

Boiler Monitoring in Power Plant Using Internet of Things

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Abstract:

The need for power generation in India increases day by day due to various factors. Nearly 70% of the power production is from the thermal power plants in various locations of the country. Monitoring and control of these power plants at all times is a must, since these power plants are operated continuously. Boiler is the major part of any thermal power plant. Hence monitoring the boiler parameters such as temperature, pressure and humidity are of great importance in power plant. It is not always possible for continuous monitoring in the plant premises because of an unpleasant industrial environment. In this project it is proposed to develop remote monitoring and control of boiler parameters using wireless communication. The proposed method provides a complete solution for these constraints in remote monitoring by using various sensors for temperature, pressure and humidity measurement. This method uses Internet of Things (IoT) as the platform of communication. The proposed method also provides an option for monitoring and control even in remote location in addition to the control room. Internet of Things (IoT) will play a major role in the future concept of power plant integration. The proposed method will suit and provide a start-up initiation for this future concept.

Keywords: IoT-Internet of Things

I. INTRODUCTION

A power station also referred to as a generating station, power plant, power house, or generating plant is an industrial facility for the generation of electric power, the term generally being limited to those able to be dispatched by a system operator (i.e. the system operator can, by one means or another, alter the planned output of the generating facility).Most power stations contain one or more generators, a rotating machine that converts mechanical power into electrical power

A. Operations of IoT

The different parameters in the boiler such as temperature, pressure,

humidity these parameters can be controlled using IoT. There is an important

parameters that has to be controlled in the boiler for the safety and to improve the reliability of the boiler. In case if these parameters are not controlled then there will be an occurrence of fault in the boiler. In order for the safety of the boiler these parameter values has to be controlled. So a smart way of control can be done by internet of things. By creating the webpage and the control operation can be done through the internet of things.

II. BLOCK DIAGRAM AND DESCRIPTION

There are three different types of sensor such as temperature sensor, pressure sensor and humidity sensor are connected to the arduino board. so that the analog values are converted into digital values and these parameters are connected to arduino uno. So these values are displayed in the LCD screen.

When there is an external disturbance given to the parameters the values are been changed .

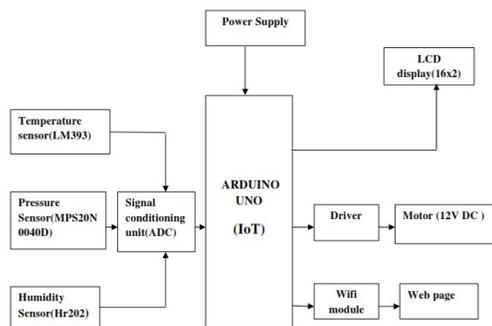


Fig. 1 Block diagram of boiler monitoring in power plant using IoT

These are sensed by the different kinds of sensors has shown in Fig.1. A set point values are kept for all the parameter values once if the values are exits the high value then there will be a occurrence of fault in order to avoid that fault online monitoring has been done and the if the parameter values if it exits over the limit it can be controlled by the online through internet. A webpage has been created and the total control operations can be done through the webpage

A. Arduino

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital

input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

B. Temperature Sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

C. Pressure Sensor

Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters sensors, pressure indicators and manometers, among other names

D. Humidity Sensor

The HR202 Humidity Sensor Module can be applied to the storage compartment, indoor air quality control, building automation, medical, industrial control systems wide range of applications and research fields .Easy to interface with your microcontroller

E. Esp8266 Wifi Module

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that’s just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

III. FLOWCHART AND METHODOLOGY USED

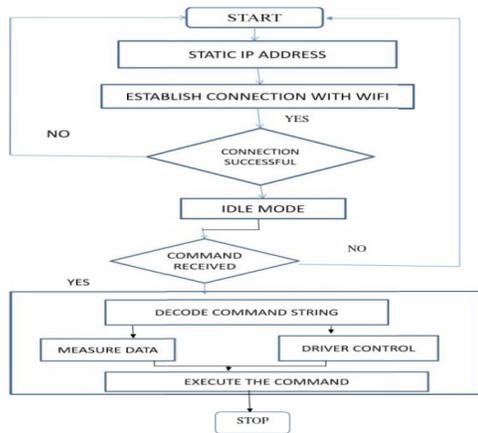


Fig. 2 Flowchart for connecting with Wifi module

Initially connect the parameters with the arduino the values are made to be displayed in the LCD screen and the control operation for the whole process is to be done through the webpage so the webpage has to be created. In order for the control of the parameter values and for the creation of the webpage HTML coding is done for this webpage ON and OFF buttons are created

in order to control the parameter values. Once the parameter value exists the high limit then the control action can be taken by the webpage.OFF button is pressed so the control operation can be taken place and the control is provided for the parameters and the fault occurrence can be reduced.

IV.RESULTS AND DISCUSSION

The parameter values such as temperature, pressure and humidity values are made to be continuously measured and the measured values are made to be displayed in the LCD.

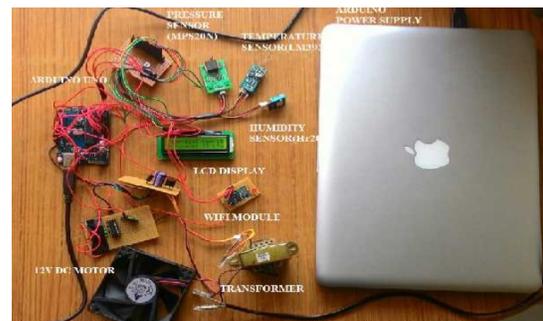


Fig. 3 Schematic view of LCD glow to indicate reading.

If an external disturbance is given to the parameter the values are changed and if the values are exists upto the high level then there will be an occurrence of fault in the system. In order to control an occurrence of fault the control operation are made through the webpage.



Fig. 4 Schematic view of webpage control

V. CONCLUSION AND FUTURE ENHANCEMENTS

A. Conclusion

An important parameters such as temperature, pressure, humidity are continuously monitored in the LCD screen. One of an important thing is to maintain these parameter values at the set point level if not there will be an occurrence of fault in the system. In order to control the parameter values these values are made to be displayed in the LCD and the webpage is created and controlled.

B. Future Enhancements

More number of parameters can be used and this parameter are used to sense all the values in the boiler and these values can be made to be displayed in the webpage and the direct control for each parameter can be done through the webpage.

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