IOT Based Motor & Pump Monitoring System

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ABSTRACT

Many industrialists belonging to coal mining industry are currently facing problems related to huge motors and pumps which are used to extract coal from beneath the ground. As per the requirements stated, the current must not specified value, dry run must not happen and the temperature must not go beyond normal working temperature. Solutions to these problems are desperately expected by them. To achieve the proper results, we have decided to use some smart sensors which may give us the current in the range of 0-30A, temperature sensor having sensing capacity -55°C to +125°C and dry run sensor checking the level of water.

Keyword : - *Monitoring, Arduino, Motor*

1. INTRODUCTION

We are here with idea of monitoring the motor conditions in the coal mining industry. The industry working on motors, having tremendous load and pressure, face enormous problems, which reduces the efficiency of the overall operation.

As we all know, coal is leading source of generation of electricity. Hence, it is obvious that the extraction process should be very efficient. While working on such huge motors, the problems of motor like excess current may damage the overall operations of the system. During this entire process, the problems of dry run, over current, over heat and hence excess current temperature occurs. We aim at monitoring these drawbacks with the help of Internet of Things (IoT), so that the industries can easily handle and recover the problems.

With this prototype, we focus on helping the industry to monitor the motor conditions so that they can take the necessary measures as soon as possible. As it overcomes their problems and helps to increase the extraction efficiency, we have preferred this concept.

2. SYSTEM

The block diagram precisely illustrates the method we are going to adapt towards the solution. The main blocks are microcontroller, temperature sensor, dry run sensor, current sensor, Wi-Fi module & internet server. The data obtained from the sensors is fed as input to the microcontroller block.

Temperature sensor we are going to use is DS18b20 which has sensing capacity from -55 to 125 degree Celsius. It is a sensor which gives information in digital form. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor.

We are going to use non-invasive current sensor which is also called as split core current transformer. This current sensor will measure a load up to 30 amp. This sensor does not have built in resistor so it is necessary to connect burden resistor across the output to convert coils induced current to a small measurable voltage.

2.1 Block Diagram

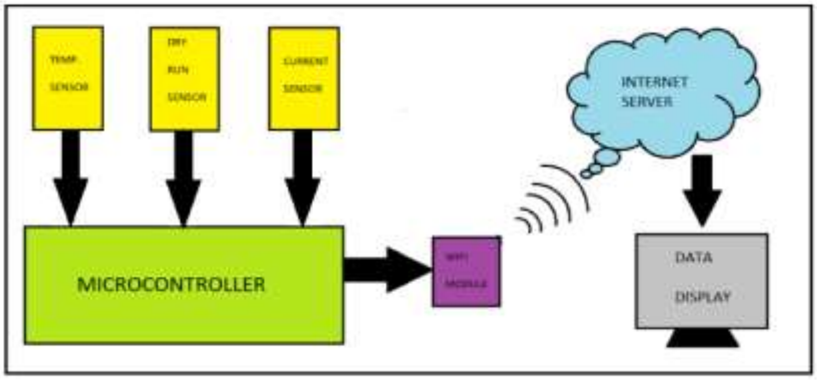

Fig -1 Block Diagram of IOT based motor and pump monitoring system

Here, the sensors used act like an input to the microcontroller because the sensors are going to detect the surroundings and act accordingly. In microcontroller block, the obtained information is decoded and processed. Processing the information is done using codes which we would have already dumped in the microcontroller. Decoded information is given as input to Wi-Fi module which shares the same chip as microcontroller known as Arduino. Wi-Fi module operates with the help of the hotspot. Wi-Fi module also acts as a channel between the obtained information and internet server. The real time information is displayed on the website we have chosen "Thingspeak.com". The data is in the form of graphical representation because of which we can easily analyze the situation or present condition of the device continuously on the website. If there is any correction required, then the control action will be taken quickly to remove it. This is a quite well designed architecture planned to solve the industry problems efficiently.

2.2Components

2.2.1AT mega 328:

The Atmel 8-bit AVR RISC -based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter programmable watchdog timer with internal oscillator, and five software selectable power saving modes.

ESP 8266 Wi-Fi module is connected to the Arduino.The ESP Module sends data in graphical representation to the website via internet, if the readings taken crosses the threshold values.

2.2.2 Temperature sensor

The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor
Measures Temperatures from -55°C to +125°C (-67°F to +257°F)±0.5°C Accuracy from -10°C to +85°C
Programmable Resolution from 9 Bits to 12 Bits
No External Components Required.

2.2.3 Current Sensor

This current clamp can be used to detect a current of up to 30A. Simply clip it around the current source that you wish to measure and it will produce a small AC voltage proportional to the current. The cable is terminated on one end with a standard 3.5mm jack .

2.2.4 ESP8266 wifi module

The ESP8266 Wi-Fi Module is self contained SOC with integrated TCP/IP protocol stack that gives any microcontroller access to your WiFi network. ESP8266 module is come pre-programmed with an AT command set firmware, meaning you can simply attach this to your Arduino device and get about as much Wi-Fi ability as a Wi-Fi Shield offers.

3. Hardware Implementation

3.1 Interfacing of Temperature sensor

We have used Atmega 328 microcontroller, it is a 28 pin IC and it consists of input and output ports. The microcontroller is interfaced with various hardware devices like DS18b20 Temperature Sensor, non-invasive current sensor and dry run sensor.

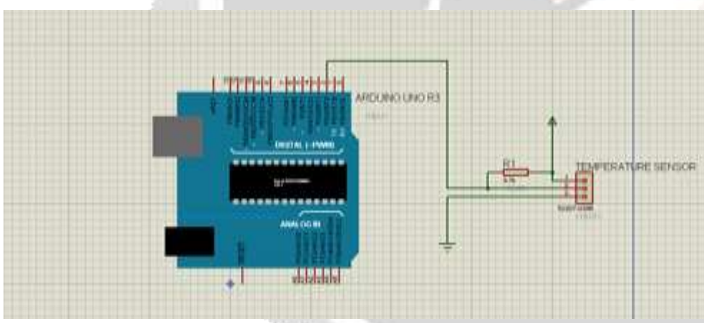

Fig 2: Circuit diagram of interfacing of Temperature sensor

The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor.
In addition, the DS18B20 can derive power directly from the data line eliminating the need for an external power supply.

3.2 Interfacing of Current sensor

Current sensor is Non-invasive AC Sensor. This current sensor can be used to detect a current of up to 30A. Simply check it around the current source that you wish to measure and it will produce a small AC voltage proportional to the current.

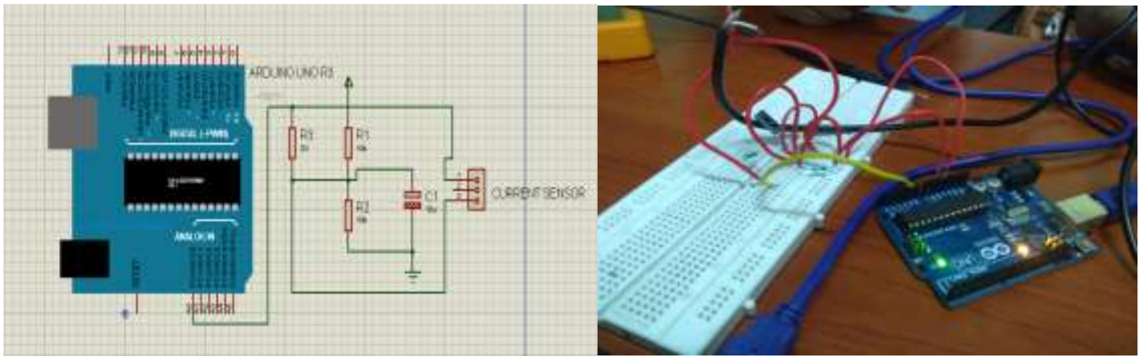

Fig -3: Circuit diagram of interfacing of current sensor

The cable is terminated on one end with a standard 3.5mm jack. Use this to build your own energy monitor and keep your power usage down, or use it to build an over-current protection device for an AC load.

4. CONCLUSIONS

The output of our work will display the value of temperature current and can be seen on the website thinkspeak.com. Also it will alert the user in case of over current, overheating, and dry run.
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5. REFERENCES

[1]. P. Ramya,“Arduino Microcontroller Based Online Ambient Monitoring Using Internet of Things”, 2016.

[2] Madan B. Matsagar2, Avinash D. Kale ,“Remote Temperature Monitoring System Using ARM, Arduino and ZigBee”,2016.Sonawane3,Chandrakant L.Ambekar4 ,Vijay S. Kale ,“Remote Temperature Monitoring System Using ARM, Arduino and ZigBee”,2016.