Measuring Electrical Parameters For Motor By Using GSM Based Technology Through IoT

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Abstract- *The increasing demand for efficient and reliable motor operation in various industrial applications necessitates continuous monitoring of electrical parameters to ensure optimal performance and prevent potential failures. Traditional methods of monitoring electrical parameters in motors often require manual intervention, leading to delays in identifying faults and inefficiencies. To address these challenges, this project proposes an innovative solution using GSM-based technology integrated with the Internet of Things (IoT) for real-time remote monitoring of electrical parameters in motors.The increasing demand for efficient and reliable motor operation in various industrial applications necessitates continuous monitoring of electrical parameters to ensure optimal performance and prevent potential failures. Traditional methods of monitoring electrical parameters in motors often require manual intervention, leading to delays in identifying faults and inefficiencies. To address these challenges, this project proposes an innovative solution using GSM-based technology integrated with the Internet of Things (IoT) for real-time remote monitoring of electrical parameters in motors.*

Keywords- IoT, GSM, Motor Monitoring, Electrical Parameters, Real-Time Measurement, Predictive Maintenance, control load by using mobile.

I. INTRODUCTION

The increasing need for efficient and reliable monitoring of motor performance in various industrial applications has led to the integration of modern technologies like the Internet of Things (IoT) and GSM (Global System for Mobile Communications). Monitoring electrical parameters such as voltage, current, power, temperature, and frequency is crucial for the effective functioning and longevity of motors. Traditional methods often involve manual readings and inspections, which can be labour-intensive and prone to errors. The integration of IoT with GSM technology offers a more efficient, real-time, and automated solution to these challenges.

II. LITERATURESURVEY

Existing Systems

Automation of Temperature Measurement in Induction Motors of Hermetic Compressors Based on the Method of Temperature Rise by Resistance

- The system measures the electrical resistance of the induction motor windings using a data acquisition system. The resistance is measured using a precise ohmmeter
- The measured resistance value is then used to calculate the temperature of the motor windings.
- The temperature calculation is based on the temperature-resistance curve of the motor windings, which is predetermined and stored in the system.
- It can be mainly used for Monitoring motor health and detecting overheating issues an Optimizing motor performance.

An Algorithm for Offline Measurement of Motor Stator Resistance and Voltage Drop Across Inverter Switches for Washing Machine Drives

- Collect voltage and current data from the washing machine drive during a predefined time interval.
- The sensors to measure voltage and current.
- Signal Processing can Filter and process signals to remove noise and extract relevant information.
- Motor Stator Resistance Calculation use Ohm's law to calculate the stator resistance (Rs) based on the measured voltage and current.
- Perform offline analysis on the collected data to determine the motor stator resistance and voltage drop across inverter switches.

C. Remotely Controlled Smart Home System using GSM and IOT

- ThisIt enables users to manage and monitor home appliances and security systems from anywhere via their smart phones or computers.
- The GSM module facilitates communication between the user's device and the home system by sending SMS commands or receiving signals for remote control.
- IOT platform updates in real-time with sensor data and appliance status.

D.Streamlining Agriculture with Smart Water Gate System

- It increasing demand for efficient water management, especially in regions facing water scarcity.
- The Smart Water Gate System addresses these challenges by automating the control of water flow, ensuring precise and timely irrigation.
- It providing consistent water supply based on real-time data, improving overall sustainability in agricultural practices.
- This method not only optimizes water usage and It can reduces human errors and saves cost.
- Sensors collect data on water levels, soil moisture, and weather conditions.

III. PROPOSED SYSTEM

- The proposed system measures electrical parameters of a motor using GSM-based cloud computing technology through IOT.
- Design and develop a hardware module consisting of current and voltage sensors, a microcontroller, and a GSM module.
- Develop a software framework for collecting and processing sensor data And Implement communication protocols for sending data to the cloud via GSM.
- Analyze motor data to identify trends, patterns, and anomalies and Visualize data insights using charts, graphs, and other visualization tools and provide real-time alert to users in case of anomalies or issues.
- Use a cloud-based IOT platform (e.g., AWS IOT, Google Cloud IOT Core) to collect, process, and analyze motor data. Device management and security features to ensure secure data transmission and storage.

Hardware Requirements

TRANFORMER, RECTIFIERCIRCUIT, VIBRATIONSENSOR, CURRENTSENSOR, RELAY, CONTROLLER, VOLTAGESENSOR, TEMPERATURE SENSOR, MOTOR, GSMMODULE, LCDDISPLAY, IOTMODULE, POWER FACTOR CORRECTION.

Transformer:

TheA transformer is an electrical device used to change the voltage level in an AC circuit. It works on the principle of electromagnetic induction and can either step up (increase) or step down (decrease) voltage to suit the requirements of the circuit.

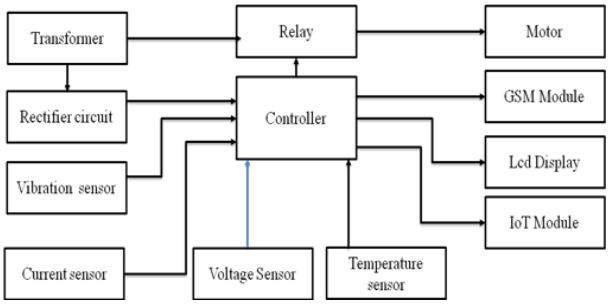


Fig.1.Proposed Block Diagram

Rectifier Circuit

A rectifier circuit converts alternating current (AC) into direct current (DC). It uses diodes, which allow current to flow in only one direction, thereby converting the AC waveform into a unidirectional signal. Rectifiers can be half-wave, full-wave, or bridge types, depending on the configuration of diodes used.

Vibration Sensor:

The A vibration sensor detects vibrations or oscillations in a system. It converts mechanical energy from vibration into an electrical signal. This is useful in monitoring equipment like motors, machines, or other mechanical systems to ensure they are operating smoothly and to detect faults or failures early.

Current sensor:

A current sensor measures the amount of current flowing through a conductor. It typically operates using Hall effect sensors or shunt resistors and is used to monitor current in a circuit, ensuring that the system operates within safe limits.

Relay

The A relay is an electrically operated switch that allows a low voltage circuit to control a high voltage circuit. It works by energizing an electromagnet to move a set of contacts and switch the circuit on or off.

Controller:

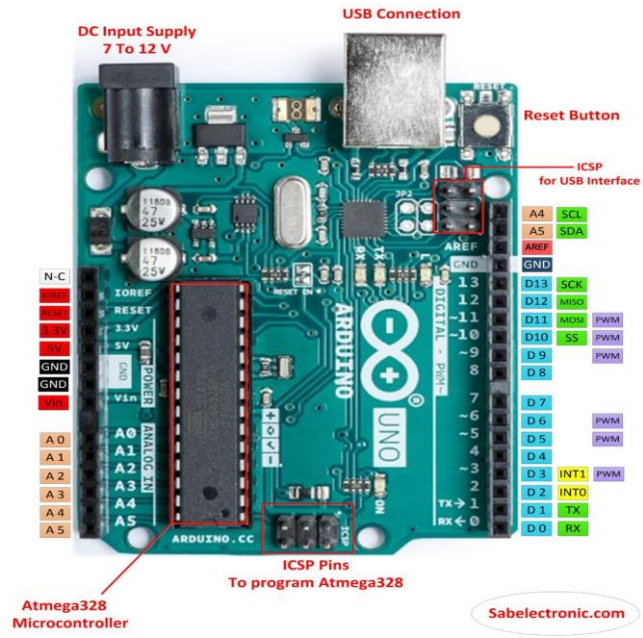
RelaysA controller is a device used to regulate and manage the operation of electrical circuits or systems. In modern applications, microcontrollers (like Arduino or Raspberry Pi) or digital controllers are used to monitor inputs (e.g., sensors) and control outputs (e.g., motors, relays) based on a set of programmed rules or algorithms.

Voltage And Temperature Sensor:

A voltage sensor detects and measures the voltage level in a circuit. It can be used to monitor the system's voltage and provide feedback to the controller for protection or adjustment of operating conditions.

A temperature sensor measures the temperature of a system or environment. Common types include thermistors, thermocouples Etc.

ARDUINO UNO BOARD



GSM MODULE

ATMEGA32 / ARDUINO

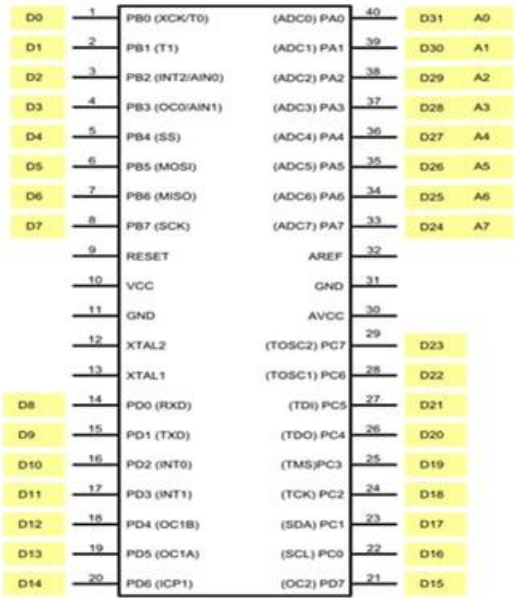


Fig.2Pin diagram of Arduino uno Atmega328 microcontroller

A motor is a device that converts electrical energy into mechanical energy. It is used in various applications to drive mechanical loads such as fans, pumps, conveyor belts, and more. Motors can be of different types, such as DC motors, AC motors, stepper motors, and servo motors.

Power Factor Correction:

Power factor correction is the process of improving the power factor of an electrical system. Power factor is a measure of how effectively electrical power is being used. It is the ratio of real power (used to do work) to apparent power (total power supplied). Power factor correction uses devices like capacitors or inductors to reduce losses and improve the efficiency of the electrical system.

IV. RESULT

The result of implementing IoT-based monitoring and control systems for induction motors is a significant improvement in efficiency, reliability, and safety. Key Benefits include real-time monitoring of electrical parameters such as voltage, current, speed, and temperature. [1] This enables prompt action in case of issues, reducing downtime and increasing productivity. Additionally, IoT-based systems allow for remote control and monitoring, making it easier to diagnose and troubleshoot problems. [2]the use of cloud-based platforms also enables data analytics and machine learning algorithms to be applied, providing valuable insights into motor performance and enabling predictive maintenance. [3] Overall, the integration of IoT technology with induction motors has the potential to revolutionize the way motors are monitored and controlled, leading to increased efficiency, reliability, and safety.

Overall, measuring electrical parameters for motors using GSM-based cloud computing technology through IoT can help improve motor efficiency, reduce downtime, and enhance overall productivity.

V. CONCLUSION

The implementation of GSM-based technology through IoT for measuring electrical parameters of motors offers a highly efficient and remote solution for monitoring and managing motor health and performance. By leveraging IoT, real-time data on parameters such as voltage, current, temperature, and vibration can be collected, processed, and transmitted via GSM networks. This enables continuous monitoring and the ability to detect potential issues before they lead to motor failure.

With GSM-based technology, users can access motor data from anywhere, providing enhanced flexibility and convenience. Furthermore, the system allows for timely maintenance, reducing downtime and increasing the operational efficiency of motors. This approach can significantly improve the overall reliability of industrial machinery, contributing to cost savings and preventing unexpected breakdowns.

In conclusion, the integration of GSM-based IoT technology for monitoring electrical parameters in motors presents a smart solution to optimize performance, ensure long-term reliability, and enhance the overall efficiency of motor-driven systems.

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