IOT Based Motor Parameter Monitoring

Monitiring, Control and Fault Detection

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Abstract— *In this project we give a special idea of industrial automation, and fault monitoring. Induction motors are the nerves of many industries. Hence industrial automation is required for precise and accurate operation. The project Arduino based parameter monitoring system for induction motor proposes a control and monitoring system for induction motor based on Arduino communication protocol for safe and economic data communication in industrial fields. Current, voltage, and temperature of the induction motors are very important parameters for its control system. The performance of an induction motor is directly affected by these fundamental quantities. However, during continuous operation it is difficult to control the machines. Arduino system is used for collecting and storing data and generate control signal to start or stop the induction machine. We measure the different type of fault such as Over Voltage, Over Current and Over Temperature.*

INTRODUCTION

Analysis of induction motor is much essential to find out utilization index of a motor for better performance. When we analyze an efficiency of an induction motor we need to acquire many parameters like voltage, current, speed from motors. All the above said parameters must be acquired at fastest speed to present an instantaneous efficiency indication. When we analyze these parameters we can easily identify whether the motor is suitable for particular operations or not, can be identified. In our project, we are going to use all type of sensing system. For above said parameters all the sensors will be connected to signal conditioning circuits to convert signals suitable for interfacing with embedded controller. The state of art Arduino UNO microcontroller manufactured by Arduino will be used in our project to cater the need of software and hardware. The Arduino embedded controller contains ADC, DAC, PWM and much more built-in options are there to have a better design. In the existing we are only bothered about the mechanical efficiency which can be calculated using the torque and speed values. But in the proposed system we are dealing with the electrical and mechanical efficiency. And the efficiency is measured in more secured manner, in other terms the safety efficiency. In the system proposed, the efficiency is measured using an absolute technique. This is also known as energy auditing.

The following features will be given in our project.

- Voltage with graph
- Current sensing
- Speed sensing

LITERATURE SURVEY

The manufacturers and users of electrical machines initially relied on simple protection such as overcurrent, overvoltage, earth-fault, etc. to ensure safe and reliable operation. However, as the tasks performed by these machine grew increasingly complex, making improvements became mandatory. Single Phase Induction machines are very popular in industries because of their vast applications. Hence it becomes necessary to protect them against faults so as to ensure uninterrupted operation and functioning. Various parameter controlling and monitoring systems are there for other types of machine, but in case of induction machine the controlling and monitoring systems are not extensively used due to high cost of installation and controlling the machines during the process of production becomes a dangerous operation in some specific industrial applications. Current system does not control through wireless medium and only focus on quantity of production but motor parameter are also important which affect the production number. Also monitoring is only possible when we come close to system.

Still in many industries the lower hp motors are protected by fuses and overload relay which is not sufficient to protect the motor from all kind of failures. A comprehensive cost effective protection technology is a major need But Current system does not control through wireless medium and only focus on quantity of production but motor parameter are also important which affect the production number. Also monitoring is only possible when we come close to system.

PROBLEM DEFINITION

Out utilization index of a motor for better performance. When we analyze an efficiency of an induction motor we need to acquire many parameters like voltage, current, KW, power factor, speed, torque from motors. All the above said parameters must be acquired at fastest speed to present an instantaneous efficiency indication. When we analyze these parameters we can easily identify whether the motor is suitable for particular operations or not, can be identified. In our project, we are going to use all type of sensing system. For above said parameters all the sensors will be connected to signal conditioning circuits to convert signals suitable for interfacing with embedded controller. The state of art Arduino microcontroller manufactured by microchip will be used in our project to cater the need of software and hardware. The Arduino embedded controller contains ADC, DAC, PWM and much more built-in options are there to have a better design. In the existing we are only bothered about the mechanical efficiency which can be calculated using the torque and speed values. But in the proposed system we are dealing with the electrical and mechanical efficiency. And the efficiency is measured in more secured manner, in other terms the safety efficiency.

METHODOLOGY

Testing Methods:

Voltage Pickup Test: - Voltage Pickup Test means to find out the Voltage across the line to check line voltage is sufficient or not.

Voltage Dropout Test: - Voltage Dropout Test means to find out the voltage level when load is applied.

Current measurement: - Current sensors are used to measure current for drive the induction motor. For that we use current Sensor ACS712. This sensor gives current in Ampere. This sensor is connected in series with motor. This senor having capacity to measure current around 30A

Speed measurement:- Hall effect sensor is used for motor RPM measurement using pulse detection according to rotation of motor as the motor will rotate pulses will be detected by the sensor and will be displayed using IOT.

Update Information: -When sensor getting all this information about line then this information is web to web server using NODE MCU Module.

SCOPE OF WORK

Induction motor is used in majority of the industrial applications. The main reason for the usage of IM is its reliability and simplicity of operation. Most of electrical energy is utilized by induction motors. And thus it is essential to monitor the performance of the motor without changing its operation. Here in this project, introduces a new technique in which embedded system is integrated into the wireless network. During this technique, different sensors are connected with the motor and the values are extracted using a Arduino microcontroller. It is then transmitted to the base station and at the base station a Graphical User Interface is given which give the user can interface with the system. The wireless protocol used is Wi-Fi. Due to this errors in industrial machines are get reduces and performance of work is increases. Hence in future all machines which work on motors, this system help them to increase their production.

SYSTEM DESCRIPTION

A. Block diagram

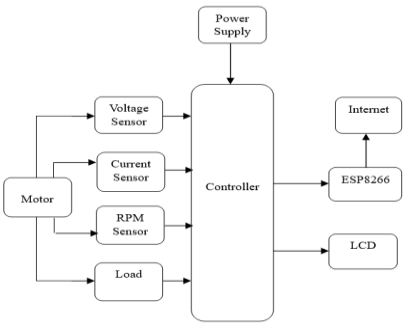


Fig.1: Block diagram

In this paper, continuous monitoring of the status of particular Parameters of Induction Motor we need. For that we use IOT module Node MCU ESP8266 Wi-Fi Module. First we séance the live line through line sensor and this data is then fed to Arduino microcontroller. Then Arduino séance this data and then analyses and then give this data to Wi-Fi module node MCU. Then Wi-Fi module takes this information and provide to internet. Then any used can easily access the data and then see the status of Induction Motor.

Users go to web browser and go to provided like of website and then inter the name of location of the need to check.

B. Circuit Diagram

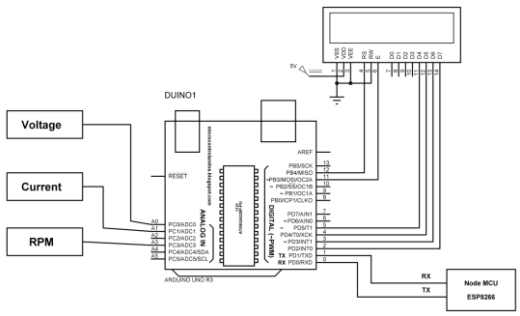


Fig.2: Circuit diagram

C. Hardware Required

Arduino Microcontroller: The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free.

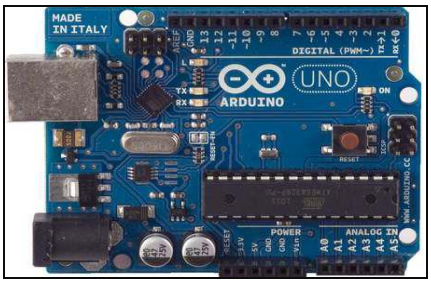


Fig.-3: Arduino

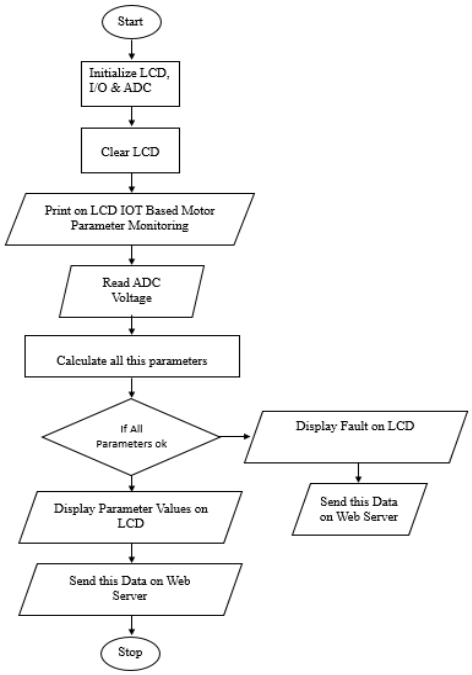
ESP8266 NodeMCU Wi-Fi Devkit: The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect Node MCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Fig.4: NodeMCU

ACS712: The ACS712 provides economical and precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include motor control, load detection and management, switched-mode power supplies, and over current fault protection. The device consists of a precise, low-offset, Linear Hall sensor circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which is sensed by the integrated Hall IC and converted into a proportional voltage. Device accuracy is optimized through the close proximity of the magnetic signal to the Hall transducer. A precise, proportional voltage is provided by the low-offset, chopper-stabilized BiCMOS Hall IC, which is programmed for accuracy after packaging.

Fig.5: ACS712

D. Flowchart



CONCLUSION

Supply Voltage, current and RPM can be displayed on LCD. Also Voltage, current and RPM displayed on WEB. LCD indicates Status of Motor with their Parameters. Just accessing web page we can easily check Fault and Condition of present or not where we go. System should be check the Voltage level current level and RPM of Induction Motor test successfully. System can be access easily from any ware using IOT. Result should display correctly on the LCD.

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