

Load Monitoring System for Diesel Generator Using Internet of Things (IoT)

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Abstract:

This paper discusses on using IoT for monitoring the various parameters such as current, voltage, run hours and fuel level. Arduino controller communicates these readings to the user over the internet. This system comprises of smart sensors based on hydrostatic /capacitive measurement principle. All these parameters can be viewed at any instant in a web page and also is connected to mobile phone, so that regular updates are being sent to the user that can be seen on a mobile phone.

Keywords — Diesel generator, Web page, Monitoring .

I. INTRODUCTION

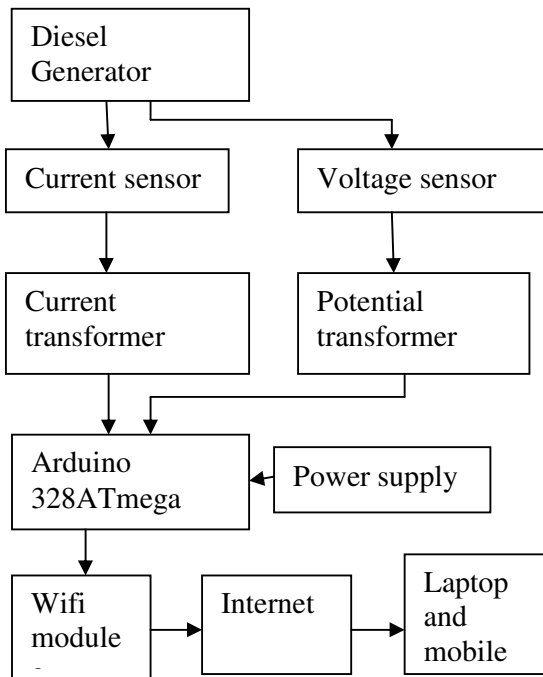
Diesel generators are commonly being used as a temporary source of power in domestic as well as industrial applications. But in case of domestic systems we don't have any monitoring systems excepting the LCD display that would be placed outside the diesel generator. The main aim of this paper is to propose a system that would monitor the various parameters and display the values in a graphical manner in mobile phones as well as in a web page that is created especially for this system. All the information are stored in cloud storage so that they can be used for future reference.

three phase current sensor and a three phase voltage sensor. It also has a current transformer and a potential transformer that are used to step down the high current and high voltage into equivalent low values so that they could be fed into arduino328ATMEGA. The arduino serves as an intermediate between the input and output. The values at any instant are sent to the user through the wifi module. The user interface is connected with the cloud storage that stores all the values. The information is updated to the user from this cloud storage. The values can also be compared as they are updated at each instant.

II. PROPOSED SYSTEM

The proposed system for monitoring the diesel generator consists of different sensors such as a

III. BLOCK DIAGRAM



The above block diagram is a simple diagrammatic representation of the diesel generator monitoring system for rating of 380KVA.

A. Diesel Generator

The diesel generator we are using here is of rating 380 KVA. It has a liquid cooling system with 1500 rpm and also the power factor is 0.8 (lagging).

B. Current Sensor

A three phase current sensor is used so that power in each of the phase can be calculated. The current measuring circuit is based on the Allegro ACS712 IC sensor. The ACS712 IC is a linear current sensor which can measure the AC and DC current. It can be classified into three types according to the maximum current sensed (± 5 , ± 20 , and ± 30 A). In this paper, the ACS712-30A is used as the current sensor. The ACS712-30A is a current sensor that can measure currents up to ± 30 A and with 66 mV/A output sensitivity on a +5 V DC power supply.

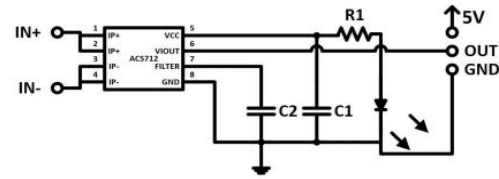


Fig.1.circuit diagram of three phase current sensor.

C. Voltage Sensor

The voltage sensor circuit that is designed to measure the maximum AC voltage that is less than 450 V. The output from the voltage transformer is directly fed into the potential transformer.

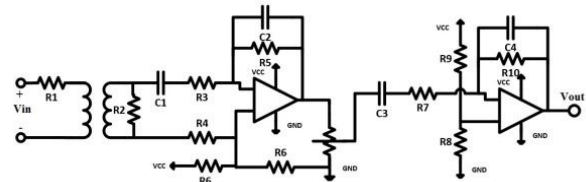


Fig.2.circuit diagram of a three phase voltage sensor.

D. Current Transformer

ZMPT101B current transformer with low impedance load is the current transformer we are going to use. The ZMPT101B is a small size current transformer which has a good consistency and isolation capacity. The main function of this transformer is to step down the high current from the sensor into corresponding low value that can be fed into the arduino.

E. Arduino ATMEGA328 Microcontroller

ATMEGA 328 microcontroller acts as a processor for the arduino board. It consists of 28 pins. Out of these 28 pins, the inputs are from the current sensor and the voltage sensor. It also consists of pulse width modulation (PWM). This PWM is used to transmit the entire signal in a pulse width modulated form. Input power supply such as Vcc and Gnd are also being used. Among those pins, 6 pins are considered to be analog input. Using these analog inputs, we can operate the arduino microcontroller. Normally the analog inputs can be in the range of 0-5V. The arduino communicates the measured values to the user.

F. Wifi Module

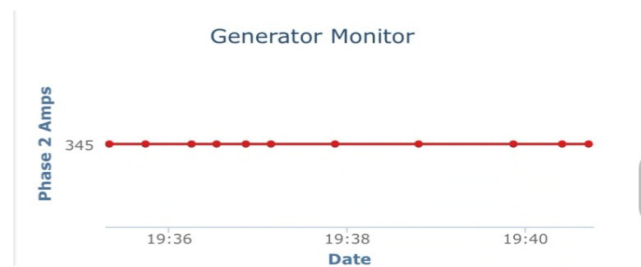
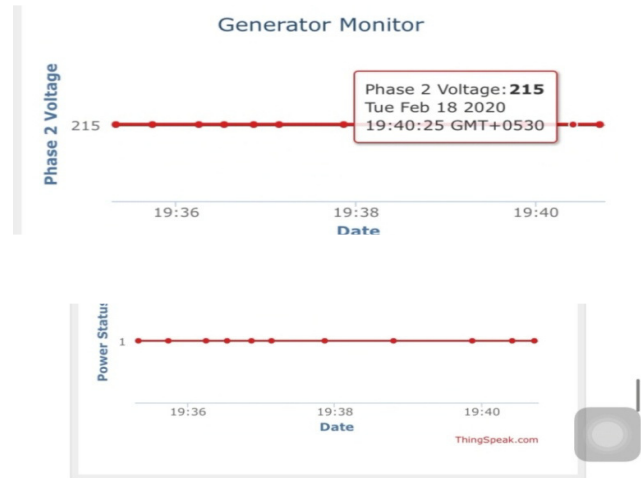
ESP8266 is the wifi module that is being used here. It is a self contained SOC that is integrated with TCP/IP protocol that gives the ESP8266 access to the internet. It is a module that works with UART serial communication pin, using this, AT commands are sent to the Wi-Fi module. First AT commands are used to connect the Wi-Fi spot and later to send the data to internet using HTTP GET request. This allows the sensors, instruments and websites to communicate the data in cloud. Microcontroller would get access to the wifi. All the measured parameters are stored in cloud storage so that they could be used for future reference.

METHODOLGY

The sensors such as the current sensor and the voltage sensor are connected to the diesel generator. These sensors measure the values in all the three phases that is the current and the voltage in all the three phases are measured. The measured values are high such that they could not be given to the arduino directly. Hence they have to be stepped down. Current transformer is used to step down the values of the current and potential transformer is used to step down the values of the voltage from the three phase. The stepped down values are now given to the arduino. The arduino communicates these values to the user through the wifi module. All the measured values are stored in cloud storage. The user can access from the mobile phones and computer through a specially designed web page for this application.

RESULT

The existing system displays the different parameters only in the LCD. The proposed system would monitor and display values in laptops and mobile phones.



CONCLUSION

This paper proposes a smart monitoring system in which current, voltage and power could be viewed at any instant. This system can offer smart service utilizing IoT technology to users which administrate the diesel generator. It can be used to reduce the generator accident and predict the system fault. This technology can be adapted to other distributed energy resource.

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