IOT BASED INDUCTION MOTOR CONDITION MONITORING AND CONTROLLING SYSTEM

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***Abstract*— Today, the AC motor is still the most popular type of motor in industrial applications. Monitoring and control of induction motor parameters is very important in many applications and there are several techniques to ensure reliable operation. This project deals with the remote monitoring and control of various parameters of an Internet of Things [IOT] based three-phase induction motor. The sensor and sensor module monitor parameters such as short circuit motor temperature, current and voltage and send them to the processing unit which displays the parameter on the server. The system also introduces automatic and manual control methods to stop or start the short-circuit motor to prevent system failures through the server gateway. The introduction of this system improves the efficiency of the machine by continuously monitoring it to prevent breakdowns and determine preventive maintenance.**

Keywords: Internet Of Things, Parameter Monitoring, AC Motor, Parameter Controlling Etc.

I. INTRODUCTION (*HEADING 1*)

In today's manufacturing industry, mechanical and electromechanical systems are mostly driven by electric motors. Before the invention of AC short- circuit motors, DC motors were widely used in industrial applications. After the invention of AC shunt motors, because they have better performance than DC motors, they are often used in industrial automation. The main advantages of the AC motor are its direct rotor design, which results in low cost, durability and low maintenance. A study of induction motor construction and operation shows that the main faults in short-circuit motors can be classified as follows: (a) Electrical faults: faults caused by unbalanced supply voltage or current, single-phase, under- or over currents. Voltage, overload, etc. (b)Mechanical faults: broken rotor rods, mass imbalance, air gap eccentricity, bearing faults, rotor winding faults, and stator winding faults. Environmental Faults: Faults under this classification are caused by ambient temperature, ambient humidity, and mechanical vibration. Since the performance of a AC motor depends on the electrical, mechanical and environmental parameters of the motor mentioned above, AC shunt motor control methods are very sensitive to motor parameters. Therefore, it is necessary to check the parameters of the short-circuit motor to ensure uninterrupted operation and evaluate the pre-failure condition to avoid possible failure conditions. As emerging technology has led to rapid development in modern wireless communication, the Internet of Things (IOT) has received much attention and is expected to benefit many applications. The recently introduced concept of the Internet of Things offers help to achieve industrial automation through remote control terminals. In IOT, each device or devices that make up a system can communicate with other devices or systems through a common platform. Thus, better communication with the "System- System" is achieved.

II. LITERATURE SURVEY

Shyamala.D "IoT Platform for Condition Monitoring of Industrial Motors" [1], several things are efficiently linked together to result in condition monitoring and performance enhancement. Data availability for continuous equipment monitoring, receiving alerts and preventive maintenance. The engine is efficiently and continuously monitored via web- based tracking.

The Bhambulkar, A.V. ,2011;Ganorkar R. A. et al. ,2014, IoT-Based Traction Motor Drive Condition Monitoring in Electric Vehicles: Part Power Electronics and Drive Systems (PEDS), 12th IEEE International Conference, 2017, Dedicated [2]. In an electric vehicle, the operation of the Veto engine was monitored through a wireless Internet of Things (IoT) implementation. Development and testing of a prototype using the ESP8266 microcontroller module to determine engine health is presented.

Rahul Mishra et al.,2013; John, B., 2012 "Smart Shutdown and Recovery of IoT-Enabled Industrial Machinery". 2018 8th International Conference on Cloud Computing, Informatics and Technology (Confluence). IEEE [3], preventative maintenance of industrial motors requires continuous monitoring to detect degradation or motor failure. The recovery engine provides a backup engine that runs when the primary engine shuts down. This helps reduce possible losses during downtime. This improves reliability.

III. OBJECTIVES

The main goal is to increase the reliability of the engine application by taking advantage of recent technological developments. This work ensures continuous monitoring and easy control of high-power induction motors used in various industries. By ensuring system reliability, abnormal conditions can be easily identified and corrected. With almost 90% use of AC machines in the industry, there is a need to track financial data. Industrial productivity can be increased by pre-maintenance of induction machines. Proactive measures are used to protect against system failures and high-power motor costs. • Internet of Things (IoT) Based AC Motor Monitoring and Control for Safety and Economic Data in Industry. • Start or stop an induction machine to avoid system faults using automatic and manual control methods. • Monitor and control of motors used in

electric vehicles (automating an electric car). • Detects various parameters of an AC motor such as voltage, current, frequency, speed and temperature.

IV. WORKING & BLOCK DIAGRAM

The **Internet of Things (IoT) for monitoring systems** refers to a network of connected devices that collect, transmit, and analyze data in real time to monitor various environments, systems, or assets. These IoT-enabled monitoring systems can range from industrial applications, smart homes, healthcare, environmental monitoring, and more

Benefits of IoT-based Monitoring Systems

- Real-time Monitoring: Continuous, real-time data collection and analysis help to make timely decisions.
- Predictive Maintenance: Identifying potential issues before they lead to system failures, reducing downtime and maintenance costs.
- Increased Efficiency: Automated processes and systems based on real-time data improve productivity and efficiency.
- Cost Savings: IoT can help optimize resource usage, such as energy in buildings or fuel in fleets, leading to significant savings.
- Improved Safety and Security: IoT devices can send alerts for unsafe conditions, preventing accidents and improving safety protocols.
- Scalability: IoT systems can be easily scaled to cover large numbers of devices or monitor vast areas, like smart cities.

IoT monitoring systems represent a transformative approach in various industries and environments. With the ability to collect and analyze real-time data from connected devices, IoT can enhance decision-making, optimize operations, improve safety, and provide new levels of automation and efficiency. As the technology continues to evolve, the potential for IoT-based monitoring systems will only grow, offering more innovative solutions to everyday challenges. IoT-based monitoring systems enhance efficiency, safety, and decision-making by connecting and automating data collection and analysis across industries.

The block diagram shows the entire picture of the work. The objective of condition monitoring of induction motor is achieved by continuously recording the considered parameters using various sensors. Accelerometer is used to record vibrations; LM 135 temperature sensors are used to record winding and bearing temperature, ACS712 current sensor for current, and a Voltage sensing circuit to measure voltage. All the sensors are connected to Arduino microcontroller board which is to be installed at the motor site. The sensors will sense the parameters and are analyzed by the micro controller board to the instruction coded. The data sensed by different sensors can be seen on the serial monitor of Arduino IDE. The collected data can be stored on the IoT platform.

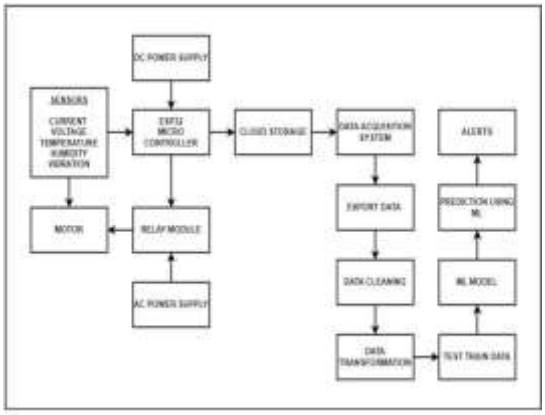
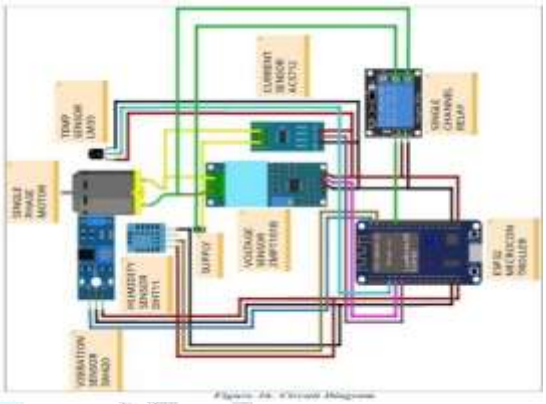


Figure 4. Block Diagram of Condition Monitoring and Control



V. TABLES

Sensors	Normal Condition	Abnormal Condition
Voltage	> 235	< 235
Current	> 1	< 1
Vibration	1	0
Temperature	> 100	< 100
Humidity	> 75	< 75

VI. ADVANTAGES

- This project gives advantage of early detection and monitoring of the motor system failure.
- The system has ability to combine various sensed parameters in real time.
- It improves accurate detection of different faults occur in motor.
- The monitoring of the motor system presents the measurement of different parameters namely vibration of the motor, temperature, speed, surrounding humidity, supply voltage and motor current.
- The system is wireless system, so there is no hazardous for human being.
- The system is cost effective.

- The system can be controlled by anyone.
- The system is accurate as the system is controlled digitally.

VII. Applications

- Automobile Industries, Cement Industries, Metal Industries.
- Hospitals, Malls, Banks, IT Parks, Commercial Complexes.
- Windmill, DGs.
- Railway / MES / Ordinance Workshops.

VIII. Conclusion

The Project was to explore predictive maintenance and fault diagnosis methodologies using different deep learning data driven techniques that can incorporate the feature selection and diagnosis in a single step, eliminating the need of field specific expert knowledge. Machine learning methods can leverage the use of historical data and data acquired by sensors in smart industries and allow for prediction models using raw data without the need of industry specific knowledge and feature engineering. the development of accelerators that would allow running machine learning natively in microcontrollers, these machine learning methods will offer a good solution to fault detection and predictive maintenance.

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