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Real Time Monitoring and Controlling of Boiler Drum Parameters using Internet of Things (IoT)

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Abstract

The need for energy production in India is improving on a regular basis due to various factors. Nearly 70 percent of the power generation comes from the country's thermal power plants in different locations. Monitoring and regulating these power plants is a must at all times as they are regularly worked. Boiler is the major part of any power plant. Thus, observing the heater parameters, for example, temperature, weight and mugginess are of extraordinary premises on account of an unpalatable mechanical condition. In this paper it is proposed to create remote observing and control of evaporator parameter utilizing remote correspondence. Dealing with these things physically requires a ton of human work and time and furthermore it an expensive issue. Consequently, the proposed technique gives a total answer for these imperatives in remote observing by utilizing different sensors for temperature, weight and mugginess estimation. This technique utilizes Internet of Things (IoT) as the stage of correspondence. The proposed strategy additionally gives a choice to observing and control even in remote area notwithstanding the control room. IoT will assume a noteworthy part later on idea of intensity plant incorporation. The proposed technique will suit and give a start-up commencement to this future idea.

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1. Introduction

The present enterprises are progressively moving towards computerization. The evaporator drum parameters must be controlled as far as possible indicated by the heater maker. The ignition of coal in the heater modifies to steam through the water. Vapor with high weight and temperature is applied to the turbine, which rotates the turbine shaft. This turbine shaft is connected to the generator shaft.

By turning turbine shaft, generator shaft likewise pivots and power will be produced. Temperature, weight and mugginess are the three principle parameter to be controlled in steam. Heater tubes will be cut if temperature of steam increments. Along these lines, temperature of steam ought to be observed and controlled [1].

The evaporator drum parameter must be controlled as far as possible determined by the heater producer. In the event that the kettle weight goes past these cutoff points, heater weight extend causes the turbine harm bringing about broad support expenses or blackouts of either the turbine or the evaporator. On the off chance that the dampness level is low, overheating of the water divider tubes may causes tube cut and genuine mishaps bringing about costly repairs and wounds or passing to human. A cut most generally happens where the tubes associated with the drum. The Internet of Things is the association of physical

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gadgets utilizing web organize [2]. These days, each of the devices has become linked to the web. Web provides an office to identify alternative devices, such as sensors, and fitness devices which provide information on the web [3]. This knowledge can be accessed and analyzed from any remote location that uses the internet. Power plants need consistent monitoring and inspection at the time of the tour. From now on, coping with temperature, weight and dampness is an important variable for the acquisition of a phenomenal quality condition. IoT-based testing is a compelling technique to improve efficiency and avoid additional human work. [4].

2. Proposed System

The different variables in the boiler, such as temperature, pressure and humidity can be regulated using IoT in this proposed system. There is an essential variable to be checked in the boiler for protection and to enhance the reliability of the boiler as shown in Figure 1. If all these variables are not controlled, there will be a fault in the boiler [5]-[7].

The temperature sensor, the pressure sensor and the humidity sensor are used to regulate the boiler parameters such as temperature level, pressure level and humidity level. For the safety of the boiler, the values of this parameter must be checked. So, a smart way of controlling things can be done through the Internet parameter using IoT.

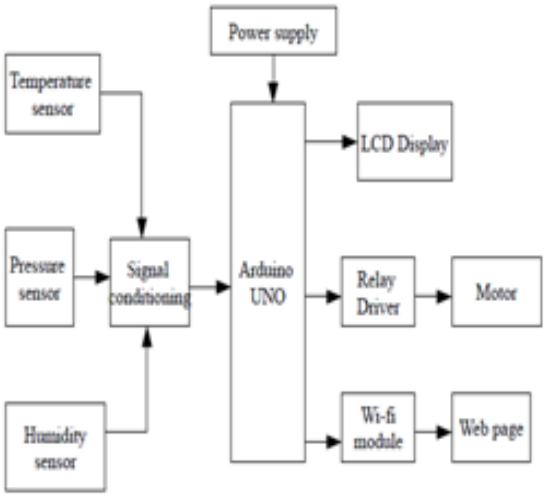

Figure 1: Functional block diagram of boiler drum

By creating the web page and the control operation can be done throughout the Internet of Things. Due to fast growth in the technology, automatic systems are playing important role in day to day life [8].

Introduction of IOT helps us to save time, reduce the human effort, provides automatic control, eliminates the human error and reduce the energy wastage. Figure 2 shows the functional block diagram of real time monitoring and controlling of boiler drum parameters using IOT. This can be controlled using IOT by viewing in the web page.

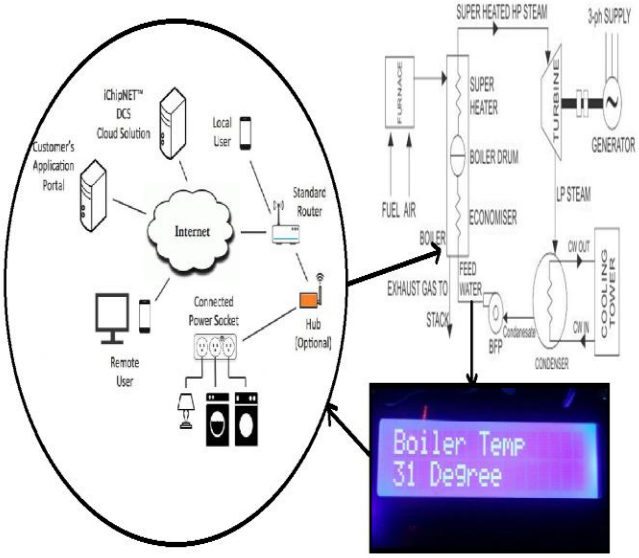

Figure 2: Real time control of power plant boiler

3. Hardware of Boiler Drums Parameters Using IoT

The two sensors are connected to the arduino UNO. The two sensors are temperature and IR sensor. The temperature sensor which analyzes the temperature of the boiler drum and sends the information to the arduino and the IR sensor sends the information about the motion of coal to the boiler drum and displays in the LCD.

The maximum temperature fixed in the implementation of hardware is 70 degree and if the temperature exceeds the maximum value the relay driver stops the working of boiler automatically working. The temperature value is updated for every 30sec. The updated value for every 30sec is stored in the cloud storage. With the help of Internet of Things the value of boiler temperature is seen in the webpage from any remote location.

The system consist a LM35, HR202 sensor, Arduino UNO with internet connectivity. The connection of sensor with Arduino is shown in the block diagram above with a prototype [9]-[11]. In the given system sensor analyze boiler temperature and convert the exact information into a digital signal output. The output obtained from the sensor is fed to the Arduino UNO.

This information is stored in a file over a period of time, which is then stored on the using IoT. Nowadays, a lot of free IoT open data platforms and other services are available on the Internet, which can also be done by building a web page [12]-[15].

The data obtained from the sensor is displayed with date and time anywhere on the globe. The maximum temperature fixed in the implementation of hardware is 70 degree and if the temperature exceeds the maximum value the relay driver stops the working of boiler automatically working. The help of IoT value of boiler temperature is seen in the webpage from any remote location and it can be

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controlled. End user can access data from anywhere and can control the attached relay.

4. Result and Analysis

The above is the result of Real Time Monitoring and Controlling of Boiler Parameter using Internet of Things. The result is updated and displayed in the web page for every 30sec. The concept of Internet of Things plays important role in updating the data in the web page. The output and result of is given below. The output of real time monitoring and controlling of Boiler Parameter using IOT as shown in Figure 3. It shows the result for every 30sec in the web page Figure 4 and 5. Hence, it can be controlled manually from any remote location using Internet. The values can be filtered for the desired date we need. Thus, it reduces man work, human error etc., are the advantages of IOT.

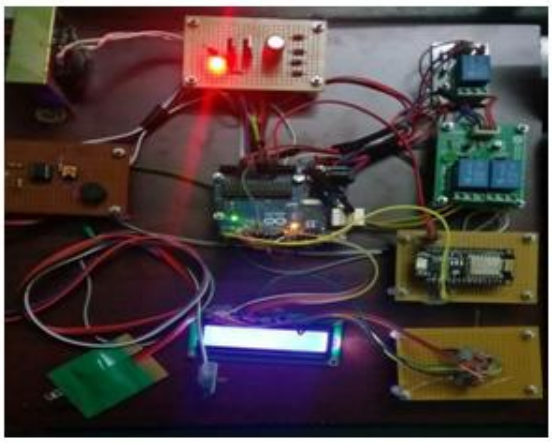

Figure 3: Hardwar diagram

The temperature of the boiler is displayed in the LCD display refer Figure 5. In the given system sensor analyze boiler temperature to convert the exact information into LCD display.

Figure 4: Output of boiler temperature

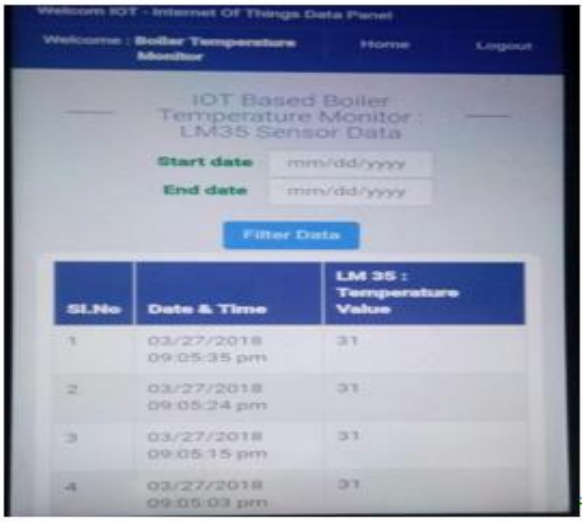

Figure 5: Result of monitoring and controlling of boiler drum using IoT

5. Conclusion

In this paper, monitoring and control system has been implemented for thermal power plant. By using this system, monitoring and controlling of different parameters at the input side of power plant is possible. IoT technology is used for sending the information to the remote location. Implemented with any type of plant control to the further improve of the communication and control system of the plant. The IoT instead of other communication control system we can achieve higher speed of control with less space of RAM and low power consumption. The main advantage of this control process is datum or information will based on cloud computing. This logic of control can be used for high-five technologies of hardware implemented plants. Thus we have monitored boiler temperature for every 30sec. The web page is automatically controlled using relay driver. Here the IOT plays major role in this paper.

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