



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Special Issue 1, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



9940 572 462



6381 907 438



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IoT Based System for Real Time Monitoring and Fault Detection in Induction Motor

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ABSTRACT: Objective of this project is to detect faults of single-phase induction motor and control. Many nascent faults may develop in single phase induction motors due to various reasons. Such faults need to be protected against as much as possible. The various faults are over-voltage, overload, heating small, over- vibration, High temperature etc. So, identify such faults most important parameters are voltage, current, speed and temperature. Here single-phase induction motor is protected using advanced Arduino Uno 328p. To do this, the variable potentiometer is connected across the circuitry, so we can adjust the motor's voltage. If motor any value is abnormal motor automatically turn off using Relay and buzzer alert. Then monitoring and controlling the all parameters send in information the web server in IoT using WI-FI. This system records crucial stir pointers for monitoring and diagnosing induction motor conditions by leveraging IOT technology. An IoT-based platform is utilized in the proposed system for collecting and recycling induction motor parameters. It is possible to access the collected data through the Pall platform, which is accessible through the website. You'll also receive timely cautions if you deviate from the required parameters, so you can take action immediately to avoid gratuitous machine time-out and save time and money. As a result of this system, outfits are monitored nonstop, alert events are processed, and data is preserved for future prophetic use.

KEYWORDS: Induction motor, over-voltage, overload, heating small, over-vibration, High temperature.

I. INTRODUCTION

After the industrial revolution the next great thing was industrial automation & in which DC motor played a pivotal role but after introduction of AC machines it changed rapidly due to their various advantages. As the automation is also seeing an experimental growth because of increase in demand & various innovations the industry has to keep up to the need of the hour. After the boom of Information Technology & modern power systems industry has gained huge in terms of growth in production ratio. Technology like artificial intelligence is now at its zenith., IOT (Internet of Things), It is said that (Machine Learning) is the present and the future for industrial revolution 4.0. Industries are already working on ways to ramp up production/services as fast as possible. In many of these industries the most common product for use of automation is AC Induction motor which is most probably a three phase Induction motor as it The motor starts on its own, is ruggedly constructed, has a good power factor, and is very inexpensive. Due to the fact that these motors are constantly in operation. It is a responsible & serious task of maintaining & servicing these machines. Monitoring these machines has to be done by various methods & other technologies developed in 1980 to 1990. Artificial intelligence does not fully integrate with these technologies due to the recent advancements. So, they can't be used to their full potential intense with help of "IOT" these challenges can be tackled. To monitor & control these machines "IOT" is very helpful as it's very dynamic network & can configure itself and can work on both standard & inter operable protocols of communication. It can connect smoothly with Information Technology control & monitoring systems. It has recently gained a huge fame due to wireless technology & connectivity of all to a central or distributed data server. It helps to integrate all the information technology divisions like Machine Learning, A.I., neural network etc. For predictive maintenance of the system & the equipment's.

International Journal of Innovative Research in Science, Engineering and Technology*An ISO 3297: 2007 Certified Organization**Volume 12, Special Issue 1, April 2023***10th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPPS '23)****5th -6th April 2023****Organized by****Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India****II. RELATED WORKS**

Traditionally, sectionalizing cables relies on physically cutting and splicing them, which reduces their reliability. There is usually a need to excavate cables repeatedly during this laborious procedure. The sound of thumping is caused by high voltage being supplied to faulty cable; the resultant high current arc is loud enough to detect above ground. Although this method eliminates the cut and splice involved in the sectionalizing method, it has its own disadvantages. An underground noise loud enough to be heard above ground requires tens of thousands of amps of current at voltages of up to 25 kV. It is quite common for the cable insulation to be damaged by the heat caused by such high currents. It is possible to reduce the damage limit by passing the minimum power required to conduct the test. Time domain reflectometers (TDR) analyze metallic cables using time domain reflectometry in order to locate and characterize faults. There is no degradation of insulation caused by the TDR because it sends a low energy signal through the cable. In a perfect cable, the signal is returned at a known time and in a known profile. TDR screens or printouts graphically represent time and profile in a "real-world" cable as a result of differences in impedance. TDR has the disadvantage of not pinpointing faults. Blavier Test is When a ground fault occurs in a single cable and there is no other cable, then blavier test can be performed to locate the fault in a single cable. In other words, in the absence of a sound cable to locate problems in the cable, the resistance measured from one side or end is called a Blavier test. Through Blavier's test, a ground fault can be identified on a single cable. The bridge network uses a low voltage supply, an ammeter, and a voltmeter for this type of test. A resistance measurement is performed between the "Far End" and the earth while the "Sending End" is isolated from it. The arc reflection method is commonly referred to as a high-voltage radar technique that overcomes the 200-volt limitation of low-voltage radar. Along with the TDR, it is also necessary to have an arc reflection filter and a surge generator. With the surge generator, we create an arc between the shunt fault and the TDR can see a downward reflection as a result of the momentary short circuit. By protecting the TDR from the surge generator's high voltage pulse, the filter routes the low-voltage pulses to the cable. The easiest and most accurate way to locate a building is through arc reflection. It is displayed in relation to splices, taps, and transformers, so there's no need to interpret it. In addition to displaying "before" and "after" cable signatures, arc reflection enables the TDR to visualize "before" and "after" traces. Low-voltage radar's "before" trace shows all cable and marks but not a high-resistance shunt fault's downward reflection. "After" traces represent the high-voltage signature which includes the fault location, even though its resistance may be greater than 200 volts.

III. EXISTING METHOD

In this GSM modem phone is interfaced with microcontroller through data cable. Cables used with mobile phones are called data cables. The GSM modem is always interfaced with the microcontroller. From anywhere we can send SMS like "S" with our desired speed, for an example "S15" to the mobile that's connected in the microcontroller. GSM modem sends this information to microcontroller through RS232 converter. RS232 logic is converted from TTL logic using this converter.

Here the microcontroller is the flash type reprogrammable microcontroller in which we have already programmed with our objective so it receives the signal from RS232 converter then the corresponding information is displayed on the LCD display. In microcontroller set speed is compared with monitored speed value, and then according to error value PWM is generated.

PWM is nothing but Pulse Width Modulated pulse. This PWM pulse is given to the MOSFET driver circuit. Through this MOSFET driver circuit we control the motor speed. The motor speed is monitored by the proximity sensor. The proximity sensor is the one type of transducer. This device detects metals and generates voltage pulses when it detects them. We fixed the metal plate in the motor shaft. So, whenever the metal plate is crossed, the proximity sensor generates the pulse. The corresponding pulse signal is given to microcontroller. Now the microcontroller displays the pulse rate on the LCD display which is equal to speed of the motor. Through this way we can control the three-phase induction motor to our desired speed with the help of SMS.

IV. PROPOSED SYSTEM

All of the components that interface with Arduino receive power when the power supply is turned on. The sensor component starts sensing their respective parameters and sends the data to the microcontroller (Arduino). Then Arduino reads the data from various devices (sensors) and analyses the data according to the given instructions, after this it sends the data to LCD and to network gateway with the help of WI-FI module. Simultaneously Arduino reads the commands internet and gives the control signals to the relay via contactor, which will control the motor. Sensory parameters are used to control the motor, and in the manual method it is controlled by alert messages displayed on LCD and from those received from web. Relay and contactor circuits are used to control the system. The motor is turned ON/OFF when there are abnormal conditions detected through the sensors. By receiving the sensed data.

V. BLOCK DIAGRAM

In this project we are going to monitor the smoke, Voltage, current, temperature and vibration detection. All the five parameters are monitored with the following IoT techniques. smoke sensor used Motor over heating for generate the small monitoring. Voltage and Current consumed by the motor are measured with the help of a Potential and current transformer. As the current transformer converts the load current to lower values, the shunt resistor converts that current into voltage. Then the corresponding the AC voltage will be rectified with the help of a rectifier. Afterward, the rectified output will be fed to the microcontroller. If current value is increased motor supply will be tripped by microcontroller.

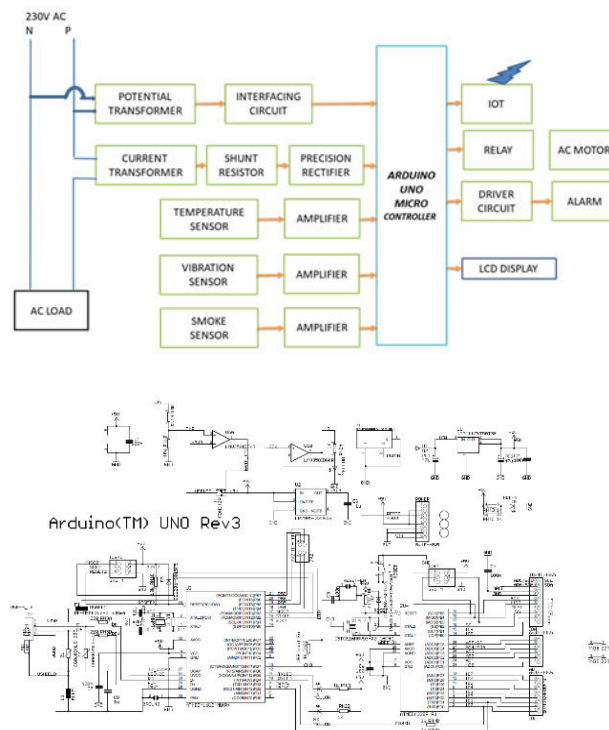


Fig.1.Block Diagram

VI. EXPERIMENTAL RESULTS

The load is controlled by this circuit. Any load can be used as a load, whether it is a motor or another. Loads are switched on and off with relays. The switching transistors (BC 547) control the ON/OFF of the relay. Transistor Q2

collector terminal is connected to relay Q2. It consists of three pins and is nothing more than an electromagnetic switching device. There are three types of normal closures (NC) and normal openings (NO). Relay common pins are connected to supply voltage. Normally open (NO) pins are connected to loads. If you give high pulse signal to the base of the Q1 transistor, the transistor conducts and shorts the collector and emitter terminal. If you give zero pulse signal to the base of the Q2 transistor, the transistor is not conducting and shorts the collector and emitter terminals. Consequently, the relay has been turned OFF. The transistor Q1 will be turned off when the base of the transistor is given a low pulse. The transistor Q2 is conducting now that 12V is applied to its base, and the relay is switched on. Consequently, the common terminal of the relay is shorted to the NO terminal.

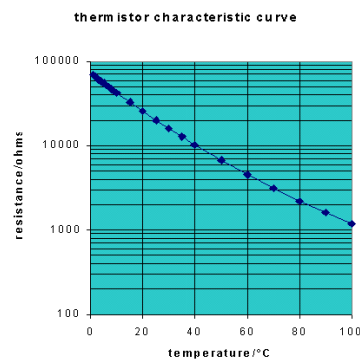


Fig.2. Temperature graph

ADVANTAGES

- ☑ More Reliable
- ☑ High efficiency
- ☑ Low power loss, better economical operation.
- ☑ We use separate renewable source as a DC source so it reduces the distortions.
- ☑ Low loss and low noise
- ☑ Efforts to reduce flicker are faster and more effective.

VII. CONCLUSION

We are using Internet of Things technology in this project to monitor and detect motor system failures remotely. Multiple sensed parameters can be combined in real time to improve accurate fault detection in a motor. Thus, compared to other conventional methods this system has a greater number of fields which enables alarm, alert messages and quick controlling. We present here an IoT concept for controlling and monitoring motors remotely. By using visual basics, the data received from the controller node represent by graphically. The data is also displayed serially. Extra fields are added for precious control in the work. The application of the system is needed today for every electrical system (i.e., EV vehicle and automation of industries where greater safety is needed). With the system, you can control and access data remotely with ease and quickness, and maintain less maintenance. The system is feasible to implement according to experimental results.

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