International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 08 | Aug 2020 www.irjet.net p-ISSN: 2395-0072

INDUCTION MOTOR PARAMETERS ANALYSIS USING CLOUD COMPUTING TECHNIQUE BASED ON IOT

ABHISHEK S[1], MADHU G N[2]

[1]*PG student, EEE Dept., UBDT College of Engineering Davanagere, Karnataka, India.*
[2]*Associate Professor, EEE Dept., UBDT College of Engineering Davanagere, Karnataka, India.*

Abstract - *Now a days the induction motor has remained the most mainstream sort of motor for modern applications. The main advantage of the induction motor is its direct rotor development prompting minimal effort, toughness, and low support maintenance. This projects presents a remote observing system for an induction motor dependent on Internet of Things (IOT) for protected and economic data communication in industrial fields. A module of transducers and sensors screens the parameters like Temperature, vibrations , speed , motor current and voltage of induction machine and sends to the processing unit (Atmega328 Micro controller), which will analyze and display the sensed parameters and the processing unit additionally speaks with Gateway module to send data to cloud database and remote checking happens. The system additionally presents the Automatic ON/OFF for faulty conditions and shows the information on LCD show and data is passed on cloud in order to prevent induction machine system failures. To make the system quick and easy to understand, model gives information to WIFI IOT applications. On the off chance that any fault occurs we are controlling it using programmed switch off with help of relay.*

***Key Words*: Internet of Things, Thingspeak, Liquid crystal display, induction motor.**

1. INTRODUCTION

In Industries, mechanical and electromechanical frameworks are driven by electric motors on the premises. The drivers of these motors are preferably on motor control – Open loop controls or closed loop controls. These prime movers are the most significant/Critical for any tasks in Industry. In Industry, any failures of the prime movers influences the most. Accessibility or Healthiness of the motor is consistently an unavoidable issue. The arranged maintenance is being done in some of the well-organized industries. Rest of the SMES don't keep up regular maintenance for dependable activities of these due to unavailability of talented labor and abnormality of the business. Once in a while the Techno-economic plausibility of such SMES doesn't work out as a result of the competitive markets. Though, with the coming of Technology and better exercises, appropriate planning of support and creation is conceivable now a days. Presently the business has begun investigating arranged upkeep about Preventive Maintenance, Predictive support, Condition Monitoring, even Maintenance prevention has come into place. Subsequent to experiencing the period of Preventive and Planned shut downs, we began searching for on-line condition observing to get ready for arranged, prescient and preventive upkeep. Thus motor maintenance support has gotten helpful. This is a further headway of innovation called IOT Based System for On Line Motor Health Monitoring.

In this framework the winding temperature, current drawn by motor and rpm speed of the induction motors were observed utilizing TCP/IP convention by means of Wi-Fi. By utilizing the current Internet organize, these parameters were measured and moved to the PC without the requirement of extra wiring. The PC gathered the parameters of the considerable number of motors with assistance of sensors and microcontroller and decides the fundamental support plans.

The principle objective is to expand the dependability of the motor application by utilizing the ongoing innovation headway. This work guarantee the consistent checking of high horse power induction machine utilized in assortment of industrial fields. By guaranteeing that the system reliability abnormal conditions are effortlessly distinguished and effectively rectified.

As Induction motors are utilized about 90% in ventures, the financial information observing is required. The profitability of enterprises can be expanded by doing the preventive maintenance in proper time period of all motors. By taking preventive estimates the failures of system and cost of high power rated motors is well protected. So here we are checking engine distinctive condition and passing it on IOT cloud.

Proposed method will ensure:

- Advanced method of motor monitoring using IoT applications.
- The sensed data will be stored for long period with all its safety.
- Predictive maintenance is scheduled based on monitoring data of motor.
- Avoids sudden failures of the system due to pre-planned maintenance.

2. METHODOLOGY

In this project, system utilizes 5 kinds of sensors which are: speed sensor to gauge the speed of the engine, LM35 sensor to quantify the winding temperature, voltage sensor, vibration sensor and CT Hall Based Liner Current Sensor to quantify the current drawn by the motor .In addition to these sensors we used voltage sensor and also vibration sensor. Alongside every one of these sensors system utilizes one Arduino microcontroller, one for doing regular connections, Arduino IDE programming, C programming language. All sensors were interfaced with MCU and detected simple values from different parts of motor and MCU changed over all values into advanced data utilizing programming on Arduino IDE.

3. BLOCK DIAGRAM OF PROPOSED WORK

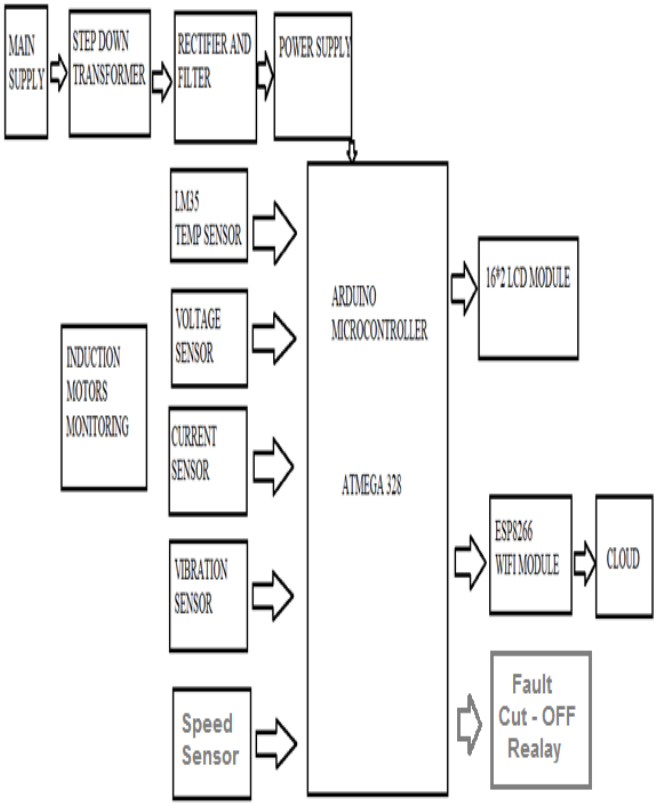

Fig-1: Block diagram of motor monitoring system.

Above figure 1 clarifies about monitoring of induction motor by utilizing IOT. The primary heart of the venture is microcontroller Arduino which is utilized to detect different information originating from sensors, transfers the same in IOT cloud and run the actuators. Temperature sensor LM35 is utilized to gauge the adjustment in temperature or screen temperature of the A.C. motor, also voltage and current sensors are utilized to quantify the over voltage or any changes. LCD show is utilized to showcase the Sensor esteems, so there can be a visual observing of sensor information. With the guide of esp8266 WIFI module, all the information is transferred in Thingspeak cloud and later checked utilizing Thingspeak application introduced in advanced mobile phone or PC. On the off chance that any fault occurs we are controlling by utilizing via programmed switch off with assistance of relay. Furthermore, when fault cleared motor will begin to work.

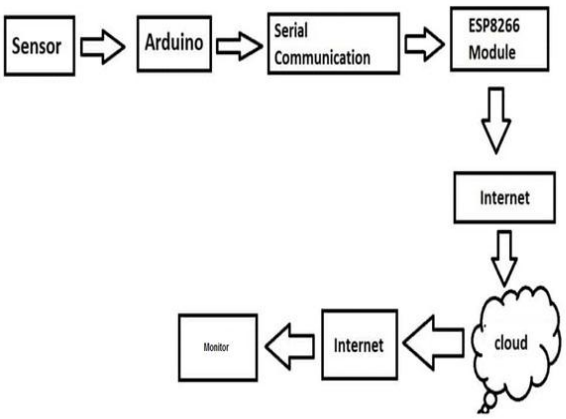

Figure-2: IoT processes diagram

3.1. Thingspeak (Internet of Things) Platform.

Thingspeak is an Internet-of-Things stage intended to make advancement and usage of keen IoT gadgets snappy and simple. It tends to be utilized to peruse, store, and imagine sensor information remotely.

Internet of Things has been all the buzz recently and an ever increasing number of gadgets are being conversing with web each day. With the ascent of such astounding innovation, the danger of security has likewise expanded generously. A portion of the significant worries in IoT are:

If IoT gadgets are sending your information to the web, the correspondence should be shut and scrambled which can't be conceivable without utilizing a committed and shut server which is extremely difficult to oversee. The IoT gadgets additionally should be responsive and once more, that is preposterous without a server with low inertness and high responsiveness.

In IoT, the stage should be good with a wide range of kinds of equipment engineering and gadgets, so it doesn't confine its clients with single sort of equipment with constrained capacities. Keeping in see the issues referenced above, Thingspeak is the ideal answer for every one of these issues.

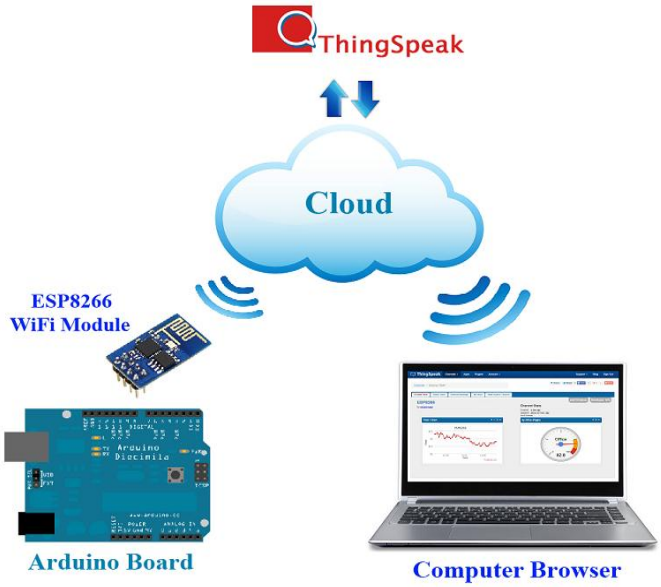

Fig -2: Thingspeak process diagram.

4. HARDWARE IMPLEMENTATION.

Single phase induction motor is monitored and controlled by using IoT was implemented in below hardware module. Where it consists of single phase AC supply and it is stepped down to 12V, then it is converted to DC using Rectifier Bridge. The obtained pulsating DC is filtered and used it for relay input and also by using regulator input to Arduino is given. Here we have used temperature, current, voltage, vibration and speed sensors are well mounted on suitable parts of motor to sense all the parameters and it was displayed in LCD display one by one with delay of three seconds. And also we have set threshold values for each sensors in order to prevent motor failures during abnormal conditions. If any one of the parameters exceeds the threshold values, the relay operates and motor will turned off automatically.

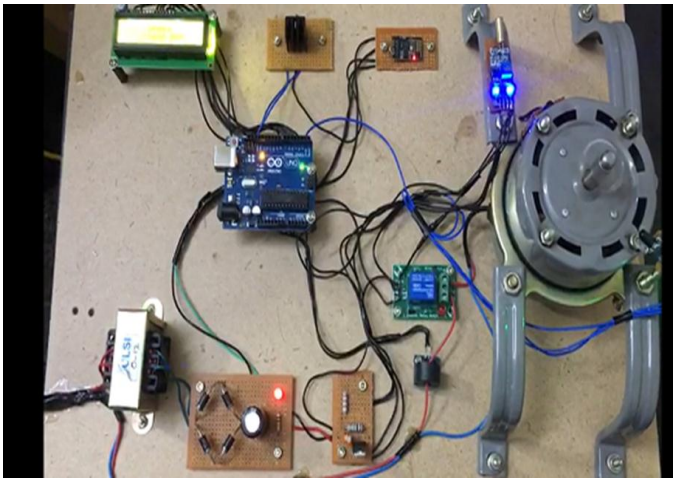

Fig-3: Hardware of proposed system.

4.1. Advantages of Proposed Work.

A) Preserves the health and extends the life of assets. By detecting and notifying, when situations stress the motors, condition monitoring alerts enable enterprise to proactively correct issues before they irreparably damage of rotating equipment.

B) Reduces energy expenses. Since motor efficiency declines with motor health, using condition monitoring to preserve the health of motors also lowers the energy costs.

C) Extends maintenance staff's reach. Staff focuses on the motors only when they need maintenance and can perform other tasks when they don't.

D) Optimizes maintenance processes. By intervening only when the asset needs maintenance, condition monitoring enables to eliminate the 19 percent of preventive maintenance activities that are unnecessary and the 45 percent of preventive maintenance practices that are ineffective, while still achieving high availability and reliability performance.

5. RESULTS AND DISCUSSIONS

In this work, AC motor was used for experimental purpose. The motor rating is 220 volt AC input. Sensors (Temperature, vibration, current, speed and voltage sensors) are attached to the motor at right positions. Sensor data was collected and processed using Atmega328 microcontroller and compared with the threshold values to switch off the motor. Every values of sensor is displayed on LCD display with three seconds of delay for each parameters. And the data sensed is uploaded to Thingspeak cloud through ESP8266 WI FI module to display parameters graphically in five unique fields on pc or android mobile. The experimental setup is working successfully.

1] Voltage monitoring with both LCD and Thingspeak application was displayed in below figure 4 and we have set the threshold value of voltage 250V, where if it exceeds this value relay will operate and motor is turned off automatically.

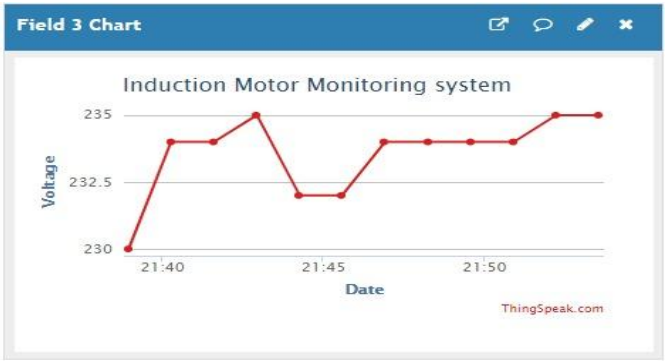

Figure-4: Voltage waveform

2] Current monitoring with both LCD and Thingspeak application was displayed in below figure 5 and we have set the threshold value of voltage 500A, where if it exceeds this value relay will operate and motor is turned off automatically.

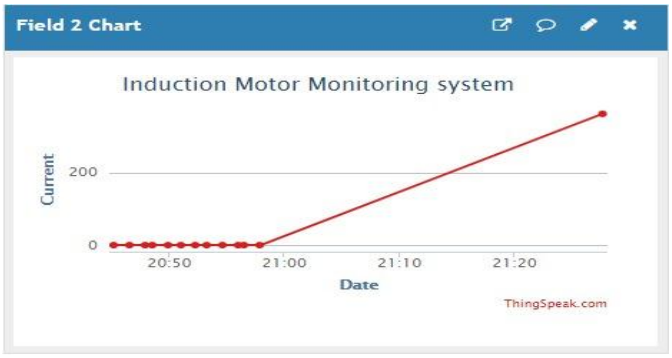

Figure-5: Current waveform

3] Speed monitoring with both LCD and Thingspeak application was displayed in below figure 6 and we have set the threshold value of voltage 12000 rpm, where if it exceeds this value relay will operate and motor is turned off automatically.

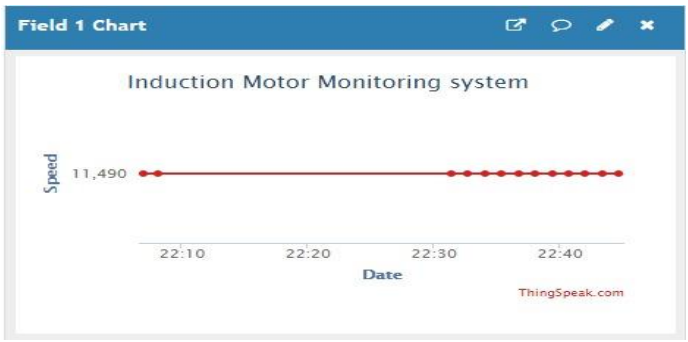

Figure-6: Speed waveform

4] In figure 7 shows the faulty condition of motor where vibration exceeds threshold value, hence motor turned off successfully.

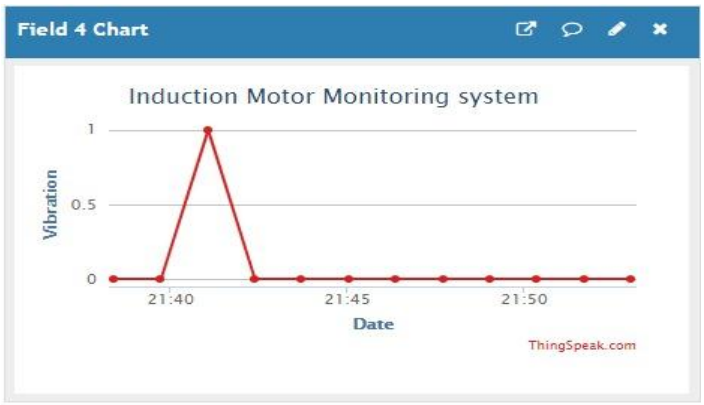

Figure-7: Vibration waveform

6. CONCLUSIONS

This Project presents the idea of Internet of Things for observing of motor failures remotely. The framework has been intended to join different parameters estimation continuously, improving the state of the motor when it is faulty. The observing of the motor system presents the monitoring of various parameters in particular vibrations, temperature, voltage, speed and current utilization. Thus, compared to conventional methods that relies solely on vibrations or temperature. The concept of IoT is presented here for remote monitoring the motor. The information got by the gateway node is collected away and graphically displayed continuously. The proposed system can be easily upgraded to add other sensors on the sensing node for the measurement of other parameters if required. The system has a high autonomy, easy installation and low maintenance costs. Experimental outcomes affirm the plausibility of the execution of the framework. If any fault coming, proposed system controls it by using by automatic switch off with help of relay. And once fault clears motor will start normally.

REFERENCES

[1] A.Ajitha, D.Swathi, Shyamala.D "IoT platform for condition monitoring of industrial motors" proceedings of the 2nd international confidence on communication and electronics systems (ICCES 2017) IEEE Xplore complaints.

[2] Prakash, Chetna, and Sanjeev Thakur. "Smart Shut-Down and Recovery Mechanism for Industrial Machines Using Internet of Things." 2018 8th International Conference on Cloud Computing, Data Science & Engineering (Confluence), IEEE.

[3] Sen, Mehmet, and Basri Kul. "IoT-based wireless induction motor monitoring." Scientific Conference Electronics (ET), 2017 XXVI International. IEEE, 2017.

[4] Xue, Xin, V. Sundararajan, and Wallace P. Brithinee. "The application of wireless sensor networks for condition monitoring in three-phase induction motors." Electrical Insulation Conference and Electrical Manufacturing Expo, 2007. IEEE, 2007.

[5] S.S.Goundar, M.R.Pillai. "Real time condition monitoring system for industrial motors".2018 IEEE, The advancement of his research is the improvement of monitoring system for motor's real time condition.

[6] E.C. quispe, X. M. Lopez-fernandez, M. S. Mendes, J. Marques cardoso, and J.A. palacios "experimental study of the effect of positive sequence voltage on the derating of induction motors under voltage unbalance," IEEE (iemdc) pp.

[7] Gedzurs a., sniders a. (2014) induction motor stator winding thermal process research and modelling under locked rotor mode. In: proceedings of 13th international scientific conference. Engineering for rural development, - 30, jelgava, Latvia, pp. 265-270