International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 1, pp: 962-966 www.ijaem.net ISSN: 2395-5252

Iot Based Protection of Three Phase Induction Motor

Mahesh Gawali[1], Rohit Bansode[2], Vijeet Kamble[3],
Prof.Mrutyunjay Patted[4]

[1,2,3] *Students, Department of Electrical Engineering BSIOTR,Wagholi Pune-412207,India*
[4] *Asst. Professor, Department of Electrical Engineering BSIOTR,Wagholi Pune-412207,India*

Date of Submission: 21-06-2020 Date of Acceptance: 13-07-2020

ABSTRACT: The restructuring of the Maharashtra state electricity board is changing the power scenario in the state. Within a span of one year, the restructuring has started yielding good result and there seems a great promise for the future of the power sector in the state. The analysis of these randomly varying parameter is done using various statically methods. These statistical methods include probability distribution functions like weibull Distribution, beta Distribution

KEYWORDS: Induction Motor, Protection system ,IoT, Voltage ,Speed etc.

I. INTRODUCTION

The induction motor is one of the most significant motors utilized in modern applications. It is utilized to change over electrical energy into mechanical energy. Its minimal effort and superior notwithstanding its unwavering quality make them the most well known exchanging current motor utilized in the modern and business fields. These motor have the adaptability of utilization fields; they can be utilized in low force applications, for example, family unit machines or in enormous force applications, for example, oil industry. In spite of the reality of high unwavering quality of acceptance engines, the working conditions may uncover the machine into various flaw conditions. These shortcomings may prompt machine shut down, accordingly causing mechanical creation misfortunes. To ensure the motor the shortcomings must be recognized in the underlying stage. Early recognition empowers the upkeep architects to accept the fundamental remedial activities as fast as could reasonably be expected. The principle purpose behind the motor faults is mechanical and electrical stresses. The electrical burdens incorporates over-stacking, single staging, stage inversion, under voltage and overvoltage.

1.1 OBJECTIVES

Electrical faults may exist in any component of the system. Some faults, which may cause catastrophic results should be cleared out immediately to protect the other parts of the system from further damage. For example, the failure of switching devices in the inverter.While other faults may undergo a long time of development before break down.For example, the motor insulation failure. Usually the fault diagnosis of the drive system can be a manual one by monitoring the voltage, current or other variables of the components. The accuracy of such diagnosis is much more subjective, subject to the experience of the engineers. To accumulate the knowledge of the faulty conditions by simulation is a very efficient approach and the simulated data can be used as bench marks for empirical diagnosis. Condition Monitoring of electrical machines is becoming increasingly essential from both practical and theoretical points of view. It plays very important role in the safe operation of industrial plants and hence heavy production losses can be avoided. However, the choice of adequate monitoring methods is a challenging task. Most of the indicators used for monitoring electrical machines are currents, temperatures, voltages and 4 vibrations depending on their varying accessibility, reliability and sensitivity.

II. LITERATUR SURVEY

2.1 BACKGROUND STUDY

Induction motors are utilized in several industrial applications in a very big selection of in operation areas due to their easy and strong structure, and low production prices. Providing a protection system is extremely necessary in industries. the aim for development of this project is to produce safety to industrial motors, raise motors, pumps etc. the most purpose of our project is to safeguard associate induction motors from faults like single phasing, overvoltage, over temperature and below voltage. during this project we have a tendency to ar employing a 3 part offer by victimisation 3 single part transformers. If any of the phases, out of the three phases is missing or if temperature of the motor throughout operation exceeds threshold price or if the voltage exceeds/drops threshold price motor stops at once. If any of the phases isn't obtainable the corresponding transformer stops supply power to the circuit. the

International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 1, pp: 962-966 www.ijaem.net ISSN: 2395-5252

most relay that is supercharged through a collection of 4 relays gets disconnected due to one relay not being supercharged. and that we are employing a microcontroller for detection of those faults and a LCD display alphanumeric display} display to indicate which sort of fault is occurred. this technique is enforced in any industries and paper mills wherever motor protection is a necessary demand. this technique can save time, cut back the quantity of labour of the administrator has got to do. Protection of 3 part induction motor from over/ under voltage, over current, over speed, temperature, frequency and part failure give the smooth running of motor that conjointly improves its lifespan and potency. thus protective the Induction Motor by numerous faults. This model model of microcontroller based mostly protection system is extremely easy in style, reliable, extremely versatile, and value effective and provides fast response.

2.2 RELATED WORK

Condition Monitoring of electrical machines is becoming increasingly essential from both practical and theoretical points of view. It plays very important role in the safe operation of industrial plants and hence heavy production losses can be avoided. However, the choice of adequate monitoring methods is a challenging task. Most of the indicators used for monitoring electrical machines are currents, temperatures, voltages and vibrations depending on their varying accessibility, reliability and sensitivity.

This project deals with the diagnosis of electrical faults by mean of current and voltage measurements only. Fault diagnosis of AC induction machines has been widely researched. However, an integrated algorithm for motor control with automated fault detection, prevention and condition monitoring is still missing. Condition monitoring can reduce the downtime of the processes and increase the maximum interval between failures. Thus the number and cost of unscheduled maintenances or minimized, which is highly beneficial.

III. PROPOSED SYSTEM

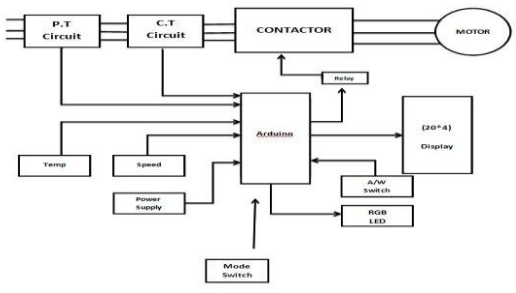

Fig.1 Proposed System

COMPONENT LIST

1. Current Transformer
2. Potential Transformer
3. Contactor
4. Relay
5. Arduino (Mega)
6. RTD
7. Speed Sensor

IV. MAIN ELEMENT OF PROPOSED SYSTEM

4.1 CURRENT TRANSFORMER

Fig.2 Current transformer (CT)

Current electrical device (CT) could be a sort of transformer that's wont to live alternating current (AC). It produces a current in its secondary that is proportional to the present in its primary. The instrument transformers isolate activity or protection circuits from the high voltage of the first system. A current electrical device provides a secondary current that's accurately proportional to the present flowing in its primary. the present transformer presents negligible series impedance to the first circuit.

4.2 *POTENTIAL TRANSFORMER*

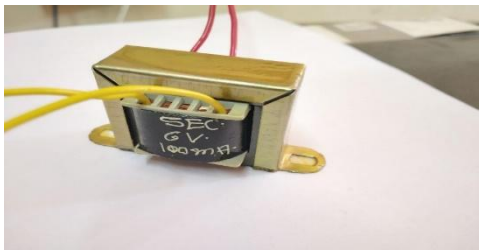

Fig.3 Potential transformers

Potential transformers are alsocalled voltage transformers and that they are essentially step down transformers with very correct turn's quantitative relation. Potential transformers step down the voltage of high magnitude to a lower voltage which may be measured with customary measuring instrument. These transformers have range sizable amount} of primary turns and smaller number of secondary turns. A potential transformer is often expressed in primary to secondary voltage ratio. for instance, a 600:120 noble metal would

International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 1, pp: 962-966 www.ijaem.net ISSN: 2395-5252

mean the voltage across secondary is 120 volts once primary voltage is 600 volts.

4.3 CONTACTOR

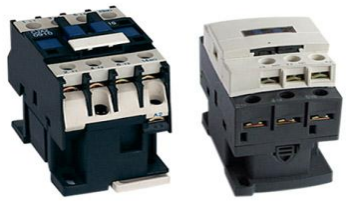

Fig.4 contactor

A contactor is associate electrically-controlled switch used for switch associate power circuit.A contactor is usually controlled by a circuit that has aa lot of lower power level than the switched circuit, like a 24-volt coil magnet dominant a 230-volt motor switch. in contrast to general relays, contactors ar designed to be directly connected to high-current load devices. Relays tend to be of lower capability and ar typically designed for each ordinarily closed and ordinarily open applications. Devices switch over fifteen amperes or in circuits rated over some kilowatts ar typically referred to as contactors. excluding elective auxiliary low-current contacts, contactors ar virtually completely fitted with ordinarily open ("form A") contacts. in contrast to relays, contactors ar designed with options to regulate and suppress the arc made once interrupting significant motor currents.

4.4 RELAY

A type of relay that may handle the high power needed to directly management an electrical motor or different hundreds is termed a contactor. Solid-state relays management power circuits with no moving elements, instead employing a semiconductor to perform change. Relays with tag in operation characteristics and generally multiple in operation coils square measure wont to shield electrical circuits from overload or faults; in trendy power systems these functions square measure performed by digital instruments still known as "protective relays". Magnetic latching relays need one pulse of coil power to maneuver their contacts in one direction, and another, redirected pulse to maneuver them back. recurrent pulses from identical input don't have any impact. Magnetic latching relays square measure helpful in applications wherever interrupted power mustn't have an effect on the circuits that the relay is dominant.

4.5 ARDUIN MEGA

Fig.5 Arduino Mega 2560

The Arduino Mega 2560 may be a microcontroller board supported the Tmega2560. it's fifty four digital input/output pins (of that fifteen will be used as PWM outputs), sixteen analog inputs, four UARTs (hardware serial ports), a sixteen rate oscillator, a USB association, an influence jack, associate ICSP header, and a button. It contains everything required to support the microcontroller; merely connect it to a laptop with a USB cable or power it with a AC-to-DC adapter or battery to induce started. The Mega 2560 board is compatible with most shields designed for the Mega and therefore the former boards Duemilanove .

4.6 RTD

RTD square measure cheap, easily-obtainable temperature sensors. they're simple to use and adaptable . Circuits with RTD will have cheap output voltages - not the potential unit outputs thermocouples have. thanks to these qualities, RTD square measure wide used for straightforward temperature measurements. they don't seem to be used for prime temperatures, however within the temperature ranges wherever they work they're wide used.

Fig.6 *RTD*

4.7 SPEED SENSOR

Fig.7 Speed Sensor

International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 1, pp: 962-966 www.ijaem.net ISSN: 2395-5252

The LM193 series consists of 2 freelance exactitude voltage comparators with associate offset voltage specification as low as two.0 mV scoop for 2 comparators that were designed specifically to control from one power offer over a large vary of voltages. Operation from split power provides is additionally attainable and also the low power offer current drain is freelance of the magnitude of the facility offer voltage. These comparators even have a novel characteristic therein the input common-mode voltage vary includes ground, although operated from one power offer voltage.

V. ADVANTAGES

5.1 ADVANTAGES

i. Time Saving Process
ii. Power saving Operation
iii. Less Operating Staff Required
iv. Compact Size
v. Economical operation

VI. RESULTS

i.) Single Phasing Condition

Opening of any of three phases is considered in single phasing condition. Fig. (a) shows the three phase voltages and currents and Fig (b) shows three phase RMS voltages and currents for SP condition. SP in B phase initiated at 1.16s.

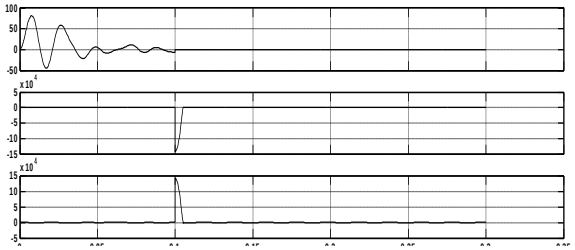

Fig.(a) Phasing Out Condition

ii.) *Overvoltage Condition*

The operating voltages more than 10% rated operating voltages are considered as overvoltage condition in simulation. Fig. b shows the three phase voltages and currents and Fig. shows three phase RMS voltages and currents for OV condition. 110.8% OV of rated voltage initiated at 1.12s.

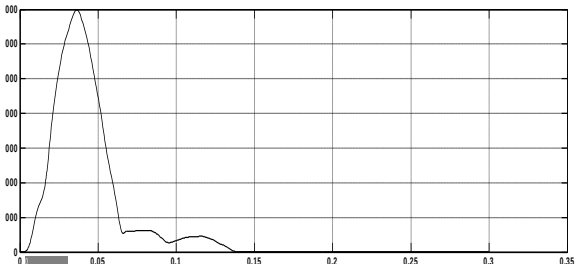

Fig.(b) Over voltage Condition

iii.) *Under voltage Condition*

The operating voltages less than 10% rated operating voltages are considered under voltage condition in simulation. Fig. shows the three phase voltages and currents & three phase RMS voltages and currents for UV condition. 87% UV of rated voltage initiated at 1.14s.

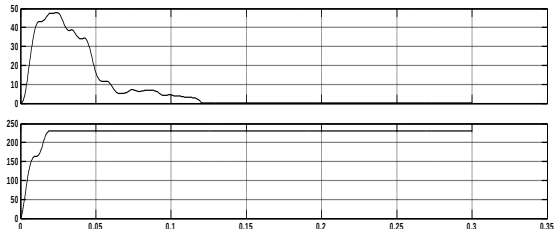

Fig.(c) Under voltage Condition

iv.) *Voltage Unbalance Condition*

Standard motor are capable of operating under condition of supply voltage unbalance of 1% for long period. Derating is requiring for voltage unbalance between 1 to 5% for safe operation which is generally not taken care in field. We have considered voltage unbalance more than 1% as fault which. All types of voltage unbalance like single phase and two phase under voltage and overvoltage unbalance, three phase under voltage and overvoltage unbalance and one phase, two phase angle displacement considered in the case. Fig (a) shows the three phase voltages and currents and Fig. (b) shows three phase RMS voltages and currents for VUB condition. Two phase under voltage VUB initiated at 1.13s.

VII. CONCLUSION

The study and development of workplace For Induction Motor. The no load check is meant to search out the no load current, core loss, friction and winding losses and also the blocked rotor check is disbursed to see the copper loss of motor. Also, temperature check primarily supposed to see the temperature rise at the bearing and also the winding of the motor.By exploitation these bench we've conducted 2 mode operation that is Run Mode and check mode. In run mode we will conducted over voltage , over current , over temperature in addition as beneath voltage ,single phasing protection.

REFERENCES

[1]. Ren-Yi Chen,Tsorng-Juu Liang, Member, IEEE, Jiann-Fuh Chen, Member, IEEE, Ray-Lee Lin, and Kuo-Ching Tseng, VOL. 44, NO. 4, JULY/AUGUST 2008, pp. 1218-1226.

[2]. R. Watson and F. C. Lee, “A soft-switched, full-bridge boost converter employing active clamp circuit,” in Proc. IEEE PESC, 1996, pp. 1948–1954.

[3]. Reza Sabzehgar and MehrdadMoallem,,"A boost type power converter for energy regenerative damping" in IEEE trans on mechatronics, VOL.18, NO.2, APRIL, 2013, pp.725-731.

[4]. FarzamNejabatkhah, Saeed Danyali, SeyedHosseini, MehranSabahi, and SeyedabdolkhaleghMozaffariNiapour, "Modeling and control of a new three-input DC-DC boost converter for hybrid PV/FC/Battery power system", IEEE, VOL. 27,NO. 5, MAY 2012, pp. 2309-2324.

[5]. Santiago J. Amodeo, Hector Gerardo Chiacchiarini, and Alejandro R. Oliva, "High performance control of a DC-DC Z-Source converter used for an excitation field driver," in.Proc IEEE , VOL 27,No.6,JUNE 2012,pp.2947-2957.

International Journal of Advances in Engineering and Management
ISSN: 2395-5252

IJAEM

Volume: 02 Issue: 01 DOI: 10.35629/5252

www.ijaem.net
Email id: ijaem.paper@gmail.com