Available onlinewww.ejaet.com

European Journal of Advances in Engineering and Technology, 2022, 9(4s):382-386
International Conference on Tech Trends in Science & Engineering (ICTTSE) 2022
Suryodaya College of Engineering & Technology, Suryodaya Polytechnic, Nagpur, Maharashtra, India

Research Article ISSN: 2394 - 658X

IoT Based Methodology for Monitoring in Induction Motor

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ABSTRACT

Rapid technological development is presently centered on the Internet of Effects (IoT). Especially in artificial robotization, numerous effects are efficiently connected, furnishing state and controlled monitoring to ameliorate productivity. The thing of this system is to develop and apply IOT technology for monitoring and diagnosing the condition of induction motors by recording crucial stir pointers. The proposed system includes an IoT- grounded platform for collecting and recycling induction motor parameters. The collected data is stored on the pall platform and can be penetrated from the website. You'll also admit timely cautions if you violate the asked limits of covered parameters, so you can take immediate action to avoid gratuitous machine time-out and save time and plutocrat. Benefits of this system include nonstop outfit monitoring, alert event, and data vacuity for prophetic conservation.

Key words: Wireless control and Monitoring System, Induction Motor, Internet of Things, Arduino, Vibration, Temperature

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INTRODUCTION

This paper has been presented a review on major research and developments over the past few decades in the condition monitoring and fault detection of induction motor. Induction motors are the majority of the prime movers in industrial application for their reliability. The demand of three phase induction motor has highly expanded in recent years because of their simplicity and reliability of construction [2]. The induction motors are widely used in the industry for railway application, mining industry, wood working machines, automotive industry, chemical industry, paper mills, etc. Single phase induction motors are most useful in domestic application and industrial machines, due to their high efficiency and reliability. The authors studied various failures of three-phase induction motors such as unbalanced stator, winding failure, rotor parameters, eccentricity, bearing failure and rotor rod failure.

The performance of the induction motor depends upon the higher than electrical and mechanical parameters. Therefore the continues observation of induction motor is required for safe and reliable operation of commercial induction motors. The electrical and environmental parameters like voltage, current, temperature and close wetness of the motor, affects the nice performance of motor. And conjointly the mechanical factors like vibration and abnormal speed have an effect on the nice performance of the motor. Some electrical and mechanical factors cause the severe injury to the health of induction motor and conjointly cause severe drawback to application wherever the induction motor is employed. Today's business scripts are running as quick as attainable to finish a product/service. In several industries, induction motors are terribly wide employed in product handling. The employment of the most recent technology ensures reliable operation of the asynchronous motor. With advances in technology, observation and management ar performed mechanically. The web of Things could be a recent development for dominant and observation engines from remote locations. This methodology provides simple administration and responsibility. Continuous observation of electrical and mechanical

parameters ensures engine responsibility. If abnormal values of electrical and mechanical factors may be detected, the motor is mechanically controlled (i.e. the motor turns off suddenly to scale back serious malfunctions).

OBJECTIVES

The main objective is to extend the dependableness of the motor application by exploitation the recent technology advancement. This work make sure the continuous watching and simple management of attitude power induction motors employed in sort of industrial fields. By guaranteeing the system dependableness abnormal conditions are simply known and simply corrected. As Induction machines are used nearly ninetieth in industries, the economic knowledge watching is needed. The productivity of industries is inflated by doing the preventive maintenance of induction machines. By taking preventive measures the failure of system and value of attitude power motors is protected.

- To observe and management an induction motor supported web of Things (Iot) for safe and economic digital communication in industrial fields.
- To start out or stop the induction machine to avoid system failures by Automatic and manual management strategies.
- To observe and management the motors employed in electrical vehicles (to create energy unit vehicle as automatic one).

LITERATURE SURVEY

The performance of the induction motor depends upon the higher than electrical and mechanical parameters, therefore continues the observation of induction motor is required for safe and reliable operation of commercial induction motors. The electrical and environmental parameters like voltage, current, temperature and close wetness of the motor, affects the nice performance of motor. And conjointly the mechanical factors like vibration and abnormal speed have an effect on the nice performance of the motor. Some electrical and mechanical factors cause the severe injury to the health of induction motor and conjointly cause severe drawback to application wherever the induction motor is employed. Today's business scripts are running as quick as attainable to finish a product/service. In several industries, induction motors are terribly wide employed in product handling. The employment of the most recent technology ensures reliable operation of the asynchronous motor. With advances in technology, observation and management are performed mechanically. The web of Things could be a recent development for dominant and observation engines from remote locations. This methodology provides simple administration and responsibility. Continuous observation of electrical and mechanical parameters ensures engine responsibility. If abnormal values of electrical and mechanical factors may be detected, the motor is mechanically controlled (i.e. the motor turns off sudden. Significant efforts are dedicated to induction machine watching throughout the last 20 years and lots of techniques are projected. Thus, a short description of the most techniques conferred within the literature, yet as their benefits and downsides are conferred during this section.

a) A nonintrusive and in-service motor potency estimation technique was projected in 2008, wherever the potency estimation was done mistreatment Air Gap torsion technique [4]. Solely motor terminal quantities and plate details, with special issues of motor condition watching necessities are needed. Pre put in potential transformers and current transformers for cover purpose. However, there's a demand for continuous watching of engine parameters within the field.

b) A low-priced wireless sensing element network for watching the operation of induction motors within the field has been projected for dynamical motors [5]. Wherever intelligent shift systems are projected. The intelligent switch contains a knowledge feller accustomed monitor the operating standing and mechanically management the association mode of the motor windings. However, this method is proscribed toolittle space, thus long-distance communication isn't potential.

c) SCADA programs areutilized for developing user interfaces. However, SCADA programs don't offer ability to users as a result of their pricey libraries.

d) RF, ZigBee and Bluetooth technologies ar wide most popular in easy-to-use applications thanks to the short vary between the sender and also the receiver, and also the tiny volumes of data transferred [5], [6]. The ZigBee, RF and Bluetooth wireless communication techniques ar usually restricted to easy applications as a result of their slow communication speeds, distances and knowledge security.

e) There are some sure-fire examples like PLC SCADA primarily {based} fault detection and protection system is enforced that provides the {online the net} based program for remote and watching was developed and conferred online to users however the most disadvantage is value this method ar additional costlier

f) Microorganism search algorithmic program alongside a nonintrusive technique is employed for the potency estimation in [7]. However, the system takes longer within the calculations' to scale back serious malfunctions).

- Shyamala.D "IoT platform for condition monitoring of industrial motors" [1], Numbers of things are efficiently interconnected, which leads to condition and controlled monitoring to increase productivity. Continuous monitoring of the equipment, receiving alerts and data availability for predictive maintenance. Motor is effectively and continuously monitored by using web location.
- Kunthong, Jakkrit, et al. "IoT-based traction motor drive condition monitoring in electric vehicles: Part 1." Power Electronics and Drive Systems (PEDS), 2017 IEEE 12th International conference. In electric vehicles, the motor drive condition for traction was supervised by applying the implementation of a wireless Internet of Things (IoT). The design and testing of the prototype using an ESP8266 microcontroller module to acquire motor condition is presented.
- 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, for predictive maintenance of motors in the industries, monitoring needs to be performed continuously so as to determine any degradation in performance or failure of the motors. The recovery mechanism provides a back-up machine which is started when the main motor is shut down. This helps in decreasing the loss that would occur during the downtime. This increases the reliability.
- Şen, Mehmet, and Basri Kul. "IoT-based wireless induction motor monitoring." Scientific Conference Electronics (ET), 2017 XXVI International. IEEE, 2017, in this way, the production process is not impeded and the required maintenance or replacement can be performed with the least possible disruption. This study has provided statistics not only for creating mathematical models but also for enabling the CMS operator to establish a motor maintenance schedule.
- 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, the most commonly used technique for the detection of faults in large three-phase induction motors is to measure the supply current fed into the motor and analyse the signal spectrum. This aspect allows companies to reduce downtime when repairing machinery and ensures that productivity does not suffer.

BLOCK DIAGRAM

The block diagram shows four sensors for sensing the respective four parameters that are voltage, current, speed, and temperature. with the help of that sensor monitoring the condition parameters of motor and gives the current status of induction motor to the Arduino Uno and from Arduino Uno through the wifi, the module gives information to the cloud where the information stored and from the cloud, it will receive information on mobile application whenever necessary with the help of things speak. In case any fault takes place in Induction Motor it should be automatically disconnected from the supply. Whatever parameter is monitored that should be displayed on LCD one by one.

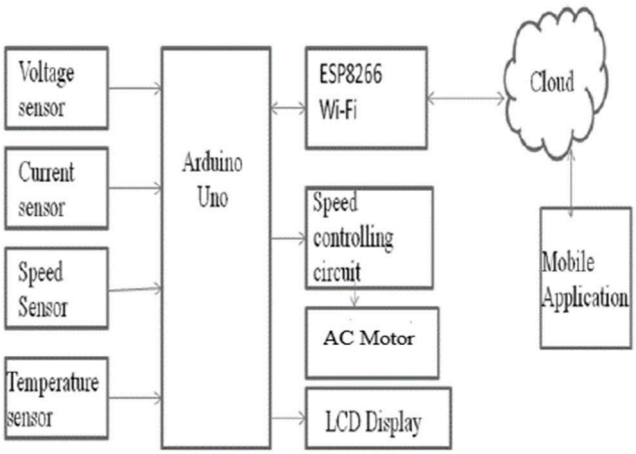

Fig. 1 Block Diagram

RESEARCH METHODOLOGY

The block diagram below provides a detailed view of the proposed system. It provides complete information about the proposed system. This diagram describes how the current working system works, how real signals are transmitted from one system to another, and the main components used in the proposed system.

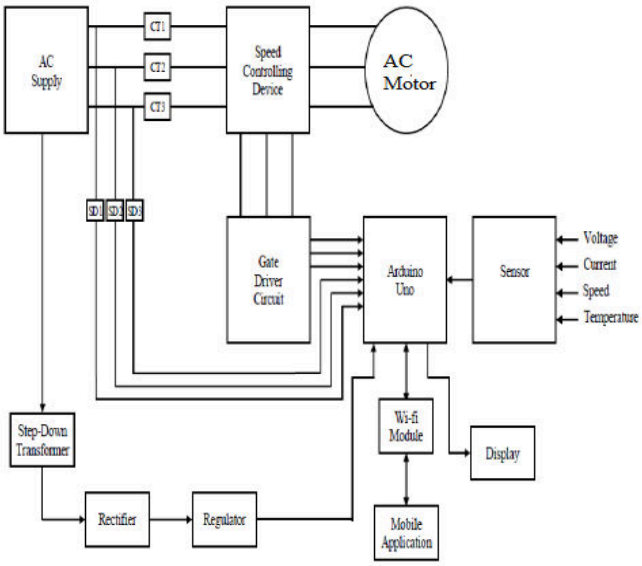

Fig. 2 Diagram of the proposed system

Here, in actual operation, one-phase AC power first enters the system, from where it is fed to the three-phase induction motor via a speed control unit and gate driver circuit. Here, the gate driver circuit acts as a logic circuit that turns a switch on and off to control the speed of the motor. There are countless ways to control the speed of the motor, but here we use the PWM method to control the speed of the induction motor. PWM technology is very difficult to use and harder to operate than other methods. By adjusting the ON/OFF period of the switch controlling the switching angle, the switching angle quietly controls the speed of the induction motor.

In this project, the Arduino Uno is the heart of the system and needs a 5V supply to work. Here the Arduino Uno is powered by a step-down transformer with a rectifier and regulator to convert and use the filter. The diagram above shows the PWM scheme for controlling the speed of an induction motor. By controlling the on-off period of the switching voltage of the induction motor, it can be easily controlled by controlling the speed of the voltage of the induction motor, and can also be controlled.

CONCLUSION

In this paper the conception of internet of Things for early detection and observance of motor system failures remotely is proposed. The system has the flexibility to mix varied detected parameters in real time and improve correct detection of various faults occur in motor. The observance of the motor system presents the activity of various parameters particularly vibration of the motor, temperature, speed, encompassing humidness, offer voltage and motor current. Thus, compared to alternative typical strategies this method has additional range of fields that allows alarm, alert messages and fast dominant. The conception of IoT is bestowed here for remote observance and dominant the motor. By exploitation visual basics the information received from the controller node represent by diagrammatically. The data is additionally displayed serially. The work is updated to further fields for precious management. The appliance of the system is required these days for each electrical system (i.e. heat unit vehicle and automation of industries wherever larger safety is needed). The system has the particular advantage less maintenance, straightforward and fast dominant and accessing of knowledge remotely. Experimental results make sure the feasibleness of implementing the system.

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