-based meetings. When they click on the feedback option in the meeting schedule, the questions created by the Academic Director appear. Once they submit their responses, the questions disappear from the interface, as the data is stored securely in the backend. The system uses role-based access and maintains clean data storage. It provides transparency, saves time, and ensures effective feedback collection, which helps improve academic decisions and communication among stakeholders.

SMART HEALTHCARE ASSISTANT: AN ANDROID-BASED PATIENT-DOCTOR INTERACTION SYSTEM

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The Smart Healthcare Assistant is an Android-based mobile application designed to improve communication and interaction between patients and doctors, especially for managing chronic diseases. In today's fast-paced world, many patients face challenges in accessing timely medical care and maintaining consistent communication with healthcare providers. This application aims to address these issues by providing a digital platform where patients can regularly update their medical history, which is then made available to their assigned doctors for real-time monitoring and medical response. Doctors, in turn, can review patient records, diagnose conditions, and provide prescriptions directly through the application. The system also includes important features such as a secure login for both patients and doctors, an integrated chat facility for real-time communication, and a prescription and reminder module that sends automated push notifications and SMS alerts. These reminders help ensure that patients follow their medication

schedules and attend necessary appointments, thereby improving treatment adherence. Additionally, the application incorporates an SOS emergency alert system that allows patients to send their location and request immediate help during critical health situations. Developed using Java and XML in Android Studio and supported by SQLite for offline data management, the application is both user-friendly and efficient. It eliminates the limitations of traditional healthcare systems, such as manual record-keeping, missed consultations, and delayed emergency responses. By offering a centralized and accessible health management solution, the Smart Healthcare Assistant contributes to better health outcomes and strengthens the patient-doctor relationship in a digital environment.

AAKAM360 WEBSITE

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Aakam360 is a web-based platform developed with the aim of bridging the gap between academic institutions and the architecture and interior design industry. It serves as a centralized space where students, faculty members, and industry professionals can interact, collaborate, and showcase creative design work. The platform enhances visibility, promotes professional exposure, and creates opportunities for learning, networking, and real-world engagement. It is especially useful for students who wish to display their project portfolios to a broader audience, gain feedback, and connect with industry experts. Faculty members can use the platform to mentor students and build academic-industry collaborations, while companies and professionals can use it to scout emerging talent and showcase their services.Aakam360 is built using a modern and efficient technology stack—Node.js for the backend server, React.js for a dynamic and responsive frontend, and Mongo DB for storing data in a flexible and scalable format. These technologies enable smooth performance and a user-friendly interface across all devices. The platform is designed with four key modules. The Chatbot Integration module offers instant support to users, especially new visitors, by guiding them through the site and answering common questions. The Required Webpages module ensures that all essential sections like Home, Services, Portfolio, and Contact are well-organized.

AUTONOMOUS CYBERSECURITY: A QUANTUM-RESILIENT AI-BLOCKCHAIN CONVERGENCE FOR DYNAMIC POST-QUANTUM DATA PRIVACY

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As quantum computing accelerates towards practical implementation, existing cryptographic and cybersecurity infrastructures face imminent obsolescence. Traditional encryption algorithms, including RSA and ECC, are vulnerable to Shor's and Grover's algorithms, rendering current data privacy models defenseless against quantum adversaries. In response, this research introduces a novel architecture called **Neuro-Adaptive Quantum Shielding (NAQS)**, an advanced, autonomous cybersecurity framework designed to withstand both quantum and classical cyber threats. NAQS uniquely integrates **lattice-based post-quantum cryptography** with **quantum key teleportation protocols**, enabling real-time, unbreakable encryption even in hostile quantum environments. Unlike static defense models, NAQS employs **bio-inspired neural anomaly detection systems** that continuously evolve through adversarial self-training, allowing the system to predict and neutralize zero-day attacks and AI-driven cyber intrusions before they occur. Additionally, this framework pioneers a **self-regenerative blockchain mechanism**, wherein compromised nodes autonomously heal by re-establishing secure cryptographic channels without network disruption or external intervention. A further innovation is the integration of **context-aware privacy layers** that dynamically modulate encryption strength based on real-time threat intelligence, user sensitivity profiles, and transactional risk factors. Experimental validations demonstrate that NAQS achieves superior resilience against hybrid classical-quantum attacks while maintaining ultra-low latency in data transactions and privacy assurances. This work lays the foundation for an **adaptive, intelligent, and quantum-immune cybersecurity ecosystem**, where privacy evolves from a static rule set to a self-optimizing, living architecture. Our research paves the path for building next-generation digital infrastructures capable of defending against threats yet to be conceived.

Keyword: component, formatting, style, styling, insert

PAY DART – DIGITALIZED ADMISSION AND FEE MANAGEMENT SYSTEM

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In the evolving landscape of higher education, managing student admissions and fee processing manually can lead to considerable inefficiencies, including human error, redundant paperwork, delayed operations, and poor transparency. Pay Dart – Digitalized Admission and Fee Management System is an innovative, centralized software solution specifically developed to address these challenges by automating the entire lifecycle of student fee management and simplifying the admission process in academic institutions. The project aims to provide a comprehensive platform that digitizes all touchpoints of fee collection—ranging from student onboarding to fee categorization, automated calculation of dues, concessions, and scholarships, and the generation of analytics-based reports for administrators and stakeholders. What makes Pay Dart especially impactful is its modular architecture and user-centric design, offering a responsive, seamless experience to students, management, and accounts staff alike. Pay Dart is built using a robust and scalable technology stack that includes:

- Flutter for the Mobile User Interface (UI), providing a fast, cross-platform experience.
- Vite with React.js for the Web UI, delivering a modern and performant browser-based interface.
- Node.js for the Backend Service Layer, enabling asynchronous, scalable operations.
- MySQL 12 as the Relational Database, ensuring strong data integrity and structured storage.
- REST API for connecting frontend and backend services in a secure and modular way.
- Power BI for the Analytics Dashboard, delivering visual insights into fee status, payment trends, outstanding dues, and student-specific financial summaries.

Security and user access management are enforced using role-based authentication, with each stakeholder (Student, Accountant, CAO, Superadmin, Management) assigned specific privileges. The system authenticates users through username and password only, eliminating two-factor authentication for simplicity and easier onboarding in educational settings where tech literacy may vary. From a development perspective, the project follows the Agile Software

Development Methodology, encouraging iterative design, frequent testing, and close feedback loops with institutional users. This methodology not only ensures timely delivery but also adapts quickly to changes in requirements, especially during pilot implementation in colleges. Although integration with a payment gateway and production deployment are outside the current scope of this phase, provisions have been made in the backend architecture to allow seamless integration in future iterations.Furthermore, the team suggests that deployment be conducted in a secure Linux-based virtual environment or containerized architecture such as Docker with NGINX for efficient scaling, security, and maintenance. Suggested hosting environments include institutional servers or cloud-based solutions (e.g., AWS EC2 or Azure VMs), depending on organizational budget and scalability needs. In conclusion, Pay Dart is not just a product but a transformational approach toward smart campus management, aligning with the goals of the National Education Policy 2020 by promoting paperless systems, transparency, and digital empowerment in academic institutions. The solution brings a modern, efficient, and student-friendly fee management experience to campuses, paving the way for future digital upgrades in education systems across India.

HR – ONBOARDING AND OFFBOARDING

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The HR On-Boarding and Off-Boarding Management System is a comprehensive, web-based platform developed to streamline and automate the entire lifecycle of employee management within academic institutions, addressing the limitations of traditional manual HR practices that often lead to data inaccuracies, inefficiencies, and communication delays. This system eliminates the dependency on scattered Excel sheets and manual documentation by offering a centralized solution that manages onboarding, resignation processing, salary tracking, asset assignment, and document handling, all through user-specific dashboards tailored to different roles such as HR personnel, Heads of Departments (HODs), Principals, System Administrators, and employees themselves. When a new employee is onboarded, their information is immediately visible to administrative users, enabling prompt asset allocation and initiation of responsibilities, while an automated email system ensures timely communication. Similarly, the

resignation process follows a structured multi-level approval chain—beginning from the employee and proceeding through the HOD, Principal, HR, and System Admin—ensuring a transparent and accountable exit procedure that includes notice period management and asset retrieval. The system also supports secure upload and retrieval of important documents, personalized access to salary details, and real-time visibility into HR operations, promoting data integrity, transparency, and operational efficiency. Additionally, it enhances coordination among departments, reduces manual workload, and improves decision-making through real-time dashboards and notifications. Designed with scalability in mind, this system is adaptable for future enhancements such as mobile accessibility, AI-powered analytics for performance evaluation and attrition prediction, and cloud-based support for managing HR functions across multiple campuses, thereby laying a strong foundation for a smarter, more efficient, and digitally empowered human resource environment.

AUTOMATED VOICE CONTROLLED WHEELCHAIR USING ARDUINO

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A voice-controlled wheelchair is a cutting-edge mobility device that uses speech recognition technology to enable individuals with physical disabilities to navigate their surroundings independently. This innovation integrates advanced hardware and software systems to provide seamless movement using voice commands like “forward”,”backward”,”left”,”right”, and “stop” Designed with user-friendly features and safety mechanisms, these wheelchairs ensure secure and efficient navigation. The primary goal of this technology is to offer improved mobility and autonomy for individuals with severe mobility impairments, such as those caused by spinal injuries, paralysis, or neurological disorders like ALS. By combining voice processing algorithms, obstacle detection sensors, and motorized systems, these wheelchairs address limitations of traditional mobility aids. The development of such systems also emphasizes affordability and accessibility to ensure that individuals from diverse economic backgrounds can benefit from this innovation. Future enhancements could include AI-driven voice recognition, outdoor GPS navigation, and integration with smart home systems. This project aims to explore the design, functionality, and impact of a voice-controlled wheelchair on user independence and

quality of life.

AN EXPERIMENTAL STUDY ON THE APPLICATION OF COIR FIBRES IN CELLULAR CONCRETE

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Concrete is known for its high compressive strength but exhibits poor tensile strength, which necessitates the use of reinforcement—typically steel. In recent years, researchers have explored alternative reinforcement materials, including various artificial fibers. This study investigates the mechanical properties of cellular (foamed) concrete reinforced with coir fibers at varying percentages. The aim is to enhance structural sustainability and performance using natural, eco-friendly materials. Coir fibers, a type of short, discrete vegetable fiber, were assessed for their physical compatibility within a concrete medium, with results indicating no deterioration. Experimental evaluations, including slump test, compressive strength, split tensile strength, and water absorption, were carried out to analyze the effectiveness of coir fiber reinforcement in foamed concrete.

A STUDY ON BRAND MARKETING AND CUSTOMER SATISFACTION OF ROYAL FIELD

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This study explores the intricate relationship between brand marketing strategies and customer satisfaction with specific reference to Royal Enfield, a heritage motorcycle brand known for its iconic identity and loyal customer base. The research investigates how Royal Enfield's branding elements—such as its retro image, lifestyle positioning, digital engagement, and community-driven events—affect customer perceptions and satisfaction levels. Through a combination of qualitative and quantitative methods, the study analyzes consumer responses to various marketing campaigns and their influence on brand loyalty, purchase decisions, and post

purchase experiences. Findings indicate that Royal Enfield's consistent brand narrative, emphasis on rider lifestyle, and emotional connect significantly contribute to customer satisfaction. The research concludes that effective brand marketing not only enhances brand equity but also plays a critical role in shaping customer experiences and long-term loyalty in the competitive motorcycle industry.

A STUDY ON CHALLENGES FACED BY RAPIDO DRIVERS IN THE BANGLORE CITY

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The rapid expansion of bike taxi services like Rapido in urban centers such as Bangalore has revolutionized last-mile connectivity. However, the drivers operating under this gig economy model face a variety of challenges that impact their livelihood and service quality. This study investigates the key challenges faced by Rapido drivers in Bangalore, including income instability, lack of social security benefits, traffic congestion, fuel costs, platform-related issues, and customer behavior. Data was collected through structured interviews and surveys with active Rapido drivers across various parts of the city. The findings highlight the need for policy interventions and platform-level reforms to enhance driver welfare and sustainability of the bike taxi model. This research contributes to understanding the socio-economic dynamics of gig workers in India's urban transport sector.

A STUDY ON RECENT TRENDS IN GREEN MARKETING IN INDIA

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A commercial strategy known as "green marketing" considers customer concerns about encouraging the preservation and protection of natural resources. In order to safeguard the environment, green marketing campaigns promote the benefits of the firms' products. The general population quickly realises that they may unwittingly and unknowingly contribute to

greenhouse gases, acid rain, pollution, and the vast accumulation of garbage as they become more educated and informed about environmental concerns. People that care about the environment work to safeguard and restore the resources in our world, and shoppers are more inclined to alter their purchasing patterns in ways that will lessen environmental impact. Hence, green marketing offers a variety of advantages, including access to the global market and a competitive edge. The paper explores how companies are increasingly going for green consumers— those who care about the environment and let it influence their shopping choices. The study's goal is to understand the potential and difficulties of green marketing. The study also looks at the current trends in green marketing in India. It comes to the conclusion that green marketing will continue to gain popularity among consumers and businesses alike.

A STUDY ON ARTIFICIAL INTELLIGENCE IN MARKETING

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Artificial Intelligence in Marketing is a rapidly emerging field that is transforming the way businesses approach their marketing strategies. It involves the use of Artificial Intelligence (AI), Machine Learning (ML), and other advanced technologies to automate and optimize various marketing processes. With the explosion of data and the increasing complexity of customer behavior, businesses need to leverage these tools to stay competitive. This article explores the concept of Artificial Intelligence in Marketing, its role in modern marketing, its benefits and challenges, best practices for implementation, and ethical considerations. It will also look into the future of Artificial Intelligence in Marketing and its potential impact on the marketing landscape.

HIERARCHICAL CLASSIFICATION OF KANNADA SHORT POEMS USING ONTOLOGY-BASED SEMANTIC EMBEDDINGS

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The classification of Kannada short poems presents a unique challenge due to the

language's complex morphology, rich poetic tradition, and cultural nuance. This research introduces a hierarchical, ontology-based semantic embedding approach to enhance the multiclass classification of Kannada poems. By constructing a domain-specific ontology that encapsulates

thematic categories such as love, nature, spirituality, and philosophy, we enable deeper semantic comprehension beyond syntactic features. The ontology-driven embeddings are integrated with machine learning models—SVM, Random Forest—and deep learning frameworks, with comparative analysis against baseline methods including TF-IDF and pretrained MuRIL embeddings. Experimental results demonstrate that ontology-enhanced RDF2Vec embeddings, when coupled with neural networks, outperform conventional models in terms of accuracy, precision, and semantic coherence. This study not only bridges a gap in Indian language NLP but also paves the way for scalable, context-aware classification in low-resource literary domains.

A STUDY ON CONSUMER BEHAVIOR POST-COVID: A SHIFT TOWARD DIGITAL BUYING

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The COVID-19 pandemic has significantly reshaped consumer behaviour, accelerating a global shift toward digital commerce, As physical restrictions and health concerns limited traditional in-store shopping, consumers rapidly adopted online platforms for purchasing goods and services. This paper explores the transformation in buying behaviour, highlighting key trends such as increased reliance on E-commerce, mobile shopping, contactless payments, and digital engagement. It examines demographic shifts, changes in product preferences, and the rise of social commerce. Additionally, the study assesses how businesses adapted their marketing strategies and customer experience models to meet evolving expectations. The findings suggest that many of these digital behaviours are likely to persist, marketing a long-term shift in consumer habits beyond the pandemic era.

EMPOWERING AGRICULTURAL MARKETS THROUGH SMART MOBILE PLATFORMS: INTEGRATING AI, IOT AND MOBILE MARKETING IN DEVELOPING ECONOMICS

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Agricultural markets in developing economies are often characterized by inefficient supply chains dominated by intermediaries, resulting in reduced earnings for farmers and inflated costs for consumers. With the rapid expansion of mobile internet, digital payment infrastructure, and e-commerce adoption, there is a critical opportunity to digitally transform agricultural value chains. This paper proposes a smart mobile platform that connects farmers directly with consumers and retailers, eliminating the need for middlemen and enhancing price transparency. Leveraging Artificial Intelligence (AI) for dynamic pricing and market trend forecasting, Internet of Things (IoT) devices for real-time supply tracking, and mobile marketing strategies for localized outreach, the platform empowers farmers to list produce, negotiate prices, and manage transactions securely. Field surveys and case study analysis demonstrate potential income increases of over 50% for participating farmers, alongside improved market transparency and consumer trust. The paper further addresses challenges such as rural connectivity, digital literacy, and technology adoption, offering a roadmap for scalable implementation. Emphasis is placed on public-private partnerships and inclusive policy frameworks to support sustainable digital transformation in agriculture.

A STUDY ON EMPLOYEES HEALTH AND SAFETY MEASURES – SHIVA MILLS LIMITED (COIMBATORE)

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Textile sector in India Plays an important role in the country's economy, providing employment to a significant population in rural and urban areas. This paper focuses on health and safety aspect of textile workers in Coimbatore (one of the key textile clusters) India. A sample of 150 workers from the identified textile industries of Coimbatore were assessed for their general physique, muscle tone, lung condition, and eyesight using different techniques. The study aimed at developing a framework for understanding risks to textile workers resulting from lack of

health and safety standards in companies. Finding showed that most of the workers have been affected by respiratory problems increase in muscle tone eye problems and musculoskeletal problem. It has been also observed that job security or regular work impacts positively to the worker's long term body health**.**

A STUDY ON ONLINE PAYMENT APP USERS SATISFACTION ON DIGITAL PAYMENT SYSTEM IN NAMAKKAL AREA

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Digital payment system is a digital medium that allows customers to make digital commerce transactions for their purchase. Consumers have moderate level of awareness about digital payment and there is still some problems and challenges faced by the customers in the E-Commerce scenario. The aim of this study is to have an eye on the problems and challenges on digital payment system as an ease of payment mechanism among customers in E- Commerce scenario with special reference to Namakkal District.

The area of the study is Namakkal district with a sample size of 50 respondents by adopting convenience sampling method. Primary data is collected through interview schedule. Simple percentage analysis and liker scale analysis were used for data analysis and interpretation. The study concluded that, as cash circulation has still major role in transaction, which requires more awareness programs to digital payment among customers as an easy source of payment mechanism. Hope this study will contribute the economy with a positive sign on go India Digital.

A STUDY ON OPTIMIZATION E-COMMERCE PRODUCTS PAGES FOR HIGHER CONCENTRATIONS

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This project presents a complete marketing plan for launching and promoting a multi-product e-commerce platform that offers a wide range of items including daily-use products, fashion accessories, and more. The goal is to reach a broad audience by combining online marketing

strategies such as social media campaigns, influencer tie-ups, SEO, and WhatsApp promotions, with offline methods like posters, local advertising, and direct community engagement. The platform is designed to provide a convenient, user-friendly shopping experience while ensuring fast delivery and customer satisfaction. By adopting a hybrid marketing approach, the business aims to boost brand visibility, attract consistent traffic, and build long-term customer loyalty in a competitive digital marketplace.

SOUND EVENT DETECTION IN REAL-WORLD ENVIRONMENTS USING DEEP LEARNING

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Environmental Sound Event Detection (SED) plays a pivotal role in advancing intelligent surveillance systems by overcoming the limitations of vision-based methods, such as poor performance in low light and privacy concerns. This paper proposes a robust deep learning framework that leverages Log Mel Spectrograms or Mel-Frequency Cepstral Coefficients (MFCCs) as input features and employs a Bidirectional GRU-based Recurrent Neural Network (RNN) for effective classification of urban sound events. The system was trained and validated using the UrbanSound8K dataset with stratified K-fold cross-validation to ensure generalization. Comprehensive preprocessing, including duration standardization, data augmentation, and feature normalization, was applied to enhance model performance. The proposed architecture achieves high accuracy and strong F1, ROC-AUC, and recall scores across multiple folds. Experimental results confirm the model's ability to discriminate between critical environmental sounds, such as alarms, sirens, gunshots, and engine noise, making it highly suitable for real-time, privacy-preserving acoustic monitoring in public safety applications. Future work will explore multimodal integration and deployment on edge devices.

A STUDY ON STUDENTS AWARENESS OF THE STOCK MARKET

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The stock market plays a vital role in shaping the financial literacy and investment behavior of individuals, particularly among the younger generation. This study aims to assess the level of awareness, understanding, and perception of the stock market among students. A structured questionnaire was administered to collect data on students' knowledge of stock market basics, familiarity with key financial terms, sources of information, and participation in trading activities. The survey also explored students' confidence in making investment decisions, their perception of risk, and their interest in learning more about the market.

A STUDY ON SUPPLY CHAIN MANAGEMENT IN COTTON MILLS AT K.K.P. FINE LINEN PVT. LTD.

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This research examines the supply chain management practices at K.K.P. Fine Linen Pvt. Ltd., focusing on their cotton mill operations. The study analyzes the entire supply chain from raw cotton procurement to finished textile distribution, identifying key challenges and opportunities for improvement. Through comprehensive data collection and analysis, the research reveals how efficient supply chain management contributes to operational excellence, cost reduction, and competitive advantage in the textile manufacturing sector. The findings highlight the importance of supplier relationships, inventory optimization, technology integration, and quality control measures within K.K.P.'s cotton mills. Additionally, the study proposes strategic recommendations to enhance supply chain resilience, sustainability, and performance in response to evolving market dynamics and industry challenges.

MACHINE LEARNING CLASSIFICATION OF SOPHISTICATED INSIGHTS AI AND PC WORKLOAD SHARING

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Better Design Ai Processors, It Is Critical to Characterize Artificial Intelligence (Ai) Workloads and Contrast Them to Normal Personal Computer (Pc) Workloads. In This Work, We Profiled the Aibench And Passmark Performancetest Benchmarks with The Intel Oneapi Vtune Profiler on A Multi-Core Computer. We Captured and Contrasted the Various Cpu And Platform Metrics and Event Counts for These Two Distinct Benchmarks. Using the Orange 3.0 Data Mining Tool, And Based on The Captured Profile Metrics and Event Counts, We Then Trained and Tested 9 Machine Learning (Ml) Models To Classify The Cpis And Elapsed Times Of The Various Tests Of These Two Benchmarks, Including Inference And Training Tests In Aibench, And Cpu, Memory, Graphics, And Disk Tests In Passmark. The Linear Regression Machine Learning Model Emerged As The Best Clocks Per Instruction (Cpi) Classifier, While The Neural Network Model With 4 Hidden Layers Was The Best Elapsed Time Classifier. This Machine Learning Classification Can Help In Predicting The Cpi And Elapsed Time And Distinguish Between Ai And Standard Pc Workloads Based On The Profiled Application(S) And Captured Profile Metrics And Event Counts. The Stressed Computer Units Identified By This Detailed Profiling Work And Exercised By The Benchmark Tests Can Also Guide Future Ai Processor Design Improvements.

INTEGRATED MULTI-SPEAKER SPEECH RECOGNITION AND IDENTIFICATION SYSTEM FOR HANDS-FREE ACCESSIBILITY

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Speech is a Fundamental Aspect of Human Communication And Interaction, Enabling Efficient Exchange Of Information In Everyday Life. Leveraging Speech Processing Technology, Numerous Applications Can Be Developed, Such As Biometric Voice Authentication, Voice-Controlled Systems, And Assistive Devices For Individuals With Hearing Impairments. This Project Proposes A Web-Based Application Designed To Facilitate Speech Recognition In A Multi-Speaker Environment. The System Integrates Advanced Speech Recognition and Speaker Identification Technologies To Identify Speakers, Transcribe Their Speech Into Text, And Display The Transcriptions With Speaker Tags On The Screen While Executing Associated System Tasks. The Proposed System Combines Speaker Identification,

Implemented Using Mel Frequency Cepstral Coefficients (Mfcc) And Gaussian Mixture Model (Gmm), With Speech Recognition Powered by The Google Cloud Speech Api. It Offers Three Key Functionalities: (1) Speech Recognition for Transcribing Spoken Words into Text, (2) Speaker Identification For Attributing The Transcribed Text To The Correct Speaker, And (3) Multi-Speaker Transmission And Reception Of Converted Text Using A Client-Server Model Enhanced With Multi-Threading For Seamless Interaction. The Application Facilitates Hands-Free Operation, Enabling Users To Perform Tasks Such As Opening Applications, Controlling Device Functions, And Accessing Files Or Websites. This Innovative Approach Promotes Improved Accessibility, Productivity, And Convenience, Making It Particularly Beneficial For Individuals with Disabilities And Those Seeking A More Efficient Computing Experience.

END-TO-END DEEP CONVOLUTIONAL PRINTED ID FACIAL IMAGE STEGANOGRAPHY TO PREVENT FROM PHOTOGRAPH SUBSTITUTION ATTACK

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At the Point When We Discuss "Character Card," We're Alluding To An Official Picture Id That Can Be Utilized As Such At Least In Germany. Shrewd To Travel Archives, Electronic Ids, Electronic Marks, Civil Cards, Key Cards For Getting To Safeguarded Regions Or Organization Framework, Government Backed Retirement Cards, And So On Are Only A Portion Of The Furthermost Common Purposes For Brilliant Cards. There Are A Measure Of Shields Included Into These Records. Battle the Act Of Report Distortion. Criminal Assaults Against Character Confirmation Frameworks Right Now Depend On Wrongfully Acquiring Genuine Archives And Adjusting Facial Pictures In Light Of The Fact That These Security Components Are Hard To Overcome. Having An Arrangement Of Believed Characters Is Critical To Any Useful Society. These State Run Administrations And Personality Producers Ought To Consistently Refresh And Improve Their Security Conventions To Decrease The Probability Of Extortion. Thus, We Convey Stegocard, The Principal Pragmatic Steganography Approach Customized Explicitly For Photographs Regularly Found On Standard Id Cards. Stegocard Is A Full-Stack Facial Picture Steganography Model That Utilizes A Profound Convolutional Auto Encoder To Make A Representation Of A Stego That Disguises A Message

And A Profound Convolutional Auto Decoder To Decipher The Picture. Capable Is The Decoder. The Stego Picture Fills In As A Message Decoder. This Turns Out As Expected Regardless Of Whether The Picture Was Printed Out And Subsequently Digitized. Examinations Of He Stego Stamp And Stegocard Encoded Face Photos Show That The Last Option Are Of Higher Perceptual Quality. Top Motion Toward Clamor Proportion, Disguising Power, And Quietness Scores On The Test Set Are Utilized As Show Measurements.

REVOLUTIONIZING BANKING USING THE AMALGAMATION OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN

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This Study Aims To Analyze The Impact Of Disruptive Technological Innovations On The Quality Of Service Delivery And Employee Performance In Investment Banks. The Cluster Sampling Method Was Used To Collect Primary Data From 500 Respondents In Foreign Investment Banks. Variables Such As Employee Performance, Service Delivery, Technology, Security, Operations, Strategy, And Quality Were Analyzed Using Chi-Square, Linear Stepwise Multiple Regression Analysis, And Correlation. Storage Network, Operating Costs, Client Reporting, Cloud Systems, And Money Laundering Were Found To Be The Most Significant Predictors Of Employee Performance. Banks Utilizing Fusion Technology Offer High-Quality Services To Clients. A Strategic Solution Causes Employee Performance To Multiply Every Unit Because Of A Strong And Positive Association. The Integration Of Artificial Intelligence And Blockchain Technology Enables Increased Automation, Enhancing Efficiency And Reducing Operating Costs. This Integration Plays A Crucial Role In Fraud Detection, Customer Support, Risk Management, Security, Digitization, Automation Processes, Algorithmic Trading, Wealth Management, And Other Areas.

Keywords : Blockchain, Statistical Package For Social Science, Artificial Intelligence.

AI POWERED ACCESSIBILITY FOR ENABLING EFFECTIVE COMMUNICATION FOR HEARING AND SPEECH IMPAIRED IN VIRTUAL PLATFORMS

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Effective Communication Is Vital Forsharing Information, Ideas, And Emotions. However, Virtual Meeting Platforms Like Zoom, Microsoft Teams, And Google Meet Often Fail To Accommodate Individuals With Hearing And Speech Impairments, Creating Significant Barriers To Inclusivity. While Sign Language Offers A Means Of Communication For Deaf Individuals, Its Interpretation Remains Challenging For Non-Signers. Existing Sign Language Recognition Technologies Are Limited In Accuracy And Accessibility, Making Them Unsuitable For Seamless Integration Into Virtual Platforms. This Project Introduces An Ai-Driven System Designed To Bridge The Communication Gap Between Deaf And Hearing Participants In Virtual Meetings. The System Employs Advancements In Deep Learning, Particularly Temporal Convolutional Networks (Tcns), To Enable Two-Way Communication In Real-Time. It Includes Three Core Modules: A Sign Recognition Module (Srm) That Interprets Signs Using Tcn, A Speech Recognition And Synthesis Module (Srsm) Powered By Hidden Markov Models, Which Converts Spoken Language Into Text, And An Avatar Module (Am) That Visually Translates Speech Into Corresponding Signs. The Avatar Module Is Essential For Visually Representing Spoken Language In Sign Language Format, Ensuring Non-Signers Can Effectively Communicate With Sign Language Users In An Intuitive And Engaging Way. Trained On Indian Sign Language, The System Facilitates Communication Across Diverse Groups, Including Deaf, Mute, Hard-Of-Hearing, Visually Impaired, And Non-Signers. Its Integration Into Popular Virtual Meeting Platforms Through A User-Friendly Web-Based Interface Enhances Accessibility And Participation. This Solution Represents A Significant Advancement In Fostering Inclusivity And Accessibility In Virtual Meeting Environments.

NEXT-GEN TRAVEL SAFETY FOR WOMEN: INTEGRATING ADVANCED TECHNOLOGIES FOR ENHANCED SECURITY

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Ensuring Safe Travel On Roads With Automobiles Or Cabs Is Crucial For Creating Secure Urban Environments. Women Traveling Face Significant Risks, Including Harassment, Unwanted Physical Touch, Kidnapping, And Assault. Often, The Shortest Or Fastest Route Is Not Necessarily The Safest. Users May Prefer A Slightly Longer Route If It Means Avoiding These Dangers. Current Navigation Systems Like Google Maps, Apple Maps, And Bing Maps Fall Short In Addressing Safety Concerns Such As Theft, Eve-Teasing, Snatching, Hijacking, Robbery, And More. These Systems Typically Overlook Safety Factors In Route Planning. With Rising Urban Crime Rates, Addressing Safety And Security For Women Has Become A Pressing Concern. To Tackle This Challenge, This Project Introduces An Innovative Travelers Safety Solution, Utilizing Advanced Technologies To Enhance The Safety And Experience Of Women Commuters. By Integrating Google Maps Api, Yolov8 For Object Detection, Tesseract Ocr For Text Recognition, And Connectivity With Rto Servers, The System Offers A Comprehensive Safety Framework. Key Features Include Route Planning Based On Real-Time Traffic Data, Driver Communication, Sms Notifications With Critical Journey Details, And Real-Time Location Tracking. The System Actively Monitors Route Deviations Using Map-Matching Algorithms, Triggering Immediate Emergency Alerts If Deviations Occur, Notifying Both The User And Their Emergency Contacts. Additionally, Users Can Review And Provide Feedback On Driver Performance Post-Journey. This Solution Not Only Addresses The Safety Concerns Of Women Travelers But Also Empowers Them With Real-Time Information And Communication, Fostering A Safer And More Secure Commuting Experience.

PROACTIVE MONITORING AND PREDICTION OF VEHICLE EXHAUST EMISSIONS FOR ENHANCED ENVIRONMENTAL HEALTH

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Exhaust Emission Index (Eei) Quantifies The Rate Of Air Pollutants Emitted By A Vehicle, With Higher Emissions Correlating To Poorer Air Quality. Traditional Emission Control Methods, Such As The Pollution Under Control (Puc) Certificate, Provide Static Test Results Rather Than Dynamic Assessments Of Vehicle Health. As Vehicle Numbers Increase, The Need For Advanced Solutions To Monitor And Predict Exhaust Emissions In Real-Time Has Become Crucial. This Project Introduces The Emission Tracker, An Innovative System Utilizing Deep Learning Techniques, Specifically Long Short-Term Memory (Lstm) Networks, To Address This Need. The Emission Tracker Employs An Lstm Model Deployed On A Central Server To Analyze Vehicle Carbon Emission Data, Predicting Trends In The Vehicle Exhaust Emission Index (Veei). The System Features A Webbased Dashboard That Provides An Intuitive User Interface For Visualizing Emissions Data. Through Location-Based Insights, Users Gain A Comprehensive Understanding Of Emission Patterns, Which Supports Informed Decision-Making. The Emission Tracker Not Only Enables Real-Time Monitoring But Also Offers Predictive Analytics To Forecast Future Emission Trends. This Proactive Approach Aids In Implementing Timely Interventions, Ultimately Contributing To Improved Air Quality And Enhanced Public Health By Fostering Environmental Sustainability.

FINGERPRINT BASED BLOOD GROUP DETECTION

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Biometrics Has Gained Significant Importance in The Field Of Identification And Healthcare. This Project Introduces A Novel Method To Detect An Individual's Blood Group Using Fingerprint Patterns. The Main Objective Is To Provide A Non-Invasive, Quick, And Cost-Effective Solution For Blood Group Detection, Which Is Especially Useful In Emergency Situations Where Time Is Critical. The System Works By Collecting Fingerprint Images And Analyzing Them Using Convolutional Neural Networks (Cnns). These Models Are Trained To Recognize Subtle Patterns And Ridge Characteristics That May Correlate With Different Blood Groups. The Proposed Model Is Tested With A Fingerprint Dataset Labeled With Blood Group Information To Ensure Accuracy. This Project Bridges The Gap Between Biometric Technology And Healthcare Diagnostics. It Avoids Traditional Invasive Methods Like Blood Sampling,

Making It Suitable For Real-Time And Remote Health Monitoring Systems. It Also Opens Possibilities For Use In Forensics, Blood Donation Camps, And Digital Health Records. In The Future, The System Can Be Improved By Integrating Contactless Fingerprint Scanning To Enhance Hygiene And User Convenience. Advanced Techniques Like Mass Spectrometry Can Be Explored To Detect Biological Markers Within Fingerprint Residues. Additionally, Combining Multi-Modal Biometrics Such As Facial Or Iris Recognition And Applying Machine Learning Algorithms For Deeper Data Analysis Could Significantly Improve Accuracy And Reliability. This Innovative Approach Shows Promise In Transforming The Way Blood Groups Are Identified And Lays The Foundation For Further Research In Biometric Health Diagnostics.

AI FOR CYBER SECURITY

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Without Substantial Automation, Individuals Cannot Manage The Complexity Of Operations And The Scale Of Information To Be Utilized To Secure Cyberspace. As Digital Landscapes Evolve And Technology Becomes Increasingly Integrated Into Every Aspect Of Society, The Importance Of Cybersecurity Cannot Be Overstated. Traditional Cybersecurity Measures, While Effective To A Certain Extent, Struggle To Keep Pace With The Sophistication And Scale Of Modern Cyber Threats. In This Context, The Application Of Artificial Intelligence (Ai) Has Emerged As A Transformative Force In Bolstering Cyber Defense Mechanisms. Firstly, It Explores The Fundamental Concepts Of Ai And Cybersecurity, Elucidating How Ai Algorithms Can Be Applied To Detect, Prevent, And Mitigate Cyber Threats Across Different Domains. Moreover, The Paper Discusses Prominent Ai-Driven Cybersecurity Approaches Such As Anomaly Detection, Threat Intelligence, Behavioral Analysis, And Predictive Modeling.

TRANSFORMING POTTERY SALES WITH A USER-FRIENDLY E-COMMERCE PLATFORM

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Pottery Is The Process And The Products Of Forming Vessels And Other Objects With Clay And Otherraw Materials, Which Are Fired At High Temperatures To Give Them A Hard And Durable Form. A Pottery Maker, Also Known As A Potter, Is A Skilled Artisan Who Creates Functional Or Decorative Objects Using Clay. The Potters May Face Difficulties In Marketing And Distributing Their Products. Limited Access To Markets, Lack Of Branding And Packaging Expertise, And A Need For Modern Marketing Strategies Can Hinder Their Ability To Reach Wider Audiences And Compete Effectively. To Stay Relevant, Potters May Need To Adapt And Find Innovative Solutions To Overcome These Challenges. The Aim Of The Project Is To Develop E-Commerce Website For Potters, Providing Them With A Digital Platform To Showcase And Sell Their Unique Creations. The Proposed E-Commerce Platform Aims To Offer A User-Friendly Interface For Potters To Exhibit Their Functional And Decorative Objects Made From Clay. The Platform Will Incorporate A Geolocation-Enhanced Feature Utilizing The Optics Algorithm, Allowing Customers To Easily Discover Nearby Potters For A Personalized And Efficient Shopping Experience. The Website Will Serve As A Digital Marketplace, Offering A Curated Selection Of Pottery Products Ranging From Functional Kitchenware To Decorative Art Pieces. The Website Will Feature Dedicated Artisan Profiles, Providing Insights Into The Potter's Background, Artistic Style, And Portfolio Of Products. A Visually Appealing Interface With Product Galleries Will Allow Users To Explore A Curated Selection Of Pottery Products, Ranging From Functional Kitchenware To Decorative Art Pieces. Additionally, The Platform Will Incorporate Features Such As Secure Payment Gateways, Detailed Product Descriptions, And High-Quality Imagery To Enhance The Online Shopping Experience. This Initiative Recognizes The Need For Innovative Solutions To Enhance Their Visibility, Streamline The Sales Process, And Foster A Connection Between Creators And Consumers.

POTENTIAL APPLICATIONS FOR AUTOMATED, BLOCKCHAIN-BASED, STUDENT ATTENDANCE REGISTERS USING CONTEMPORARY SECURITY CAMERAS AT EDUCATIONAL INSTITUTE

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This Research Presents An Innovative Solution For Automating The Creation Of A Student Attendance Register Using Ai-Based Security Cameras. The System Aims To Reduce Administrative Burdens And Paperwork For Teachers By Automatically Tracking Student Attendance. This Solution, Which Has Not Yet Been Implemented At Any University, Utilizes Blockchain Technology To Secure Data Storage By Encrypting Data And Storing It On Multiple Nodes. The Ai-Powered Camera System Can Monitor Student Attendance At Lectures By Capturing Facial Features, Including A Timestamp, Classroom Number, Lecturer's Name, And Subject Designation. Students Attending Lectures Would Receive Digital Subject Approval Through This System. Additionally, The System Could Be Used For Fire Protection Purposes. In The Event Of An Evacuation, The Cameras Would Indicate The Exact Location Of Each Student, Aiding Rescuers And Firefighters In Locating Individuals Within The Premises.

Keywords : Blockchain; Student Attendance , Security Camera

NATIONWIDE UNIFIED VOTING SYSTEM USING BLOCKCHAIN AND AI-DRIVEN FACE RECOGNITION

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Voting is A Cornerstone of Democracy, Enabling Citizens to Participate in Governance. However, Traditional Voting Systems Face Significant Challenges Such as Tampering, Inefficiencies in Vote Counting, Delayed Results, And A Lack of Transparency. Current Electronic Voting Systems Often Fail to Fully Address These Issues, Including Security Vulnerabilities, Limited Accessibility, And Inconsistencies Due to The Absence of a Unified System Across All States In India. These Shortcomings Call for A Comprehensive and Secure Solution to Enhance Trust, Efficiency, And Fairness in The Electoral Process. This Project Proposes a Blockchain-Based Traceable Selftallying Electronic Voting System to Overcome These Challenges. The System Integrates Qr Codes and Face Recognition Using Convolutional Neural Networks (Cnn) Linked to Aadhaar For Multilevel Authentication. Cnn Enables Precise and Reliable Facial Verification, Enhancing the Security and Accuracy of Voter Identification. Voters Can Cast Their Votes at Any Authorized Booth, And Each Vote Is Encrypted Using 256-

Bit Sha Hash Codes and Securely Stored on A Blockchain. It Ensures Immutability, And Any Modification or Tampering of Votes Triggers A "Vote Integrity Verifier Link" Notification Via Sms, Allowing Voters to Verify the Authenticity Of Their Votes. The System Introduces Several Innovations, Including Same-Day Result Announcements Through A Self-Tallying Mechanism That Performs Vote Counting at The End of The Day. Core Counting Processes Are Eliminated, Streamlining the Result Declaration Process. Additionally, The Adoption of A Unified Voting Platform For All States In India Ensures Consistency And Efficient Election Management Across The Nation. This Project Offers A Secure, Transparent, And Scalable Solution to Address The Limitations Of Existing Voting Systems, Reinforcing Trust In The Democratic Process While Providing Timely And Accurate Results.

ADVANCED OPTIMIZATION OF GROOVING AND BORING BAR OPERATIONS IN CNC TURNING FOR SUPERIOR PRECISION, EFFICIENCY AND SURFACE QUALITY

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This abstract outlines the critical aspects of boring and grooving operations performed on CNC turning centers. These essential machining processes enable the creation of internal cylindrical features and precise circumferential recesses, respectively, crucial for manufacturing complex components. The abstract will delve into key considerations for successful boring, including tool selection (boring bars, inserts), cutting parameters (spindle speed, federate ,depth of cut),and strategies for achieving desired bore diameters and surface finishes while mitigating issues like chatter and tool deflection. Similarly, the abstract will address grooving operations, focusing on tool selection (grooving tools, insert widths), feed and speed optimization, and techniques for effective chip evacuation and achieving accurate groove dimensions and profiles. Furthermore, common challenges encountered in both operations, such as tool wear, vibration, and dimensional inaccuracies, will be discussed, along with potential solutions and best practices for maximizing efficiency and part quality in CNC turning center environments

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DEVELOPMENT OF SUSTAINABLE COMPOSITES FOR THERMAL INSULATING MATERIALS – AN EXPERIMENTAL INVESTIGATION

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This study examines the development and characterization of sustainable composite materials made from waste cotton, coffee husk, and sawdust. These composites were fabricated using a compression molding system with varying blend ratios: CFS1, CFS2, and CFS7 (66.667% and 16.667%), CFS3 (33.333%), and CFS4, CFS5, and CFS6 (100%). The mechanical, thermal, and physical properties of the composites were evaluated according to ASTM standards. Thermal conductivity was measured using the ASTM C177 guarded-hot-plate method to assess the materials' effectiveness as thermal insulators. The thermal performance of the samples was tested and the results indicated that the composite containing equal proportions of cotton fiber, coffee husk, and sawdust achieved the best thermal insulation performance, with a thermal conductivity and an insulation value. This study highlights the potential of waste fibers as reinforcement materials, offering both environmental sustainability and economic opportunities, especially for rural communities. The findings provide a solid foundation for the development of innovative, eco-friendly thermal insulation materials.

Keywords: Coffee husk, Waste Cotton fiber, Sawdust, Epoxy resin, Composites, Thermal Insulation

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FABRICATION OF LATTICE STRUCTURE VIA FUSED DEPOSITION MODELLING FOR INTEGRATED ENGINEERING APPLICATION

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The study explores the performance of diverse lattice structures fabricated through Fused Deposition Modelling (FDM) in additive manufacturing. Lattice structures offer unique mechanical properties, impacting strength, flexibility, and weight. This research aims to investigate and compare the performance of different lattice configurations. The methodology involves the creation of varied lattice designs using FDM technology with distinct parameters, including infill density, cell size, and pattern types. Subsequently, mechanical tests are conducted to evaluate their performance under different loading conditions. Through comprehensive analysis, the study assesses factors such as structural integrity, load-bearing capacity, and deformation characteristics exhibited by each lattice structure. Finite element analysis (FEA) might complement experimental data to predict and validate structural behavior. The findings aim to contribute insights into identifying optimal lattice configurations for specific applications, considering trade-offs between strength, weight, and material usage. Understanding the mechanical behavior of these structures is crucial for industries like aerospace, 1automotive, and
biomedical engineering, where lightweight yet robust components are essential. In conclusion, this investigation endeavors to provide a comprehensive understanding of the mechanical performance of various lattice structures manufactured.

Keywords: Lattice structure, FDM,FEA

DESIGN FABRICATION OF SELF POWERED EV PROTOTYPE MODEL FOR PHYSICALLY CHELLENGED: A REVIEW

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As transportation needs grow and environmental concerns increase, we need better ways to use energy efficiently. Electric Vehicles (EVs) are a good option, but they face problems like short driving range, long charging time, and range anxiety. This project suggests a new method to solve these issues by adding different energy generation methods into EVs, creating a self-sustaining energy system. The system includes solar panels on the vehicle roof, a braking system

that changes braking energy into electricity, wheel-based power generation, and piezoelectric modules that use road vibrations to produce extra power. These methods together improve energy use and increase driving range while reducing charging needs. It also offers quicker and easier charging for public and personal use. This method helps create more reliable and sustainable EVs that need less external charging.

Keywords: Regenerative Braking System, Visual Basic, Switched Mode Power Systems, Wheel Power Generation, Piezoelectric Crystals.

THERMAL BEHAVIOR OF HEAT SINKS UNDER NATURAL CONVECTION: A REVIEW

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Heat sinks are crucial parts that dissipate surplus heat into the surrounding air to regulate and lower the temperature of mechanical and electrical systems. Their main purpose is to use passive cooling to increase system efficiency and improve thermal control. Fins, a crucial part of heat sinks, have a significant impact on the overall rate of heat dissipation. The efficiency of heat transfer is greatly influenced by the fins' design specifications, especially their size and form. In order to enhance thermal performance under natural convection, many fin configurations have been investigated. Predictive correlations have been developed as a result of numerous research that have examined thermal properties including heat input and the temperature differential between the base surface and ambient air. Since the geometric aspect ratio of heat sinks has a direct impact on the rate of heat transmission, it must be optimized. Additionally, for future design advancements, it's critical to comprehend the effects of extremely low aspect ratios.

Keywords: Fin geometry, heat sink, thermal analysis, and heat dissipation.

DESIGN AND DEVELOPMENT OF AN AI-ENABLED IOT-BASED AUTONOMOUS FARMLAND ROVER FOR SUSTAINABLE GROWTH

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This paper presents the development of an AI-enabled, IoT-integrated autonomous rover tailored for precision agriculture in challenging muddy terrains. The rover employs a GPS-based navigation system augmented with an Inertial Measurement Unit (IMU) and LiDAR to facilitate accurate autonomous path-following and real-time obstacle avoidance. To ensure sustainable and prolonged field operations, the system is powered by solar panels coupled with rechargeable battery systems, minimizing environmental impact. The rover is equipped with modular mounts accommodating advanced soil sensors to monitor parameters such as moisture content, pH levels, and nutrient concentrations. Additionally, multispectral imaging capabilities enable comprehensive crop health assessments, facilitating early detection of pest infestations and stress indicators. A convolutional neural network (CNN)-based machine learning model has been trained for early disease detection in cotton plants, demonstrating superior performance compared to existing models like AlexNet and VGG-16. The model was trained using a 90:10 data split for training and testing, respectively, with performance metrics such as accuracy and loss graphs validating the robustness of the proposed approach. The mechanical design of the rover, including its chassis and attachments, was executed using Autodesk Fusion 360's generative design tools. This approach optimized the structural strength-to-weight ratio, material utilization, and manufacturing feasibility. The design specifications encompass an all-terrain four-wheel-drive configuration, adjustable ground clearance, modular sensor mounts, and weather-resistant housing. Additive manufacturing techniques, specifically fused deposition modeling (FDM), were employed to fabricate the rover's structural components, enabling rapid prototyping and customization. The system architecture is modular and scalable, allowing adaptation to various field sizes, crop types, and climatic conditions. Real-time data acquisition and transmission are facilitated through IoT connectivity, providing users with accessible insights via mobile applications or web interfaces. Field testing of the prototype in simulated muddy terrain conditions validated the system's stability, navigation accuracy, and operational efficiency. The paper concludes by discussing the opportunities and challenges associated with integrating intelligent irrigation control and other precision agriculture applications using

autonomous systems.

Keywords: Autonomous rover, Precision agriculture, IoT, Machine learning, Generative design, Fusion 360, Additive manufacturing, Soil health monitoring, Crop disease detection, Sustainable farming, GPS navigation.

DESIGN AND DEVELOPMENT OF HYDRAULIC ASSIST WHEEL CHAIR

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Wheelchairs are still the best form of mobility for many bedridden peoples. However, wheelchair for bedridden people is always sold at very high price. Apart from that, they're also not innovative enough. We decide to design, and build cheaper, yet feature rich wheelchair for bedridden. We make sure this product is useful, safe to use, ergonomic, and cheaper that the current one in the market. A new concept of having hydraulic system to adjust the height of the wheelchair is to address the issue of ergonomic current design. In this wheelchair we use the hydraulic jack for lifting, wheels for transfer the from one locations to another location and also frame of wheel chair manufactured from mild steel materials having high strength and seating arrangement is foldable.

INVESTIGATION OF GRAPHENE REINFORCED ALUMINIUM 2080 METAL MATRIX COMPOSITE PROPERTIES

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Metal Matrix Composites (MMCs) offer significant improvements in properties such as specific strength, specific modulus, damping capacity, and wear resistance when compared to unreinforced alloys. The demand for composites with low-density, cost-effective reinforcements has been on the rise in recent years. Among these, Aluminium Metal Matrix Composites

(AMMCs) have emerged as a promising class of advanced materials, owing to their superior mechanical properties. In the design and optimization of composite structures, parameters like surface roughness and wear resistance play a critical role. MMCs have garnered considerable attention in industries such as aerospace, electrical, electronics, and automotive due to their outstanding technical properties and diverse applications. To further enhance the properties of these composites, the addition of graphene to Aluminium 2080 has been explored, aiming to increase the material's conductivity while improving mechanical properties like hardness and tensile strength .This study focuses on the development of Al 2080-based composites reinforced with graphene particles (up to 0.3% by weight), produced via powder metallurgy. The crystallographic structure and physical properties of the composites were characterized using X-ray Diffraction (XRD) and chemical composition analysis. The XRD results helped in determining the crystallographic phases, while the chemical composition analysis provided insights into the material's elemental composition.

SOLAR POWERED PROGRAMMABLE QUARTZ FURNACE FOR HIGH TEMPERATURE ELECTROSTATOR

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Thermal conductivity of metals is generally proportional to the absolute temperature and electrical conductivity. However, as temperature increases, the electrical conductivity of pure metals decreases, so the thermal conductivity of pure metals remains approximately constant. In contrast, alloys of metals do not show significant changes in electrical conductivity with increasing temperature. Heat moves along a temperature gradient from an area of high temperature and high molecular energy to an area with a lower temperature and lower molecular energy. And the readings are automatically fed into the embedded system. From this electronic device signals are coded into the microcontroller. So that VISUAL BASIC software is used to analyse as well as decoding of microcontroller into our understandable readings.

SMART VENTILATION CONTROL SYSTEM

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With growing transportation and population density, increasing global warming, and sudden climate change, air quality is one of the critical measures that need to be monitored closely on a real-time basis in today's urban ecosystems. This paper examines the issues, infrastructure, information processing, and challenges of designing and implementing an integrated sensing system for real-time indoor and outdoor air quality monitoring. The system aims to detect the levels of gases, carbon monoxide (CO), carbon dioxide (CO2), temperature, and humidity on a real-time basis and provides an overall air quality alert. The development of the system for real-time monitoring and alerting is validated and supported through conducted experiments.

AUTOMATED SMART KIT FOR HEALTH MONITORING AND EMERGENCY RESPONSE

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The rapid growth of the Internet of Things (IoT), especially in healthcare and home automation, has underscored the importance of secure data transmission to ensure confidentiality and privacy. This paper introduces an integrated approach to the Internet of Healthcare Things (IoHT), focusing on the development of a real-time "Patient Monitoring System." The system is designed to monitor vital signs such as heart rate, SpO2 levels, ECG, respiration, and body temperature using multiple sensors. The system is also equipped with an emergency switch, which, when activated, sends the patient's GPS coordinates to the doctor and family members via a GSM module, facilitating quick responses in emergencies. By integrating sensors, GPS, GSM, and cloud technologies, the system offers a comprehensive solution for

remote health monitoring, improving patient care and reducing response times during critical situations.

Keywords – IOT, IoHT, ECG.

SMART FERTILIZER APPLICATION SYSTEM USING MACHINE LEARNING

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Automation and robots must be integrated into modern agriculture in order to increase production and efficiency. This paper describes the creation of a pick-and-place robot with colour sensors that was created especially for agricultural uses. A highly developed colour sensing system on the robot allows it to precisely recognize and control things based on their colour characteristics. The major goal of this project is to solve the labour-intensive tasks associated with agriculture, such as fruit and vegetable harvesting. To simplify these operations, the suggested robot uses a mix of computer vision and robotics technology. Automation plays a major role in reducing human effort in most routine and frequently performed tasks. We are making a Colour Sensor-based Pick and Place Robot in this project. In this project, the wheels and DC motors are used to move and place objects, and Arduino is used as the central control system. Arduino is an open-source microcontroller platform that provides a simplified coding interface and is ideal for hardware integration. These robots might decrease damage, increase productivity, and be cost-effective while also freeing up labour.

Keywords – Robot, Automation, Modern Agriculture.

WATER DATA COMMUNICATION FOR FLOOD MANAGEMENT AND REAL TIME RESCUE COORDINATION

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Water data communication is a potential technology to realize underwater communication. The experiment of underwater data communication in the laboratory is different from that in the real water environment because the physical scale is limited. Although since recent several decades, artificial scattering agents are used to recreate underwater data communication through water channels under different communication medium conditions. Flood problems have always been a severe ongoing issue in residential, commercial, or industrial environments. While most problems are minor enough to ignore or live with, flood issues can escalate to significant reconstruction and investment. The major problem with the flood issues is our all-communication sources such as mobile phone are stopped. The Biggest Problem for the Rescue Team is Communication to the Control Room because Mobile towers shut down During Flood for electric safety. So, no other technology is available to inform the rescue team about the rescue needed people's places and the number of peoples and what are sources to be brought for the rescue operation.

Keywords – Safety, GPS, Communication.

AUTOMATIC REEL SPLITTING MACHINE USING HYDRAULIC SYSTEM

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In today's world, paper industry is one of the most important industries due to its continuous demand on its product i.e., the paper industry is classified under the continuous flow production industries, due to this nature of production, time of the operation and quality should be maintained. There is a greater number of moving and stationary machines in paper industries. The manufacturing of paper involves several steps. Among these machines, the reel splitting machine is one of the major machines located in the finishing house. This machine is used for cutting the damaged paper reels. During this rolling process the paper may get damaged. The damaged paper rolls are unfit for sales or export. So, for this reason the paper reels should be cut into pieces, and they will be recycled by roller guide, so that the friction is The existing reel splitting machine in the finishing house is working in a mechanical drive mechanism. The

output of each paper reel is 6 tons per hour. This change over time will lead to a great amount of reduction of paper cutting. This can be done by the following techniques This project is meant for converting mechanical based (lead screw with motor) reel splitting machine into a hydraulic based one as required by the company. Lead screw is replaced low. The core will be used in the paper industry widely for rolling the paper neatly. When the mechanical reel splitting machine cuts the rejected.

DEVELOPMENT OF A SMART HELMET DETECTION SYSTEM FOR MOTORCYCLE RIDER

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Street wellbeing is a central issue, especially with issues like cap resistance and liquor utilization, the two of which essentially increment the gamble of mishaps and fatalities. Head wounds, frequently brought about by not wearing protective caps, are a main source of death and handicap in street occurrences. Moreover, liquor utilization weakens basic mental capabilities, for example, independent direction and response time, which are fundamental for safe driving. This issue is particularly serious in high-traffic regions like India, where plastered driving can make mishaps significantly more hazardous. To handle these issues, we propose a brilliant protective cap framework that incorporates both a gas sensor and a head protector sensor to guarantee security. The gas sensor identifies the driver's liquor levels, while the head protector sensor checks whether the driver is wearing a cap. On the off chance that the cap isn't worn, or on the other hand assuming liquor is identified in the driver's framework, the vehicle's key will be locked, forestalling start. This action guarantees that drivers can't work their vehicle under perilous circumstances. Moreover, on the off chance that liquor is recognized after the key is opened, the framework will send a GSM message to the driver's family, cautioning them of the risky condition. By coordinating innovation with head protector consistence and liquor location, this shrewd cap framework means to altogether decrease mishap rates, advance dependable driving, and upgrade generally street security. The framework's constant correspondence and observing capacities assume an essential part in further developing driver conduct and decreasing the gamble of lethal mishaps out and about.

Keywords – Smart Helmet, Sensor, GSM.

INNOVATIVE SEED SORTING AND PACKAGING AUTOMATION FOR SUSTAINABLE AGRICULTURAL PRACTICES

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The project aims to design and implement an automated system for sorting and packing seeds using Python and Arduino. This system will sort seeds based on predefined parameters such as size, weight, or type and efficiently package them for distribution. Leveraging the computational power of Python for data processing and Arduino for real-time control, the system is cost-effective, precise, and adaptable for agricultural or commercial applications. Seed sorting is an essential process in agriculture, where precision and speed are crucial for maximizing crop quality and yield. Traditionally, manual sorting methods are slow and prone to errors. By leveraging Python's image processing libraries and machine learning capabilities, this project proposes a cost-effective and efficient solution for seed sorting. It processes seed images from the user or dataset, extracts relevant features, and applies a machine learning model to determine the class of each seed. This automated approach eliminates human error, increases throughput, and improves consistency in seed quality. The proposed system can be tailored to various types of seed and integrated with existing sorting machinery to further enhance operational efficiency.

Keywords – Automation, Python, Agricultural.

IOT BASED ONION HARVESTER

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Onion harvesting is often labor-intensive and inefficient, with issues like inconsistent

quality, uneven sizes, and soil variability leading to losses. Our IoT-based onion harvester addresses these challenges through smart automation and real-time monitoring. The system features a motor-driven mechanical design with spur gears and rollers that efficiently collect and deposit onions into a collecting box. Integrated IoT sensors allow for remote control, performance tracking, and real-time adjustments based on field conditions. This reduces labor, minimizes crop damage, and ensures consistent harvesting quality. By providing critical data on soil and machine efficiency, the harvester empowers farmers to make informed decisions. The result is a faster, more reliable, and cost-effective harvesting process, transforming traditional onion farming into a smarter operation.

Keywords – IOT, Sensors, Harvesting.

AUTOMATED SMART DUSTBIN WITH SOLAR POWERED AND IOT APPLICATION

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Urban development has led to increased waste generation, putting pressure on existing waste collection infrastructure. This paper proposes a solution using IoT and solar energy: the IoT-based solar-powered smart dustbin. This system enhances efficiency and sustainability in waste collection processes in urban areas. The smart dustbin monitors garbage levels continuously using two ultrasonic sensors-one for the lid and another for waste levels. When the waste exceeds a threshold, it automatically sends real-time alerts to municipal authorities. Once fully occupied, the bin remains closed to prevent overflow and dumping issues, adopting a proactive approach to improve cleanliness and sanitation. Additional features include GPS for locating dustbins, a camera for preventing the disposal of living beings (via image processing), and smoke sensors to detect fire incidents caused by electrical waste or chemical reactions. Powered by solar energy, the system operates sustainably, reducing carbon footprint and costs. IoT integration allows for remote monitoring across multiple locations, enabling municipal authorities to access real-time data, schedule garbage collection, and monitor system performance through a centralized dashboard. This improves operational efficiency, optimizes resource allocation, and supports proactive maintenance.

Keywords – Automation, Solar, Gps.

AUTONOMOUS AQUAPONICS SYSTEM FOR SUSTAINABLE FARMING

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Agriculture faces pressing challenges as climate change, population growth, and diminishing natural resources increase the strain on food production systems. Sustainable farming has emerged as a critical approach to addressing these challenges, emphasizing the efficient and responsible use of resources to support environmental health, crop productivity, and food security. Central to sustainable agriculture is the need for intelligent resource management, especially concerning soil and water—two pillars of any productive agricultural system. To achieve this, real-time monitoring and data-driven decision-making are essential. The Internet of Things (IoT) offers promising capabilities for this purpose by enabling continuous monitoring, precise analysis, and remote control, all of which contribute to a more sustainable farming model. This project introduces a comprehensive, IoT-based system that monitors soil health and water quality to support informed decision-making and optimize the use of essential resources. The system is designed to measure and monitor critical environmental parameters, including soil moisture, ambient temperature, humidity, sunlight intensity, water levels in wells or reservoirs, and nutrient levels (NPK—Nitrogen, Phosphorus, and Potassium) in the soil. By accurately detecting moisture levels, the system provides timely information that prevents both over-irrigation and under-irrigation, ultimately conserving water and ensuring soil is maintained in optimal condition for plant growth. Sunlight intensity is also measured to ensure crops receive adequate exposure to light, which is vital for photosynthesis and overall plant health. The NPK sensor provides data on soil fertility, enabling targeted nutrient management and reducing the need for excessive fertilizer use, which is key for environmental sustainability. Furthermore, water level measurement in local wells or reservoirs enables the system to gauge resource availability, facilitating water management that aligns with sustainable practices. This feature is especially valuable in regions prone to water scarcity, where efficient water usage is paramount.

Keywords – Automation, NPK, IOT.

AI-POWERED PEST AND DISEASE DETECTION DRONE

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The integration of artificial intelligence (AI) with drone technology is revolutionizing agriculture, particularly in pest and disease management. AI-powered drones, equipped with high-resolution cameras and advanced sensors, autonomously monitor large fields, capturing detailed aerial imagery. Using real-time image analysis, AI systems detect early signs of pest infestations and plant diseases with high accuracy, enabling timely, targeted interventions. This approach reduces the need for manual field scouting and minimizes excessive pesticide use. Additionally, machine learning models provide predictive insights, helping farmers anticipate outbreaks based on environmental and historical data. By enhancing crop health, reducing costs, and promoting sustainable farming practices, AI-powered drones represent a major advancement in precision agriculture and a vital tool for ensuring global food security.

Keywords – AI-Powered drone, Pest detection, Precision agriculture.

SMART IRRIGATION SYSTEM FOR PRECISION FARMING USING IOT

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The world is facing an increasing environmental crisis due to rapid urbanization, which results in the destruction of numerous plants that play a crucial role in maintaining the balance of oxygen and carbon dioxide in the atmosphere. This imbalance negatively impacts air quality, contributes to climate change, and poses a threat to both plant and human life. The system is

designed to monitor key environmental factors that are critical for plant growth, such as soil moisture, pH levels, temperature, and humidity. By integrating various sensors, the system can detect changes in these parameters and respond accordingly to ensure the plant receives optimal care. A soil moisture sensor continuously checks the moisture content in the soil, and when it falls below a certain threshold, the system automatically triggers a water pump using a driver relay to irrigate the plants. The pH sensor monitors the soil's acidity or alkalinity, which is crucial for maintaining healthy soil conditions, while the DHT11 sensor records the temperature and humidity levels, ensuring the environment remains suitable for plant growth.

Keywords – Soil sensor, DHT11 sensor, Humidity.

BIO-SPHERICAL EFFECTS OF SOLAR ILLUMINATION AS WELL HUMAN CIRCADIAN RHYTHM ENHANCEMENT THROUGH SUN-SALUTATION ALONG WITH DAYLIGHT ENERGY HARVESTING

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This study used Human Circadian Rhythm to analyze and Enhance biological Activities, scheduling Daylight Harvesting pattern based on Energy Management scenario. The impact of Sunrays and Solar Illumination on the functionality of Human Circadian Rhythm through Sun-salutation is the subject of this paper. Activities amalgamating daylight schedule on seasonal and geographical context are essential based on energy management scenario, as well. The Photobiologycal parameter of Circadian Rhythm shows that they have a great influence over Human health and behavior. An amalgamated system proposed to enhance Human Life, as a part of the great Biosphere, along with daylight utilization, providing energy management, influenced Photobiologycal by virtue of sun.

Keywords: Circadian Rhythm, Solar Illumination, Sun-salutation, Daylight, Energy Management.

REVOLUTIONIZING URBAN MOBILITY THROUGH AUTONOMOUS PUBLIC TRANSPORT

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Autonomous Public Transport Systems (APTS), which use self-driving technology driven by artificial intelligence, sensors, and machine learning, are a revolutionary development in urban mobility. These systems, which range from self-driving buses to trams, provide creative answers to urgent urban problems like pollution, traffic jams, and the shortcomings of traditional transit. APTS helps create smarter, more sustainable communities by improving safety, cutting operating costs, and optimizing routes using energy-efficient vehicles. More flexibility and multimodal connectivity are made possible by its interaction with current transportation networks, which enhances the user experience overall. In order to achieve broad adoption, important concerns like cybersecurity, infrastructural preparedness, public trust, and regulatory frameworks must be addressed. APTS has the ability to revolutionize public transportation and play a crucial role in determining the future as cities develop into smart urban ecosystems.

Keywords:Autonomous Vehicles, Sensors, Radar, GPS Systems, AI Algorithms ,Connectivity

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AI-DRIVEN WELFARE SCHEME ASSISTANCE AND MANAGEMENT SYSTEM

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The AI-Driven Welfare Scheme Assistance and Management System is an intelligent platform designed to bridge the gap between government welfare schemes and eligible beneficiaries. This system leverages artificial intelligence to analyze user data such as age, income, occupation, location, and personal circumstances, in order to recommend the most suitable welfare schemes to individuals. It simplifies the application process by providing an automated eligibility checker, intelligent form filling, and document verification. A built-in AI-powered chatbot offers real-time support, addressing user queries and guiding them through the system in multiple languages. The platform also includes a dashboard for users to track application status and for administrators to manage schemes and view analytics. By automating and personalizing the interaction between citizens and welfare services, this system enhances accessibility, reduces delays, and ensures that

support reaches the right people efficiently. Overall, the project aims to create a smarter, transparent, and user-friendly approach to public welfare distribution.

A SECURITY ALERT SYSTEM AND IOT-BASED MONITORING FOR AZARDOUS GAS LEAKAGE IN INDUSTRIAL ENVIRONMENTS

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Industrial environments frequently handle hazardous gases such as methane, LPG, ammonia, and carbon monoxide. Unmonitored gas leaks can lead to catastrophic outcomes, including explosions, fires, and health hazards. This paper presents the design and implementation of an IoT- enabled alert system for real-time detection and notification of gas leaks. Using sensors (MQ-2/MQ-135), a microcontroller (ESP8266/ESP32), and cloud-based platforms, the system continuously monitors gas concentration and triggers alerts through alarms and real-time notifications. This approach enhances safety, enables remote supervision, and ensures timely intervention.

MEDICAL DATA ANALYSIS ON HEART PATIENTS USING DEEP LEARNING FOR ENHANCING SECURITY

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In the data analysis arena, the Convolutional Neural Network (CNN) technique emerges as a promising approach for the analysis of medical data. Medical data encompassing diverse patient attributes, including demographics, medical history, and lifestyle factors, undergo meticulous pre- processing before CNN clustering. By grouping patients into clusters based on similarities in their medical profiles, CNN facilitates the identification of distinct subpopulations with varying cardiovascular risk profiles. Main phases of this analysis encompass feature

selection, model training, and evaluation, culminating in the deployment of validated CNN models into clinical practice. The integration of CNN within healthcare workflows promises to furnish clinicians with actionable insights for tailored patient management strategies, thereby enhancing treatment efficiency and patient outcomes. Moreover, CNN's interpretability and computational efficiency render it a valuable tool for disentanglement intricate relationships within medical data, forcing advancements in health informatics and personalized medicine. This paper deals with medical data analysis to provide solutions for making decisions and secure medical data.

Keywords**:**Medical Data, Deep Learning, Neural Networks, Data Analysis, Health informatics.

A NOVEL CONVOLUTIONAL NEURAL NETWORK FOR EFFICIENT IMAGE CLASSIFICATION

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Image classification is a fundamental task in computer vision that aims to assign a label or category to an input image. Convolutional Neural Networks (CNNs) have emerged as powerful models for image classification, leveraging their ability to automatically learn hierarchical and discriminative features from raw pixel values. This paper presents an overview of image classification using CNNs, highlighting the key components and techniques involved in the process. The research study begins with a discussion of the basic principles of CNNs, including convolutional layers, pooling layers, and activation functions. It then explores the training process, detailing the use of back propagation and gradient descent to optimize the network's parameters. Additionally, various regularization techniques such as dropout and batch normalization are introduced to improve the network's generalization and prevent overfitting. Next, the study delves into the data pre-processing steps required for effective image classification. These steps include data augmentation, normalization, and handling class imbalance issues. The evaluation metrics commonly used for assessing the performance of image classification models are discussed, including accuracy, precision, recall, and F1-score. The research paper also addresses transfer learning, a technique that enables the utilization of pre-trained CNN models on large-scale datasets to improve the performance on smaller,

specialized datasets.

TWITTER SENTIMENT ANALYSIS: AN OVERVIEW

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This research introduces a new method for understanding emotions in tweets, especially when people use sarcasm, irony, or express mixed feelings. We combined two powerful techniques: one that uses dictionaries of emotional words (lexicons) and another that uses deep learning to understand the context of tweets (like BERT). After testing two different designs, we chose a hybrid approach that gave the best balance between being accurate and easy to explain. When tested on real Twitter data, our system correctly identified emotions in tweets 93% of the time and achieved a 95% F1-score. We used various tools to double-check the results and found the system worked well even with tricky language. However, some tweets were still hard to understand because people often use slang, abbreviations, or change how they talk depending on the time or place. Even with these challenges, our approach is a strong step forward and can help improve how we monitor public opinion, brand feedback, or major events on social media. In the future, we plan to expand the system to work in more languages and handle images, emojis, and videos too.

REAL-TIME SMS SPAM DETECTION USING MACHINE LEARNING AND NLP TECHNIQUES: A SCALABLE APPROACH

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In today’s digital era, spam messages have become an increasingly pervasive threat, particularly in the domain of mobile communication via Short Message Service (SMS). With the rise in mobile connectivity and the ease of mass communication, malicious entities have begun exploiting these channels to deliver unsolicited advertisements, phishing links, malware, and

fraudulent messages. As per the 2024 Statista report, nearly 45% of global email traffic consists of spam, and a growing percentage of SMS communication now faces the same risk. These spam messages are not just an annoyance—they pose significant risks including data breaches, financial fraud, and erosion of user trust.This research paper presents a machine learning-based approach to SMS spam detection that leverages natural language processing (NLP) techniques. By utilizing feature extraction methods such as TF-IDF and Count Vectorizer and training multiple classifiers including Naïve Bayes, Logistic Regression, and Random Forest, this study aims to develop a robust, real-time spam filtering system. The proposed solution addresses the major challenges of high false positives, scalability, multilingual support, and real-time performance. The ultimate objective of this research is to ensure safe, efficient, and trustworthy communication systems by intelligently filtering out harmful or irrelevant content while preserving genuine user interactions.

DESIGN AND DEVELOPMENT OF INDUSTRIAL SAFETY HELMET OF 3D PRINTED POLYMER MATRIX COMPOSITE

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This project presents the design and development of an industrial safety helmet using advanced 3D printing techniques with polymer matrix composite materials. Traditional safety helmets, typically produced using injection-molded thermoplastics, offer limited opportunities for customization, weight reduction, and performance optimization. With the emergence of additive manufacturing and composite filaments, it is now feasible to create more efficient and ergonomic personal protective equipment. The objective is to fabricate a functional safety helmet using Fused Deposition Modeling (FDM) and evaluate its mechanical performance using three material: Acrylonitrile Butadiene Styrene (ABS), PLA reinforced with Carbon Fiber (PLA-CF), and PLA reinforced with Glass Fiber (PLA-GF). These materials were selected for their combination of strength, ductility, and printability. A full-factorial design of experiments was employed to study the effects of FDM parameters such as layer height. Extrusion temperature, infill density, and raster angle. Tensile and flexural tests were conducted according to ASTM D638 and ASTM D790 standards using 3D-printed specimens. A CAD-based helmet model was also developed to optimize impact distribution, ventilation, and

ergonomic fit. The final prototype, printed using optimized parameters, demonstrated improved strength, reduced weight, and modularity for accessory integration. The results validate the potential of 3D-printed polymer matrix composites as a sustainable and customizable solution for industrial safety helmets, especially suitable for low-volume or specialized applications.

Keywords: 3D printing, Fused Deposition Modeling, Safety Helmet, Polymer Matrix Composites, PLA-CF, PLA-GF, Mechanical Testing, Additive Manufacturing.

BLOCKCHAIN-BASED HEALTH INFORMATION EXCHANGE: ENSURING DATA PRIVACY AND SECURITY

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Block chain technology has emerged as a revolutionary solution to the fundamental problems in healthcare systems by showing promise to fix these problems in health systems. Old ways of sharing health info have problems like risk of data leaks, not being able to share data easily, and not giving patients enough control over their health records. Block chain gives us a secure and unchangeable list of transactions. This helps keep data secure, improves privacy, and makes it easier for different health organizations to interact. Using block chain for electronic health records (EHRs) has shown increased security and privacy. This was done by using smart contracts and making data hard to decipher in cloud systems. Patients like the idea of using block chain for sharing health information as the same keeps their privacy intact and make data sharing processes more transparent. Block chain gives patients control over their health data, letting them decide who can access it and at the same time, keeps transactions secure with approved people only. Some have suggested using block chain-enabled smart contracts in new ways like in matching patients for clinical trials, it could automate steps and deal with problems including lack of awareness and complex processes. But, using block chain more often faces some obstacles. This includes problems with how much it can handle, how to meet government rules, and difficulties working with old systems. To make the most of block chain in making healthcare data management better, these issues need to be addressed. In this research work, we've studied results from numerous recent research studies in block chain with respect to health

domain more particularly to get more insights like pros and cons of same, and more importantly the future of block chain in healthcare.

ANALYTICAL IMPLEMENTATION OF WPT SYSTEM FOR PERFORMANCE ENHANCEMENT OF EV BATTERY CHARGING

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Fossil fuel based vehicle emit toxic gases and other pollutants in the atmosphere. A big fraction of environmental pollution is caused by these fossil fuel based vehicle. As a step towards creating a pollution free environment, people are encouraged to switch to electric vehicles. But the major concern of electric vehicle owner is range anxiety. Undeveloped charging infrastructure and the lack of fast chargers are one of the major reason of the people for not owning an electric vehicle. This paper proposes the idea of dynamic wireless charging of electric vehicle. This method focuses on charging an electric vehicle when it is in motion. Moreover, with the development of dynamic wireless charging system, the size of battery of the electric vehicle, which is the reason for the electric vehicle being expensive can be reduced since there would be no need for such big storing system and as a result of this the price of the vehicle will be reduced by a major margin and electric vehicle will fall into the category of affordable range attracting more buyers. A prototype solution has been designed for a working wireless charging system to demonstrate the feasibility of wirelessly charging EVs.

ADAPTIVE IOT-BASED MONITORING SYSTEM FOR GREENHOUSE GAS AND CLIMATE OPTIMIZATION

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This project focuses on the design and implementation of an IoT-enabled device for real-time monitoring of greenhouse gas emissions and environmental parameters. The system integrates

various sensors and control components to ensure the greenhouse environment remain optimal. A gas sensor is employed to detect abnormal gas emissions within the greenhouse, ensuring safety and efficiency. Additionally, a DHT11 sensor monitors the temperature and humidity levels to maintain a favorable climate for plant growth. Light intensity is tracked using an LDR (Light Dependent Resistor) sensor, which helps in optimizing lighting conditions. To manage irrigation, a water motor is activated for spraying water when needed, helping to regulate soil moisture. A buzzer provides alerts for any abnormal conditions, serving as an indication system for potential hazards. All sensor data and actions are controlled and processed by an ESP32 microcontroller, which facilitates real-time data acquisition, analysis, and remote monitoring.

CROSS WING DRONE FOR FERTILIZER SPRAYING

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The CrossWing Drone for Fertilizer Spraying is an advanced agricultural drone designed to enhance precision farming practices. Featuring a unique cross-wing design, the drone ensures superior stability and load distribution during flight. It is equipped with a GPS-enabled navigation system for accurate path mapping and targeted spraying. The drone can autonomously cover large areas while minimizing fertilizer waste and ensuring uniform application. Its modular tank and nozzle system allow for easy maintenance and multiple crop compatibility. By reducing human labor and exposure to chemicals, it promotes safer and more efficient farm operations. The cross-wing structure also improves aerodynamics and endurance. Real-time data feedback and mobile control integration support remote operation and monitoring. This project aims to revolutionize crop management with sustainable, cost-effective, and intelligent spraying solutions.

DESIGN AND ANALYSIS OF FIN USING AL-SI ALLOYS WITH MG FOR IMPROVING HEAT TRANSFER EFFICIENCY

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The Engine cylinder is one of the major automobile components, which is subjected to high

temperature variations and thermal stresses. In order to cool the cylinder, fins are provided on the cylinder to increase the rate of heat transfer. By doing thermal analysis on the engine cylinder fins, it is helpful to know the heat dissipation inside the cylinder. The principle implemented in this project is to increase the heat dissipation rate by using the invisible working fluid, nothing but air. We know that, by increasing the surface area we can increase the heat dissipation rate, so designing such a large complex engine is very difficult. The main purpose of using these cooling fins is to cool the engine cylinder by air. Presently Material used for manufacturing cylinder fin body is Cast Iron. In this thesis, using materials Al-Si Alloys with Mg are analyzed. Thermal analysis is done in combination or two alloy materials by changing geometries

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DESIGN AND DEVELOPMENT OF AN AUTONOMOUS DRONE FOR INTRUDER DETECTION AND ALERT IN SURVEILLANCE AREAS

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In today's world, more crimes are happening, so people fear their safety and security. Mostly, gun violence is categorized as the most highly anticipated violence around the world as it is growing rapidly. DRONE cameras are used in many areas to monitor activities, but still we need human oversight and involvement. We require a technology that is capable of automatically identifying these criminal activities. This project focuses on providing a secure place using DRONE footage as a source to detect harmful weapons like guns by using deep learning algorithm. Therefore, weapon detection is a primary requirement in the current world and our project presents automatic weapon detection using Drone camera identifying weapons using Convolutional Neural Networks (CNN). We implemented YOLO "You Only Look Once" V4 object detection model by training it on our customized dataset. The training outcomes show that YOLO V4 outperforms YOLO V3 in speed and accuracy. Applying this model to our surveillance system in smaller areas, we may save a person's life, which may reduce the crime rate. Additionally, our proposed system also alerts the admin by sending email with the captured image of the weapon, if the weapon is detected. Index terms: YOLO, CNN, SVM, SSMBD, SSD, RCNN, FCOS

AI-BASED DRIVER DROWSINESS WITH ALCOHOL AND HEARTATTACK DETECTION USING IOT

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In recent years, road accidents caused by driver drowsiness, alcohol consumption, and sudden health issues such as heart attacks have become a major concern. This project presents a smart, IoT-based safety system designed to monitor a driver's physical and mental state in real time, enhancing road safety through early detection and automated response mechanisms. Methods: The system integrates multiple sensors including a heart beat sensor, alcohol sensor, and optional camerabased drowsiness detection powered by artificial intelligence. An Arduino Uno microcontroller acts as the control unit, processing sensor data and controlling output components such as an LCD display, alarm, relay, and DC motor to simulate vehicle control. Upon detecting abnormal heart rate, alcohol presence, or signs of fatigue, the system triggers an alert, displays the condition on the LCD, disables the motor via a relay, and sends real-time alerts through a WiFi module to an IoT platform. Findings: This system demonstrates a cost- effective, scalable approach to reducing accidents by continuously monitoring the driver's health and behavior, ensuring both the driver's safety and that of others on the road
Keywords : Vehicle. Road Safety, Gate, Wi-Fi, LCD

A SMART INTEGRATED AI AND IOT FRAMEWORK FOR SUSTAINABLE URBAN WASTE MANAGEMENT

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The accelerating pace of urbanization has amplified the complexities of effective waste management, raising critical environment and public health concerns. This paper presents an integrated framework that combines Artificial Intelligence (AI) and the Internet of Things (IoT) to enhance the sustainability and operational efficiency of urban waste management systems. The proposed architecture leverages

real-time data from smart sensors deployed in waste bins, collection vehicles, and recycling facilities to enable intelligent monitoring, dynamic route optimization, predictive analytics, and automated decision-making. AI algorithms analyze waste generation patterns to forecast collection demands and optimize resource allocation, while IoT connectivity facilitates seamless communication across all nodes in the waste management network. The system aims to reduce operational costs, minimize carbon emissions, and encourage waste segregation and recycling at the source, thereby contributing to the realization of smart and sustainable cities. Simulation results and case studies validate the effectiveness of the proposed framework in transforming conventional waste management into an adaptive, data-driven infrastructure supporting urban sustainability.

ARDUINO-POWERED SMART CROP PROTECTION SYSTEM AGAINST FIRE AND ANIMALS

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Local animals, such as buffaloes, cows, goats, birds, fire, etc., frequently destroy crops on farms. This leads to huge losses for the farmers. Farmers cannot stay on the field all day and guard it, nor can they barricade entire fields. Here, we suggest an automated system to safeguard crops from fire and animals. This system uses a micro-controller and is based on an Arduino Uno. This device employs a smoke sensor to identify fires and a motion sensor to identify wild animals entering the field. In this scenario, the sensor instructs the micro- controller to operate. In addition to sending the farmer an SMS and making a call, the microcontroller now sounds an alarm to entice the animals out of the field. This way, the farmer is aware of the problem and can respond if the animals don't leave when the alert sounds. The motor is turned on instantly if there is smoke. This protects the farmer's loss by guaranteeing that the crops are completely safe from animals and fire.

MULTI-CLASS CLASSIFICATION FOR ALZHEIMER'S DISEASE PROGRESSION

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This paper develops a holistic multiclass classification framework in an attempt to predict the progression of Alzheimer's disease. Because datasets are often imbalanced, with some classes having fewer data points than others in the case of Alzheimer's disease stages, our synthetic framework uses SMOTE, or Synthetic Minority Over-sampling Technique, to oversample data points belonging to the underrepresented classes. This results in improving the class balance but also ultimately enhances overall performance of the classification model. We apply the framework to a benchmark dataset widely used within this domain and observe that it leads to substantial accuracy improvement along with other performance metrics compared to the straightforward classification techniques. Our findings suggest SMOTE-based augmentation as a feasible method to de-alter the class. imbalance of medical datasets, particularly related to the progression of Alzheimer's disease.
Keywords: Alzheimer's Disease, Multiclass Classification, SMOTE, Data Augmentation, Machine Learning, Disease Progression

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THERMOELECTRIC AIR-COOLING SYSTEM BASED ON PELTIER MODULE

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The rising global temperatures, growing urbanization, and increasing demand for personalized comfort have highlighted the limitations of conventional air conditioning systems. Traditional vapor compression-based cooling solutions, while effective for large spaces, are often power-intensive, environmentally harmful due to their use of refrigerants, and impractical for small or portable applications. In regions with limited access to stable power or financial resources, these systems are often inaccessible. This growing challenge calls for the development of compact, energy-efficient, and affordable alternatives tailored for personal and localized use. This project presents the design and implementation of a smart, portable, and energy-efficient IoT-based Thermo-Electric Air Cooling System. The system utilizes a TEC1-12706 Peltier module, which functions on the Peltier effect — a thermoelectric phenomenon that transfers heat from one side of the module to the other when an electric current is applied. Peltier modules are solid-state, silent, environmentally friendly, and ideal for targeted cooling applications, making them well-suited for personal workspaces or

compact living areas. The cooling system is controlled by an ESP32 microcontroller, which monitors environmental conditions through a DHT22 temperature and humidity sensor. The ESP32 collects real-time data and transmits it over Wi-Fi to a Firebase Realtime Database, serving as the system's cloud backend. This data can then be accessed and visualized through a custom-built Android mobile application, developed using Android Studio. The mobile app displays live environmental readings. To ensure secure access and user-specific control, the system incorporates Firebase Authentication, allowing only registered and authorized users to operate the cooling unit. This cloud-integrated design enables seamless communication between the hardware and the mobile interface, supporting real-time updates and command execution.

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