AN INTELLIGENT STIPULATION MONITORING SYSTEM FOR INDUSTRIAL MOTOR

PROF. MANISH KUMAR
Department of Electrical Engineering, Rajiv Gandhi College of Engineering & Research, Nagpur
Email:mkmanish64534@gmail.com

PROF. P. DHABE
Department of Electrical Engineering, Rajiv Gandhi College of Engineering & Research, Nagpur

PROF. SAGAR LANJEWAR
Department of Electrical Engineering
Rajiv Gandhi College of Engineering & Research, Nagpur

ER. PRAMOD PATIL
Director Electrical Engineering, Russian Electrical Pvt. Ltd., MIDC Nagpur

ABSTRACT:
Situation monitoring means, it is an upholding process for monitoring. The explicit parameter like over current, speed, vibration, temperature, emanation for early finding of impending failure and require to maintenance previous to failure or to guesstimate the machine vigor. It is technique that serves for situation based safeguarding. In stipulation based maintenance provide the actual condition of machine and indicate clearly where and what type of maintenance is essential so that it be able to reduce manpower consumption, optimal utilize of machine parts and will assurance that crashs will not transpire suddenly.
INDEX TERMS: **Mobile control system-GSM monitoring, potential transformer, current transformer, electric drive, induction motor, and activity control system.**

I. INTRODUCTION:

In view of the fact that technology for activity control of electric drive befall available. The crash of motor proves to be very expensive as it increases down time on the machines. So it befallsessential to swell some cost capable and steadfaststipulation monitoring system for the fortification of motors to shun unexpected crashes. Stipulation monitoring techniques be able to define into two categories: Firstly the classical method and secondly the digital method. In classical method, electromechanical tools are expensive, less efficient, having very slow response and not reliable as some of the tools have even shorter life in place the motor itself.

The digital method is the newest method for the stipulation monitoring and it involves integrated circuit, microcontrollers, microprocessors and programmable logic controllers. There are numerous factors which give to damaging of motors having different way like thermal overloading, due to air gapeccentricity, speed oscillations, stator winding failure, Rotor bar broken, failure of bearing andderanged voltages. According to aassessment the percentage crash faults is as follows:
Bearingrelated Motor faults   41%
Statorrelated Motor faults   37%
Rotor related Motor faults   10%
Additional faults 12%

This document provides a sensor-less method to widenstipulation monitoring system for the speed, over current, temperature, over voltage via microcontroller. The anticipated system has to able for detecting faults at the time of working motor. This system endlessly monitored the status of motor on mobile screen. The anticipated system could be applied to AC motors of all sizes, particularly in severe environment stipulation where access to motor is not effortless.

II. METHODOLOGY:

In this work the system consist of a 3 phase AC induction motor. The system has current and voltage transformer attach to the supply which is fed with power switching circuit shown in Fig. 1. The switching circuit is linking with three phase supply with a three phase AC motor. The current and voltage transformer give defense of switching circuit or the control panel form the uncharacteristic current and voltage.

The interfacing tool interfaced or connects with control panel system and gives the stipulation for control the motor. The driver circuit also connect to the controller device i.e. microcontroller for the reason that all parameter control by the microcontroller. Driver circuit be able toutilize for motor and the relay which give the signal to the three phase contactor tool for either on or off the stipulation. All the system is digitally so that we easily understand what the process is going on. The complete process shows in the diagram in Fig.1.
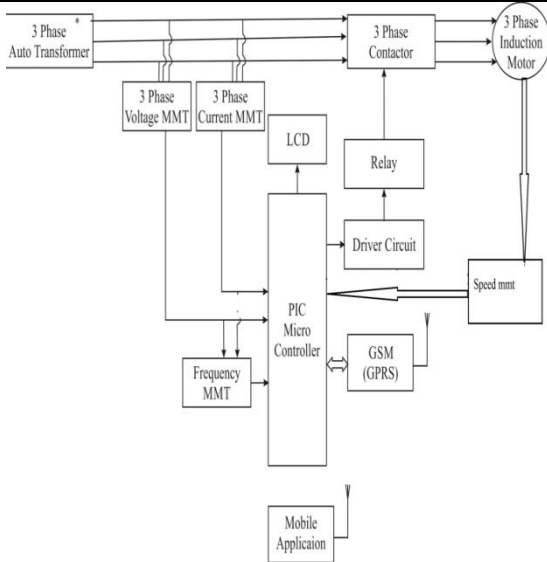
Figure 1.Diagram of the CM system

For voltage and current measurement a voltage and current transformer utilized.The supply current and voltage that has to monitor is step down by the current transformer and voltage transformer. The step down transformer transfer the current is transformed by voltage with the help of shunt register in current transformer.We are using 0 to 6 volt potential transformer. The step down voltage is rectified by meticulousness rectifier.The exactitude rectifier is aarrangement obtained with an set amplifier IC 741 in order to have a circuit which is behaving like an ideal diode or rectifier.

The burning of induction motor is very much because of rising of temperature,consequently we utilized LM35 sensor for measurement of temperature.The LM35 is anexactitude integrated-circuit temperature tool with anlinearly output voltage comparative to the normal (centregrate) temperature.It is a defined sensor which has 3 main connectors. VCC, GND and OUTPUT. The fixed value of circuit pins are first and second and the output pins are third pin provide the voltage is proportional to the temperature. Its Range from −55°C to 150°C .

For the Proximity sensor (Inductive Type) utilized for speed measurement, this sensor is mount near or in front of the shaft, generates output signal or electrical signal when metal objects are either enteringor crossed into its sensing area from any direction.

All the statistics are composed in analogue form of voltage signal, and then folk's voltages are stepped up correctly by step up transformer. Folks stepped up analogue voltage signal are converted to d.c voltage by using rectifier. Folk'sanalogue voltages are given to the analogue to digital converter. Consequently the PIC Microcontroller IC which we utilized is ATMEGA16 .It is 40 Pin IC.Microcontroller receives signal from different monitoring device of Induction motor and display in Liquid Crystal Display (LCD).

III. HARDWARE DISCRIPTION:

Figure 2. Mounted Hardware System

This fig.2 is the main hardware system which is indicate the condition monitoring , a power supply arrangement available which has used a IC7805 for +5V and IC7812 and IC7912 used for +12V and -12V supply arrangement for current and voltage measurement devices. The PIC Microcontroller IC which we utilized is ATMEGA16 for controlling and programming the system. It is 40 Pin IC. Microcontroller receives signal from various monitoring unit of Induction motor. The statistics collected from the motor are displayed in Liquid Crystal Display (LCD).A GSM Module is mounted in Monitoring Kit which is initialize by a Number or the aneroid mobile phone.

Figure 3.GSM Module

This is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM800 module for all its operations. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers.

The modem consists of all the required external circuitry required to start experimenting with the SIM300 module like the power regulation, external antenna, SIM Holder, etc.
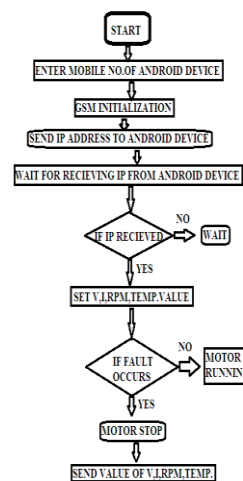
IV. SOFTWARE DISCRIPTION:

Figure 4.GSM Initialisation Flow Chart Diagram

This is the main initialise program when I fix a SIM in module slot at first it is send IP address to the android device ,we wait few minutes for IP from android device when it received it start the process and giving the result as per already settled program value of voltage, current, speed, etc.If fault will occur then motor stop until no then continuous and then after send value to the mobile phone .

V. RESULTS:

LCD Display Value			
Phase	V	I	Speed-
R	275	1.0	1800 RPM
Y	254	1.2	Relay
B	265	1.2	Status- ON

Result on LCD   Result of user system

Result of user system
(Over Voltage & Under Voltage)

`Mobile Display Value				`Mobile Display Value			
Motor in Over Voltage Condition at no load				Motor in under Voltage Condition at no load			
Phase	V	I	Speed-	Phase	V	I	Speed-
R	401	0.0	336 RPM	R	136	0.0	1638 RPM
Y	365	0.0	Relay Status- off	Y	122	0.0	Relay Status- off
B	385	0.0		B	127	0.0	

Result Blocks (Over Voltage & Under Voltage)

Case I-If Motor supply voltage or the time when load is connected goes above than 240V then system will intimate as for overvoltage for before precaution if it cross thee limit i.e above than 260V then motor get trip.

Case II- If Motor supply voltage or the time when load is connected is below the 150V then system intimate as the under voltage if it crossed then motor trip.

VI. DISCUSSIONS:

Our project proposed a stipulation monitoring and fault diagnostic system with microcontroller or processor which will control and protection the motor in easy way. Design a system without complexity and which be able to be easily handled. This tool is so that reduce the burning rate of motor and save/conserve the energy. This paper is based on ongoing project whose testing is yet to be done.

Consequentlyauthentic results have not been accessible. The system is likely to monitor the parameters of induction motor and send message on mobile phone when the values of folk's parameters crosses the limitations prearranged in programming of microcontroller. Consequently, preventative action is able to be taken for protection of motor before definite fault occurs in the system.

IV. CONCLUSIONS:

This research produce new method based on the controlling device i.e microcontroller for the diagnosis of faults related to speed, over voltage, over corrent, temperature of AC motors. This system aims to provide a reliable protection to AC motors against unexpected crashes. Thus the system facilitates supervision for defensive maintenance and prognostic failure analysis.

REFERENCES:
1) R. Bayindir, I. Sefa, I. Colak, and A. Bektas, "Fault detection and protection of induction motors using sensors," IEEE Transactions on Energy Conversion, vol. 23, pp. 734-741, 2008
2) I. Moon, "Modeling programmable logic controllers for logic verification,"IEEE Control Syst. Mag., vol. 14, pp. 5 3–59, Apr. 1994. Programmable Controllers. Part 2: Equipment Requirements and Tests, 1994.
3) C. Bianchini, F. Immovilli, M. Cocconcelli, R. Rubini, and A. Bellini,"Fault detection of linear bearings in brushless ac linear motors by vibration analysis," IEEE Transactions on Industrial Electronics, vol. 58, pp. 1684-1694, 2011.
4) S. F. Farag and M. K. Jhaveri, "Intelligent microprocessor-based tools provide advanced motor protection, flexible control, and communication in paper mills," IEEE Transactions on Industry Applications, vol. 33, pp. 840-847, 1997.
5) A. R. Al-Ali, M. M. Negm, and M. Kassas, "A PLC based power factorcontroller for a 3-phase induction motor," in Proc. Conf. Rec. IEEEIndustry
6) IEEE Power Eng. Soc. Summer Meeting, vol. 4, 2000, pp. 2475–2480.M. Young, The Technical Writer's Handbook, Mill Valley, CA: University Science, 1989.
7) Muhammad KamarulBaharin, NordinSaad and Taib Ibrahim, "protection of induction motor ," IEEE Symposium on Industrial Electronic And Application (ISIEA2011)25-28 September 2013 .
8) Stipulation monitoring and fault diagnostic of induction motor using motor current signature analysis" ; Neelam Mehra , Doctor of philosophy in NIT Kurukshetra, India in Oct.2010
9) W. Thomsan, P. orphin, "current and vibration monitoring for fault diagnose of induction motor " in International Journal For Technological Research In Engineering Volume 1, Issue 9, May-2014.