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Predictive Maintenance of Industrial Machines Using Internet of Things

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Abstract*: Predictive maintenance (PdM) is revolutionizing industrial machine management by using real-time data collected from IoT-enabled devices to predict machine failures before they occur. By leveraging IoT sensors, AI, and machine learning algorithms, industries can optimize maintenance schedules, reduce unplanned downtime, and improve operational efficiency. This paper explores the role of IoT in predictive maintenance, reviewing the methodologies, technologies, applications, and challenges associated with its implementation in industrial environments.*

Keywords: pdM, Real time data, IoT sensors, Machine learning algorithms

I. INTRODUCTION

Predictive maintenance is defined as a proactive approach to machine management that anticipates equipment failures before they happen. Contrast PdM with traditional maintenance approaches (reactive, preventive). An IoT technology, through sensors and connectivity, enables the real-time collection of data from machines, which can then be analyzed to predict maintenance needs. The importance of PdM in industries like manufacturing, energy, and oil & gas, where downtime can lead to significant financial losses. Our purpose is to explore the integration of IoT in predictive maintenance, focusing on methodologies, technological requirements, applications, and the challenges faced during implementation.

Proposed Project Work:

We are proposing a system which will help to counterfeit the machine maintenance issues in industries at portable scale. The proposed project is to design and build a system which will take parameters of the of the machine such as machine cabinet temperature in case of perishable goods through DHT22 sensor, vibration sensors such as MPU6050 to detect machine wear, imbalance, pressure sensors to monitor change in pressure and acoustic sensor to detect unusual noise patterns and internet connectivity using Wi-Fi and cloud storage as blynk IOT cloud platform. The first step in the project will be to determine the size and dimensions of the hardware. This will be based on the intended use, as well as the amount of items to be transported. This has been designed and constructed; it will undergo thorough testing to ensure that it meets the desired specifications. This will involve testing its cooling efficiency, power consumption, and overall durability.

System Architecture:

The system is divided into given sections:

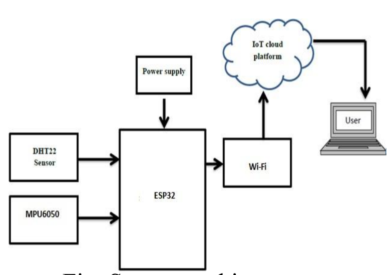

Fig: System architecture

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Stage 1: In the first stage, ESP32 is assembling to receive parameters from DHT22 sensor and other sensors

Stage 2: In the second stage, the hardware components are assembled.

Stage 3: In the third stage, the ESP32 is programmed to control the system, using the Arduino IDE and can be connected to the DHT22,MPU 6050 and other sensors via Wi-Fi.

Stage 4: In the fourth stage, the system is tested and optimized for efficiency and performance. The ESP32 can be used to monitor the temperature of the two surfaces,

Overall, the system architecture of the system with ESP32 involves the design and assembly of hardware components, programming of the ESP32 for control and monitoring, and testing and optimization for efficiency and performance.

Advantages:

Cost effective solution.

Easy to trace the machine life.

Easy to use: The combined system is easy to use, with a simple interface for monitoring the status of the vehicle.

Low maintenance.

Compact design: The combined system has a compact design, making it suitable for small spaces, and easy to move if required.

Applications:

Manufacturing industries.

Logistic industries.

Energy generation.

II. CONCLUSION

In conclusion, this system provides automation in predicting the machine life. Also this will help to resolve the problem of machine maintenance work using IoT technology and trending cloud platform like Blynk.

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