Add-On Unit for Multi-Parameter Monitoring of any Motor using IOT

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Abstract— **In today's world the need of the hour is atomization, remote monitoring, quick data acquisition and failure analysis which brings efficiency in asset management. It is difficult, to keep track of the different motor by days long manual observation. Electrical motors and drives consumes about 45% of the power generation. However, if the electrical machines are not maintained properly the motors consumes about 5% to 10 % of excess power, which affects the productivity and revenue. Monitoring of parameters of the different types of motors is crucial which continuously operates large number of electrical drives. Keeping this in mind, the present approach has been made to apply the advantages of wireless communication and programming of embedded technology towards monitoring the multi parameters of different motors using GSM. In the present work, the machine parameters like current, voltage, speed, temperature, direction and status are measured using the sensors for continuous monitoring. The data is collected and processed, and transferred to a remote server wirelessly. Any deviation from the safe operating conditions is reported.**

Keywords— *Arduino UNO; GSM Modem 900A; LCD, Sensors; Switching Ckt*

I. INTRODUCTION

Due to the modern civilization the growth of industry has been increased as the usage of energy has been raised. So, every industry needs to implement power factor correction to limit power wastage and to avoid penalty due to the same. Lower power factor means that higher current is flowing through it, Higher current results in greater voltage drop. Before the advent of Internet of Things (IOT) technology, monitoring of the machine parameters were carried out using Supervisory Control and Data Acquisition (SCADA), which can store data temporarily, after which that data will be overwritten by more recent data. Also the online monitoring of the machine is not feasible. In the IOT technology the data collected can be safely stored in the Cloud and retrieved whenever needed. Moreover, the data collected can be easily integrated through any platform to any application, which benefits the end user by cutting down huge investment costs.

Now-a-days wireless and mobile communication is the major tool that can be used to provide the information to the operator for their supervisory. The mobile communication technology in the recent years has been extensively used in different form in different application areas. In the present work, the machine parameters like current, voltage, speed, temperature, direction and status are measured using the sensors for continuous monitoring. The data is collected and processed, and transferred to a remote server wirelessly. Any deviation from the safe operating conditions is reported. The proposed scheme uses Global System for Mobile (GSM) modem along with the Arduino which is interfaced with analog unit to display the motor performance parameters like temperature, speed, voltage, current, direction and status on Liquid Crystal Display (LCD). The same data can be acquired remotely through Short Message Service (SMS) from the user mobile handset by dialling the mobile number of SIM of GSM modem. The system is capable of monitoring the motor by receiving message from an authorized mobile number. Arduino is the heart of our system, which controls the overall operation of our system. System is always alert for receiving SMS from valid number and that message can be displayed on the LCD. This add-on unit monitor parameters of any motor (AC or DC). The monitoring of the system is realized in real time.

II. BLOCK DIAGRAM DESCRIPTION

Keeping this in mind, the present approach has been made to apply the advantages of wireless communication and embedded technology towards monitoring the multi-parameters of a motor using GSM. The Block diagram of the proposed system is shown in Figure 1. This Add-on Unit uses Arduino UNO, GSM Modem 900A, LCD, Signal Conditioning Units for Voltage, Current, Speed, Temperature, Direction & Status, relay Unit. The Prime parameters of any Motor AC/DC are Speed, Voltage, Current, Temperature etc., to be monitor and controlled precisely to safe guard the motor.

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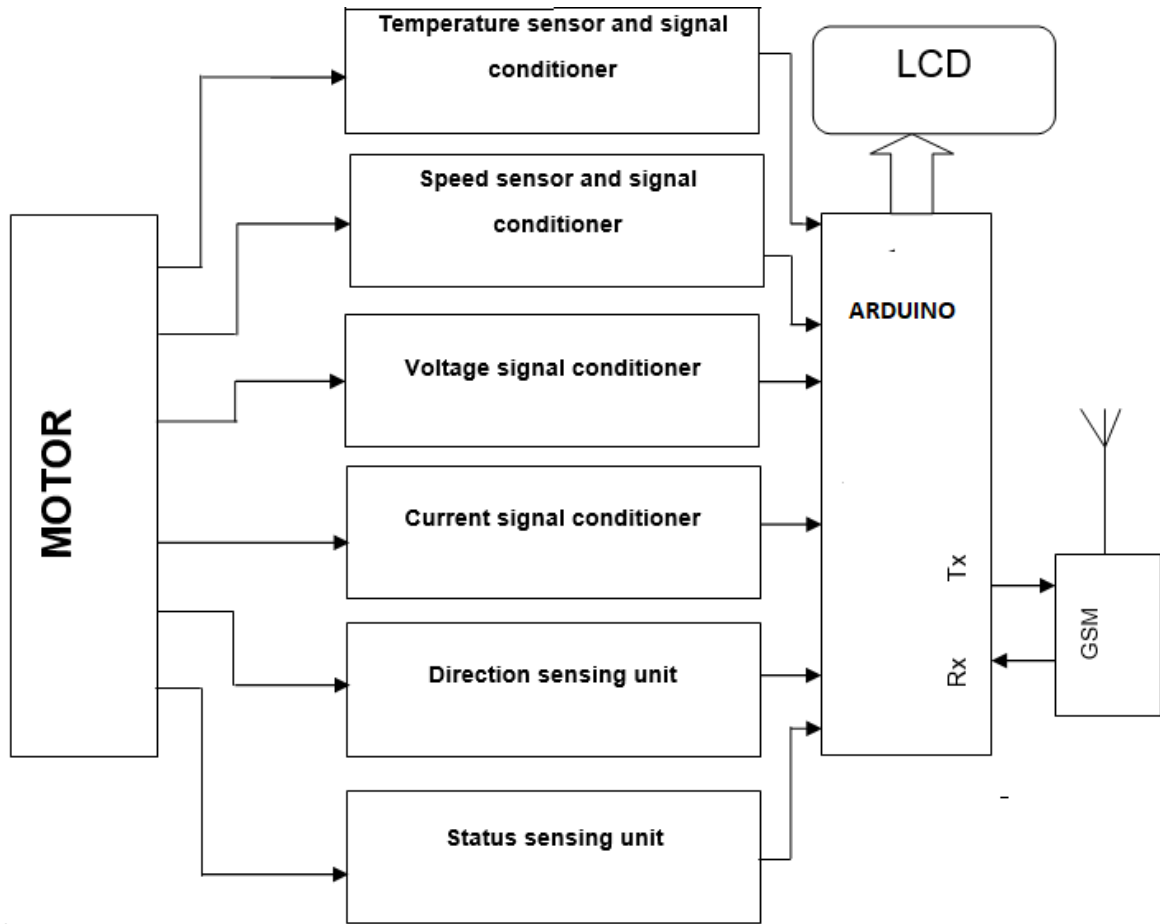**ISSN: 2278-0181**
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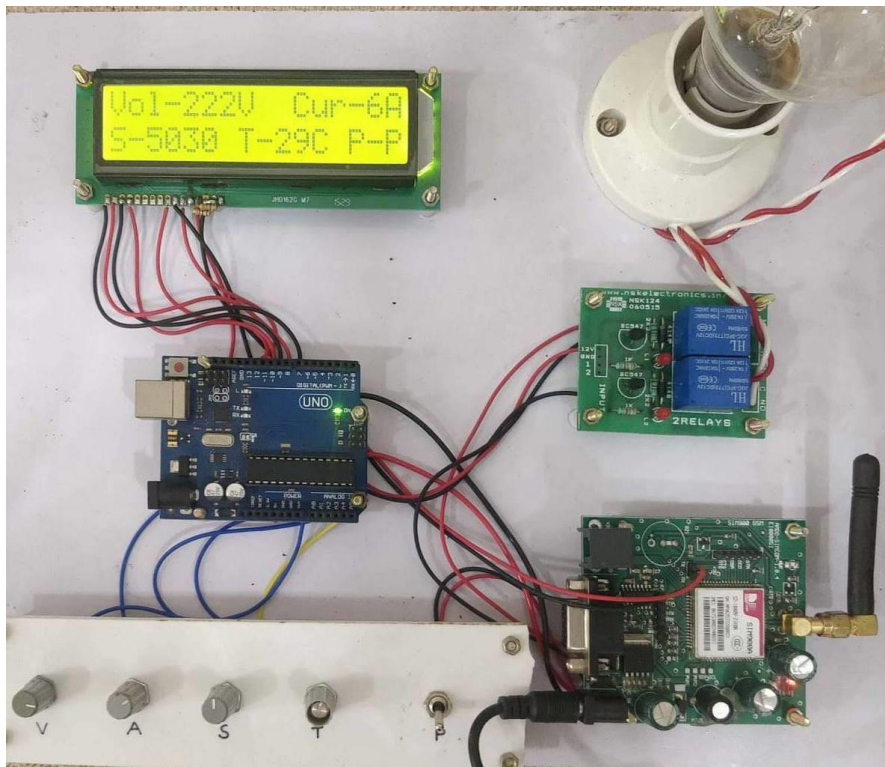Fig. 1 Block diagram of Experimental Setup

Fig. 2 Experimental setup – LCD, Arduino, and Global System for Mobile (GSM) modem and Load

So, an attempt is made to monitor and control these parameters remotely with the help of GSM Modem. The heart of the system is the GSM modem through which one can control the motor and can get the current data of all the parameters remotely.

This Add-On unit uses Arduino UNO board which is programmed to get the analog data from different signal conditioning units and convert them into digital data. Once the parameter value exceeds the predefined value, which is programmed in Microcontroller, then Microcontroller turn-off the Motor and simultaneous send the Text message of the faulty Parameter to the user mobile phone (which is pre-loaded in Microcontroller) through GSM modem. GSM modem should have a valid SIM card.

If the user wants to turn – On/Off the motor, user has to send a missed call to the SIM number of the GSM Modem, in turn user will get the return Text message as an acknowledgement. The user can get the current parameter values of all the parameters at any time by simply sending the text message as 'get data' to the GSM SIM number, then GSM modem get the values of all the parameters from Microcontroller and send to the user Mobile number.

The experimental setup as shown in Figure 2 is tested for AC/DC motor and working satisfactorily. This Proposed work is a very good example of embedded system as all its operations are controlled by intelligent software inside the microcontroller. The aim of this work is to monitor the following parameters of the motor:

1. Temperature
2. Speed
3. Voltage
4. Current
5. Direction
6. Status

For this purpose user can use any type of Mobile. This way it overcomes the limited range of infrared and radio remote controls. Using the convenience of SMS, this unit lets you remotely monitor the motor parameters, all of which can be pre-programmed into the controller. This Add-On unit finds many Industrial Applications, where the monitoring and control of motor is essential.

III. SYSTEM REQUIREMENTS (TOOLS) AND IMPLEMENTATION

A. Hardware Requirements:
1. Arduino UNO
2. LCD
3. GSM
4. Motor
5. Sensors (temperature, speed etc,..)

B. Software Requirements:
1. Ardunio IDE
2. Embedded C Programme
3. Mobile Phone

C. Applications:

1. Add-on Unit can be used to measure the Multi-parameters of any Motor.
2. Helps to keep track of motor and monitor it remotely
3. Industrial Motor Automation
4. Cost effective and reliable.
5. Add-on Unit helps to provides the accurate output data.
6. Can be used in harmful chemical industries, Nuclear power plant sectors where manual monitoring is a risk.

CONCLUSIONS

The approach discussed in this topic will achieve the target of monitoring the motor parameters of any motor. One can monitor the performance parameters of a motor from a long distance and can be used by everyone with the knowledge of text message. Since the unit is network dependent so network congestion can reduce the reliability of the system and this unit monitors the parameters. Hence, we can conclude that the required goals and objectives of GSM based monitoring multi-parameters of any motors can be achieved.

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