Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12

AC Motor Monitoring and Controlling Using IoT

Piyush Burade[1*], Ravi Aurase[2], Anjali Hirapure[3], Rohini Chawardol[4]

[1,2,3,4]Department of Electrical Engineering Government college of Engineering Nagpur, India.*

Email: [2]raviaurase299@gmail.com, [3]Pwsanjali01@gmail.com, [4]rohinikchawardol01@gmail.com
Corresponding Email: [1]Piyushburade3@gmail.com*

Received: 27 February 2023 **Accepted:** 22 April 2023 **Published:** 01 June 2023

Abstract: ***The design of IOT technology is shown to monitor and diagnose the performance of a three-phase induction motor and record crucial operational characteristics. Today's technology is rapidly tied to the Internet of Things (IOT), keeping things connected efficiently. For the purpose of gathering and processing induction motor parameters, the solutions given include an IOT-based platform. The parameters are made up of sensors, including humidity, temperature, voltage, and current sensors. With the help of the pocket IOT application, this data may be shown on a smartphone, accessed via web sites, and stored in a cloud platform. It will be promptly informed if performance limits are exceeded. To prevent motor downtime, an induction motor can be checked and immediate action taken can save money and time. Utilising IOT to monitor induction motors has several benefits, including notification of problem alerts and historical data for preventative maintenance. Recent technological advancements have greatly improved the quality, speed, and ease of our lives. This article explains how to manage and control induction motors (IOT) using the Internet of Things. The IOT is more effective and convenient for controlling systems because it can be used from anywhere via Wi-Fi. This intelligent system's main objective is to prevent induction motor failure by taking preventive measures. Because of its many benefits, including their self-starting nature, low cost, high power factor, and robust construction, induction motors are utilised in a wide range of applications, including those for electric vehicles, businesses, and agricultural areas. In order to maximise motor efficiency and assure safe and reliable operation, it is crucial to identify defects in motors as soon as possible using the best smart protection approach currently available. Remote monitoring is possible for the induction motor's speed, voltage, current, temperature, humidity, and other electrical, mechanical, and environmental parameters because errors in these areas seriously damage the motors and have an impact on the induction motor's ability to function in other applications. In this system for monitoring and controlling Induction using IOT, a number of sensors are employed to acquire the motor data in real-time and a relay is used***

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)

Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12

to control the motor. The proposed system will collect and analyse induction motor parameters in real-time using an IOT-based platform.

Keywords: AC Motor, IOT, Remote Monitoring, Humidity, Temperature, Voltage,Current Sensors.

1. INTRODUCTION

Pumps, compressors, conveyors, and other equipment are all driven by AC motors, which are utilised extensively throughout many industries. The operating temperature and humidity are two elements that affect the efficiency and lifespan of AC motors. The insulation in the motor windings might deteriorate under high temperatures, resulting in decreased performance or possibly failure. High humidity can also shorten the life of the motor by causing corrosion inside of it. Overvoltage can drive up amperage and temperature even on lightly loaded motors. Thus, high voltage can shorten motor life even on lightly loaded motors. Efficiency drops with either high or low voltage. Power factor improves with lower voltage and drops sharply with higher voltage Therefore, it is essential to monitor and control the temperature and humidity in AC motors to ensure optimal performance and longevity.

The monitoring and control of AC motors can be greatly enhanced with the use of IOT technologies. IOT makes it possible to combine sensors, microcontrollers, and cloud-based platforms, enabling real-time environmental monitoring and management for the motor. In this essay, we suggest a technique for leveraging the Internet of Things to monitor and regulate the temperature and humidity of an AC motor.

System design
A microprocessor, temperature and humidity sensors, CT, PT and an IOT platform make up the proposed system. The microcontroller gathers data from the sensors and uses the internet to transmit it to the IOT platform. If the voltage, current, temperature or humidity exceeds a set threshold, the platform analyses the data and issues alerts. The motor is turning off based on the sensor data, the system can also be utilised to regulate the over voltage, under voltage, current, temperature and humidity.

The suggested system's block diagram is displayed in FIGURE 1. A microprocessor, temperature and humidity sensors, an IOT platform, and a fan/heater control unit are all components of the system. The microcontroller, which is coupled with the temperature and humidity sensors, reads data from the sensors and transmits it via the internet to the IOT platform. If the temperature or humidity exceeds a set threshold, the IOT platform analyses the data and generates alerts. Based on the sensor data, the fan/heater control unit is turned on to regulate the temperature and humidity.

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)

Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12

System Block Diagram

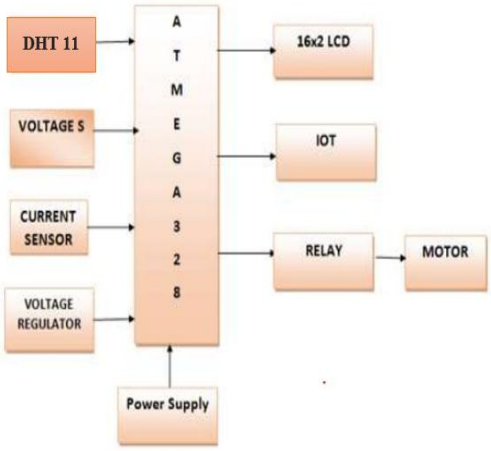


Figure 1: System Block diagram System implementation

Components from stores can be used to build the suggested system. An inexpensive Wi-Fi-capable microcontroller like the ESP8266 or ESP32 can be used as the controller. The DHT11 or DHT22 sensors, which are frequently used for environmental monitoring, can be employed as temperature and humidity sensors. Any cloud-based platform, including AWS IOT or Microsoft Azure IOT, can serve as the IOT platform. A relay module that regulates the power supply to the fan or heater may serve as the fan/heater control unit**.**
Components from stores can be used to build the suggested system. An inexpensive Wi-Fi-capable microcontroller like the ESP8266 or ESP32 can be used as the controller. The DHT11 or DHT22 sensors, which are frequently used for environmental monitoring, can be employed as temperature and humidity sensors. Any cloud-based platform, including AWS IOT or Microsoft Azure IOT, can serve as the IOT platform. A relay module that regulates the power supply to the fan or heater may serve as the fan/heater control unit.

Circuit Diagram

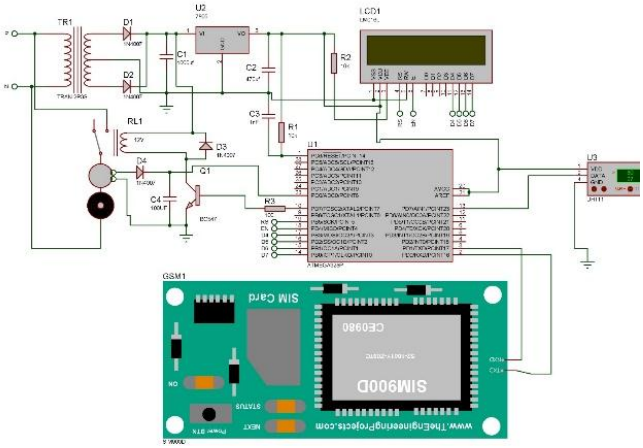


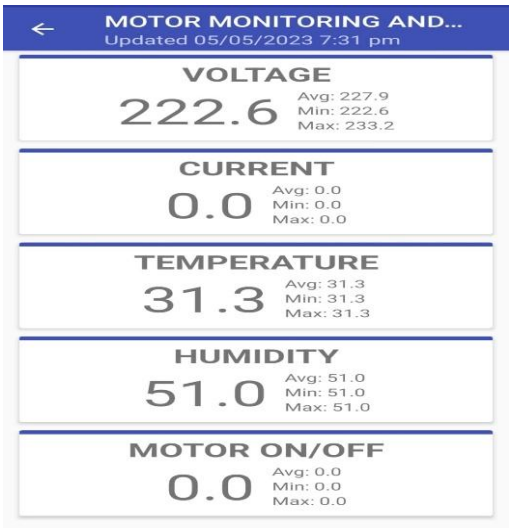
Figure 2. Ardunio Interface with sensor and motor

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)

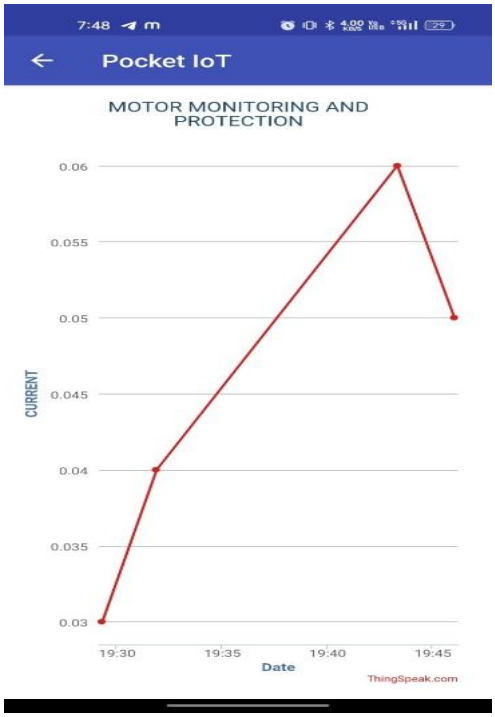
Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12

Using the flowchart in Fig. 2, the architecture's operation is explained. The POCKET IOT application will be used to store and display the data that the nodes have received. The following study was done using a hardware model that was created using a motor. Analysis of the temperature and humidity.voltage rating and current rating

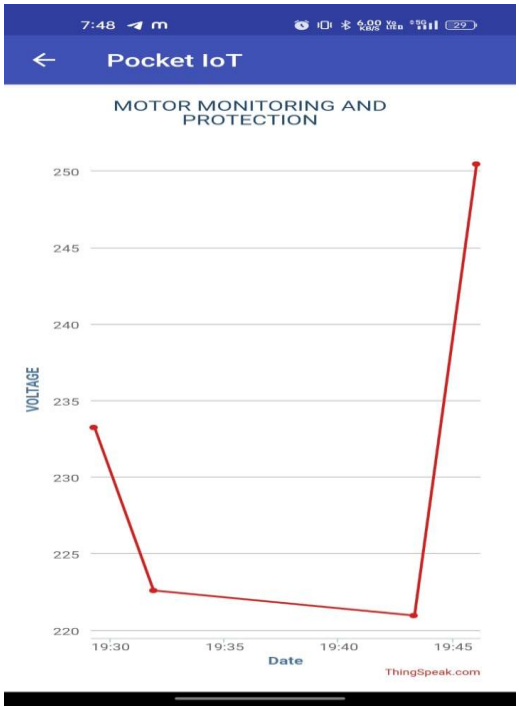
Software interface



Graphs



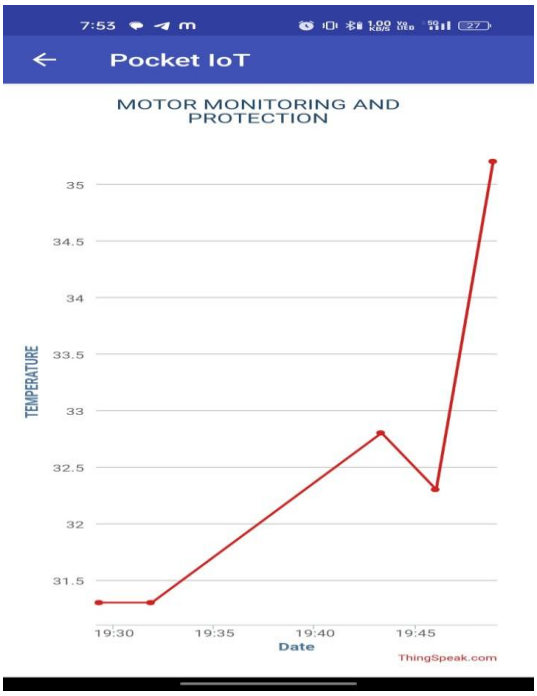
Graph No: 01 Current Graph



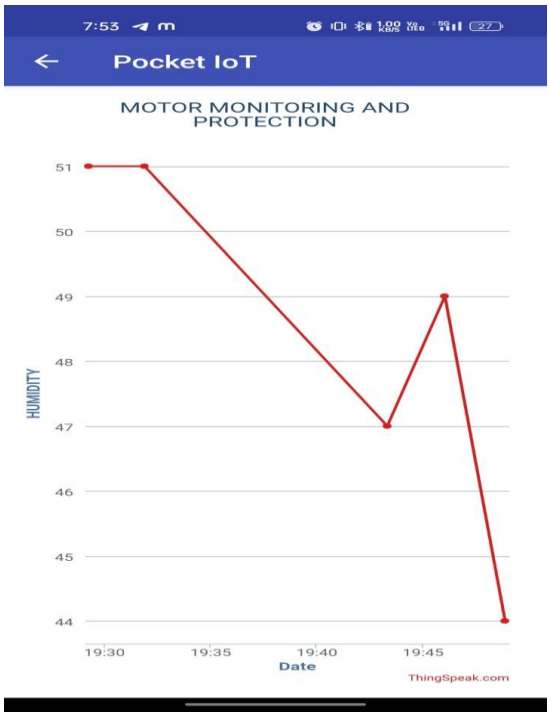
Graph No: 02 Voltage Graph

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)

Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12



Graph No: 03 Temperature Graph



Graph No: 04 Humidity Graph

2. RESULT AND DISCUSSION

After installation, the system module is equipped to record the temperature, moisture content, voltage range, and current range in real time. The defaulter can be easily found if there is any indication of a change in the readings of (voltage, current, temperature, and humidity). Monitoring of Temperature: A temperature sensor called a DHT11 Sensor can be used to measure the stator winding's temperature. Thermistor, a typical form of temperature sensor that alters its resistance in response to changes in temperature, is used by the DHT11 Temperature Sensors to monitor temperature. Monitoring the temperature data recorder is widely utilised in sectors like food processing, manufacturing, printing, metallurgy, etc. where crucial process factors like temperature and humidity may negatively impact the process's outcomes.Continuous monitoring keeps track of the process, and user-defined alarm thresholds promptly notify the operator of extreme conditions that demand attention. When there are power outages, the system immediately resumes monitoring the process under the existing circumstances. The goal of our research is to develop and implement a framework that will be valuable in enhancing the current situation in the field of controlling and automating systems while also making them simpler and maintaining security measures.

3. CONCLUSION

The IOT paradigm transforms every object into an intelligent object. Intelligent objects contain features for identification, sensing, communication, and processing that enable them to interact with other things, software, and internet-based services. The IOT's core is made up of intelligent things, which also extends motor lifespan. We used IOT in this work to investigate problems with overvoltage, undervoltage, current, temperature, and humidity occurring in an ac motor. To address the

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)

Journal of Electronics, Computer Networking and Applied Mathematics
ISSN: 2799-1156
Vol: 03, No. 04, June-July 2023
http://journal.hmjournals.com/index.php/JECNAM
DOI: https://doi.org/10.55529/jecnam.34.7.12

aforementioned issues, these modules monitor and operate the induction motor. The proposed system is found to be capable of resolving a variety of problems, particularly problems with overvoltage, undervoltage, current, temperature, and humidity.

4. REFERENCES

1. SudharaniPotturi and Dr. Rajashekar P. Mandi "Critical Survey on IOT Based Monitoring and Control of Induction Motor'', IEEE 16th Student Conference on Research and Development , Bangy(Malaysia)26-28Nov 2018.
2. Seenivasan, Ponkumar, Venkatraman and Jeslindrusilanesamalkar, " Induction Motor Condition Monitoring And Controlling Based On IOT", International Research Journal Of Engineering and Technology(IRJET) Volume:06 Issue:3Mar 2019.
3. V.S.D Rekha and Dr. K. Srinivasa Ravi , " Induction Motor Condition Monitoring And Controlling Based On IOT",International Journal of Electronics, Eletrical,And Computational System IJEECS Volume 6, Issue:9 September 2017, ISSN 2348-117X.
4. Pradeepkumar. V, Indhumathi.B, Poorani.P, Nirmala.M, Anbarasu.L" IOT Based Sensorless Speed Control Induction Motor" SSRG International Journal of Eectronics and Electronics Engineering (SSRG)- special Issue ICTER Mar 2019.
5. J. Kunthong et al., "IOT-based traction motor drive condition monitoring in electric vehicles: Part 1," 2017 IEEE 12th International Conference on Power Electronics and Drive Systems (PEDS), 2017, pp. 1,184-1,188.
6. C. Prakash and S. 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), 2018, pp. 824-828.
7. M. Şen and B. Kul, "IOT-based wireless induction motor monitoring," 2017 XXVI International Scientific Conference Electronics (ET), 2017, pp. 1-5.
8. Xin Xue, V. Sundararajan and W. P. Brithinee, "The application of wireless sensor networks for condition monitoring in three-phase induction motors," 2007 Electrical Insulation Conference and Electrical Manufacturing Expo, 2007, pp. 445-444

Copyright The Author(s) 2023.This is an Open Access Article distributed under the CC BY license. (http://creativecommons.org/licenses/by/4.0/)