IMPLEMENTATION OF PROTECTION UNIT FOR INDUSTRIAL DC MOTORS

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Abstract – *In today's scenario, the induction motors play a predominant role in industrial applications. It can operate in any environmental condition and the cost is inexpensive. This depends upon IoT (Internet of Things) based on protection and monitoring system of an induction motor in industries. The transducers modules and sensors observed the parameters like Temperature, vibrations, external moisture RPM, induction machine load current and voltage and send to the (Arduino) conveys with the gateway module to cloud database. To eschew system failure, this presents the induction machine start and stop control by both automatically. It makes the system become faster and user friendly.*

Keywords – Induction Motor, Internet of things, Arduino, vibration and Temperature.

1. Introduction

The electrical and environmental parameters such as voltage, current, temperature and surrounding humidity of the motor, affects the good performance of motor. And also the mechanical factors such as vibration and abnormal speed affect the good performance of the motor. Some electrical and mechanical factors cause the several damage to the health of induction motor and cause several problems to applications where the induction motor is used.

This project is mainly depending upon IOT (Internet of things) and motor device. In this system the condition of the motor and also give protection against over current like voltage current, temperature, humidity and thermal overloading by providing program for that, so if the motor crosses the maximum value of current or temperature by some fault it will get automatically turn on/off and the alarm five signal on the application . We have used PWM for the speed control of the motor.

This work is to advance the field of condition monitoring and fault diagnosis in induction motor operating in variety of operating conditions with the help of condition monitoring we can easily avoid the critical emergency shutdown as well as reduce the maintenance cost of other faults. Electrical faults such as unbalanced voltage supply, single phasing. condition monitoring signal processing and data analysis are the key parts of the motor fault detection scheme.

2. Literature Overview of Implementation of protection unit for Industrial DC motors

Shital kalbhande [1]:- in their paper "Protection of monitoring of three phased induction motor" from overvoltage , under voltage, single phasing, phase reversal and overheating", Explained protection and monitoring of single phase induction motor from over current, unbalanced load, under voltage, internal ground fault and winding temperature provides non-stop running of motor. Civilize its lifetime and efficiency. Also monitoring of various protection parameters can be done by use of automation system.

Shyamlal. D et al[2]:- "IOT platform for condition monitoring of industrial motor", Numbers of things are efficiently interconnected, which lead to condition and controlled monitoring to increase productivity. Continuous monitoring of the equipment, receiving alerts and data availability for projectivity maintenance motor effectivity and continuously monitoring by using wave location. "Iot based traction motor drive condition monitoring in electrical vehicles; power electronics and drive system (PEDS),2017 IEEE 12th international conference."

Prakash Chetan and Sanjeev kumar thakur [3]:-"electric vehicles, the motor derive 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. "Smart shutdown and recovery mechanism for industrial machines using internet of things."2018 8th international conference on cloud computing, Data science and engineering (confluence). IEEE for predictive maintenance of motors in the industry, 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 is occur during the downtime.

sen, Mehmet, and Basri kul [4]:-"IOT-based wireless induction motor monitoring." Scientific conference Electronics (ET), 2017 International.

V. sundarajan, and Wallace P. Brithinee [5]:- the production process is not implemented 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.

2007. IEEE, 2007. [6]:- "The application of wireless sensor networks for condition monitoring in 3 phased induction motors". Electrical insulation conference and electrical manufacturing. The most commonly used technique for the detection of faults in large 3 phased induction motors is to measured supply current feed into the motor and analyse the signal spectrum. This aspect allows companies to reduced downtime when repairing machinery and ensures that productivity does not suffer.

P. Zhanng, T. G. Habelter [7]:-"An active stator winding thermal protection for DC motors" elaborated active thermal protection techniques are capable for providing accurate, non-thermal protection for DC motors. The thermal protection for dc motors is essential for a motors lifetime and preventing unexpected process downtime. Reliable thermal protection for industry motors.

Ms. Patil Smita Jaywant[8] :- The monitoring of the motor system prevents measurement of different parameter namely vibration motor , temperature , speed, surrounding ,humidity , supply voltage and motor current. Thus, compare to other conventional methods this system as more number of fields which enable sensor, buzzer and quick controlling. These data is also displayed serially. The work is updated to extra field for precious control. The application of the system is needed today for every electrical system. it has specific advantage less maintenance easy and quick controlling and accessing of data.

3. Conclusion

The aim of this work is to advance the field of condition monitoring and fault diagnosis in induction motor operating in variety of operating conditions with the help of condition monitoring we can easily avoid the critical emergency shutdowm as well as reduce the maintenance cost of motor and other faults. Electrical faults such as unbalanced voltage supply, single phasing, condition monitoring, signal processing and data analysis are the key parts of motor faults detection schemes.

References

[1] Shital kalbhande, Prof. Ankita "protection and monitoring of single phase induction motor from over voltage , under voltage, single phasing, phase reversal and overheating " IRJET (international research journal of engineering and technology) volume 4 issue -january 2017.

[2] P.Zhang , T.G. habelter , B. Lu An active stator temperature estimation technique for thermal protection of inverted fed induction motors with consideration of impaired cooling detection, electric machine and driver conference , IEEE(institute electrical electronics engineering), '09, 2009.

[3] Shymala.D "IOT platform for condition monitoring of industrial motors" (2014):

[4] Z.Gao, T.G. Habetler, R.G. Harley, and R.S. Colby,"A sensorless Adaptive stator winding Temperature Estimator for Mains-Fed induction machines with contionous -Operation periodic duty cycles,"Industry applications, IEEE Transactions on, 2008.

[5] Dr. Ashok kausagar, Dr.S.F.Kodad "AI based design of fuzzy logic scheme for speed control of induction motor using SVPWM technique" power electronics Hydrabad-85,Andrapradesh, India.2017

[6] Shital S. Kalbande, Vaishali M. Kamble, Priyanka G. Kale, Prof. Ankita "Protection and monitoring of three phase induction Motor from over voltage ,single phasing , Phase reversal and over Heating- A Review" ,IRJET Volume -4 Issue – January 2017.

[7] K. S. Varsha, P. Surdarshan Palaniappan, S. Susmithaa and M. Prabhu Raj "Speed and Direction Control of DC Motor Using Arduino Mobile Application,"IJESC, 2017.

[8] Khan Masoom Raza, Mohd. Kamil and Pushpendra Kumar, "Speed Control of DC Motor By using PWM," IJARCCE, 2016.

[9] "Induction Motor Protection System" Bachelors Thesis, Faculty of Electrical Engineering and Management.2016.

[10] Vikram Singh, Abhishek Gupta, Ankit Gupta "Induction Motor Protection System ", Imperial journal of Interdisciplinary Research (IJIR) 2017.