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(57) Abstract :
This project focuses on the design and development of an advanced differential current analyzer specifically tailored for industrial transformers. The system integrates artificial intelligence (AI) and machine learning (ML) algorithms to significantly enhance the reliability, efficiency, and longevity of transformers in industrial power systems. By continuously monitoring and analyzing current imbalances between the high-tension (HT) and low-tension (LT) sides of the transformer, the system offers real-time insights into the transformer's operational health. It also calculates key performance metrics, including transformer efficiency, to ensure that the system is operating optimally. the analyzer leverages AI and ML to predict potential transformer failures before they occur, reducing the likelihood of unscheduled downtime and enhancing overall system stability. Through predictive maintenance capabilities, the system helps optimize maintenance schedules, ensuring that resources are utilized efficiently and that the transformer is always in peak operating condition. The system features a user-friendly dashboard that provides real-time data visualization and actionable insights, allowing operators to make informed decisions quickly. The dashboard offers intuitive views of transformer performance, fault alerts, and efficiency metrics, making it easier to monitor and manage energy consumption. This innovative solution aims to revolutionize energy management and operational performance in industrial power systems, enabling predictive maintenance, improving the reliability of power distribution, and reducing operational costs.

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