International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER
SSRN

IJIEMR Transactions, online available on 12th Nov 2022. Link :http://www.ijiemr.org/downloads.php?vol=Volume-11&issue=Issue 12

DOI: 10.48047/IJIEMR/V11/ISSUE 11/25

Title **SOLAR POWER BASED INDUSTRIAL BOILER CONTROLLER WITH TEMPERATURE DISPLAY**

Volume 11, ISSUE 11, Pages: 159-164

Paper Authors

G. Ismayel, Putta Ramya, Motam Aravind, Gunravathi Meganath, Baruoor Ambika

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

SOLAR POWER BASED INDUSTRIAL BOILER CONTROLLER WITH TEMPERATURE DISPLAY

G. Ismayel[1], Putta Ramya[2], Motam Aravind[2], Gunravathi Meganath[2], Baruoor Ambika[2]

[1,2]Department of Electrical and Electronics Engineering

[1,2]Malla Reddy Engineering College and Management Sciences, Medchal, Telangana

ABSTRACT

This project is an industrial boiler controller that controls the temperature of the heating element of a device according to its requirement. The system uses solar power as the power supply. Thus, the project saves the electrical power up to the maximum extent. The sensed and set temperature values are simultaneously displayed on the LCD panel. The circuit is programmed for on/ off control. It is very compact using few components and can be implemented for several applications including air-conditioners, water-heaters, snow-melting equipment's, ovens, heat-exchangers, mixers, furnaces, incubators, thermal baths and veterinary operating tables. The temperature sensor LM35 senses the temperature and converts it into an electrical signal, which is applied to the microcontroller through ADC. The analog signal is converted into digital format by the analog-to-digital converter (ADC). The sensed and set values of the temperature are displayed on the 16x2-line LCD. The set temperature value can be varied from 1C to 255C using an external PCB mount push on switch.

Keywords: Industrial boiler, solar power, temperature display.

1. INTRODUCTION

This project is an industrial boiler controller that controls the temperature of the heating element of a device according to its requirement. The system uses solar power as the power supply. Thus, the project saves the electrical power up to the maximum extent. The sensed and set temperature values are simultaneously displayed on the LCD panel. The circuit is programmed for on/ off control. It is very compact using few components and can be implemented for several applications including air-conditioners, water-heaters, snow-melting equipment's, ovens, heat-exchangers, mixers, furnaces, incubators, thermal baths and veterinary operating tables.

The temperature sensor LM35 senses the temperature and converts it into an electrical signal, which is applied to the microcontroller through ADC. The analog signal is converted into digital format by the analog-to-digital converter (ADC). The sensed and set values of the temperature are displayed on the 16x2-line LCD. The set temperature value can be varied from 1C to 255C using an external PCB mount push on switch. An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main

devices used in embedded products are Microprocessors and Microcontrollers.

Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

This Project provides an option for monitoring and controlling of boilers in power plant even in remote location in addition to the control room. The proposed method develops the remote monitoring and control of boiler temperature using wireless communication. This Project provides an option for monitoring and controlling of boilers in power plant even in remote location in addition to the control room. The proposed method develops the remote monitoring and control of boiler temperature using wireless communication. 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 the proposed method will suit and provide a start-up initiation for this future concept. In this project we are using temperature sensor to sense the temperature of the boiler. 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. Temperature sensor sense the temperature of the boiler which is given to micro controller. Whenever the temperature value is exceeded to prescribed value, it gives the alerts through buzzer. While it is theoretically possible to operate a boiler with manual control the operator must maintain a tedious, constant which for disturbances and variations of parameters. Time is needed for the boiler to respond to a correction and this led to over correction with further upset to the boiler. An automatic controller once properly tuned will make the proper adjustment quickly to minimize upsets and will control the system more accurately and reliably. Apart from mechanical strength, it is control logic & instrumentation which decides the safety & reliability of any modern boiler. There are different types of process in which the parameters are to be controlled at specified range. For heavy oil-fired boilers, the fuel needs to be heated to reduce viscosity and improve atomization. Low fuel temp can result in incomplete combustion, unstable flame and backfiring. Fuel temp monitoring system should stop the burner firing below safe temp. Since, different process requires different operating temperature range, so in this as temp. Varied initially but using controller, we maintained the temperature range. in manual control the boiler is heated and has no ability to control the temperature in the specified range. Let here the temperature range is taken for the process is 300° c to 400° cut after using of temperature sensor and controlling the range through PIC controller it can be achieved

Keeping proper water level in the boiler is of paramount importance from boiler safety point of view. This instrument maintains necessary operating water level by controlling the water inflow. In this we are using level sensor which detects the level of the liquid in the boiler. Here we use two level sensors one is low level & other is top level, which show the lower liquid & higher liquid level, so that the liquid level can be maintained with in a range. The following figure (2) shows that in manual configuration the water level increases, but after using level sensors trough controller it's level can be withstand within 15 to 20 (say for any boiler level specified). Now a day the automation field gets a wide growth in the worldwide. So, every process control industry, different parameters need to be monitored and controlled simultaneously.

2. LITERATURE SURVEY

In [1] Distributed temperature sensors (DTS) measure temperatures by means of optical fibers. Those optoelectronic devices provide a continuous profile of the temperature distribution along the cable. Initiated in the 1980s, DTS systems have undergone significant improvements in the technology and the application scenario over the last decades. The main measuring principles are based on detecting the backscattering of light, e.g., detecting via Rayleigh, Raman, and Brillouin principles. The application domains span from traditional applications in the distributed temperature or strain sensing in the cables, to the latest "smart grid" initiative in the power systems, etc. In this paper, we present comparative reviews of the different DTS technologies, different applications, standard, and upcoming, different manufacturers. Thermal modelling of large, pulverized fuel utility boilers has reached a very remarkable development, through the application of CFD techniques and other advanced mathematical methods. However, due to the computational requirements, on-line monitoring and simulation tools still rely on lumped models and semi empirical approaches, which are often strongly simplified and not well connected with sound theoretical basis. This paper reviews on-line modelling techniques, aiming at the improvement of their capabilities, by means of the revision and modification of conventional lumped models and the integration of off-line CFD predictions. The paper illustrates the coherence of monitoring calculations as well as the validation of the on-line thermal simulator, starting from real operation data from a case-study unit. The outcome is that it is possible to significantly improve the accuracy of on-line calculations provided by conventional models, taking into account the singularities of large combustion systems and coupling off-line CFD predictions for selected scenarios.

3. PROPOSED SYSTEM

From the below figure, we can see that the device which is able to perform the task is a micro controller. Here Temperature sensor senses the temperature of the boiler which is given to micro controller. Whenever the temperature value is exceeded to prescribed value, it gives the alerts through buzzer then also cooling is on micro controller which is

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

the main controlling part of the system. The temperature sensor will measure the temperature of the boiler when it is crossed the set temperature shows the high alert in mobile and buzzer also then on the cooling fan with micro controller. When the temperature decreases it automatically turn on the boiling element to increase the temperature. This process will continue for the until the power is turned off.

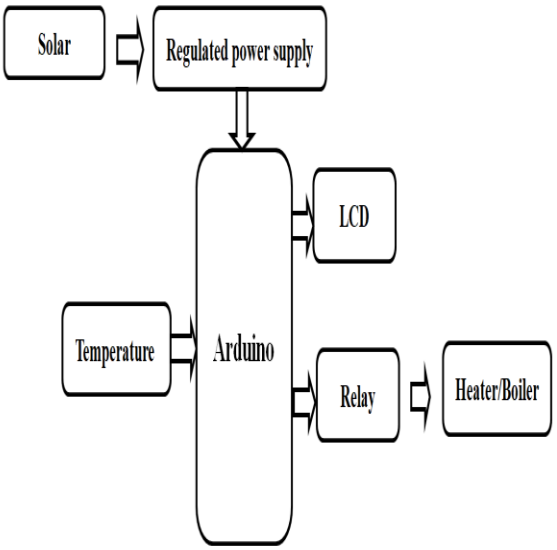


Fig. 1: Block diagram of proposed system.

Temperature sensor senses the temperature of the boiler which is given to micro controller. Whenever the temperature value is exceeded to prescribed value, it gives the alerts through buzzer then also cooling is on micro controller which is the main controlling part of the system. The temperature sensor will measure the temperature of the boiler when it is crossed the set temperature shows the high alert in mobile and buzzer also then on the cooling fan with micro controller.

4. RESULTS AND DISCUSSION

4.1 Arduino IDE

What is Arduino IDE?

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

A program for Arduino hardware may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their 8-bit AVR and 32-bit ARM Cortex-M based microcontrollers: AVR Studio (older) and Atmel Studio (newer).

4.2 Schematic diagram

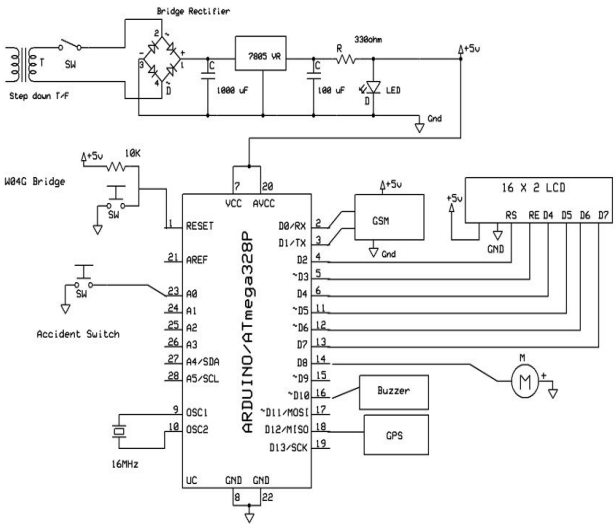
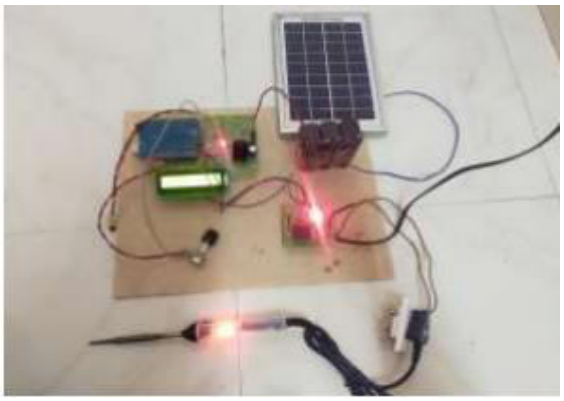
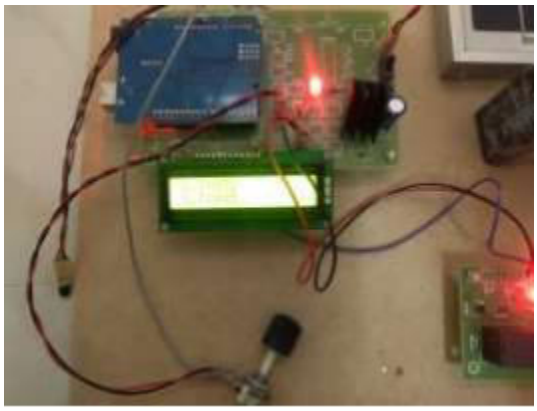


Fig. 2: Schematic diagram of proposed system.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

4.3 Hardware implementation





5. CONCLUSION

This Project designed and implemented an option for monitoring and controlling of boilers with temperature sensor and buzzer with alerts. In power plant even in remote location in addition to the control room. The proposed method develops the remote monitoring and control of boiler temperature. we are using temperature sensor to sense the temperature of the boiler. 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. Temperature sensors sense the temperature of the boiler which is given to micro controller. Whenever the temperature value is exceeded to prescribed value, it gives the alerts through buzzer.

Future Scope

In future we will add IOT then temperature monitoring will be done through out server.

REFERENCES

[1] Presi.T.P, “PIC Microcontroller Based Vehicle Monitoring System Using Controller Area Network (CAN) Protocol”,IEEE international conference 2012.

[2] Dogan Ibrahim, “Microcontroller based temperature monitoring and control”, ISBN: 0750655569, Elsevier Science & Technology Books

[3] Kumar, M. A.Verma, and A. Srividya, Response-Time “Modeling of Controller Area Network (CAN). Distributed Computing and Networking, Lecture Notes in Computer Science Volume 5408, p163-174, 2009.

[4] Tindell, K., A. Burns, and A.J. Wellings, Calculating controller area network (CAN) message response times. Control Engineering Practice, 3(8): p. 1163-1169, 2005.

[5] John Rinaldi and Vince Leslie (2003), "The Fast Guide to Controller Area Network (CAN) Application Layers", Real Time Automation, pp. 1-8.

[6] B.Gmbh, "CAN specification" vol 1 Version 2.0, 1991.

[7] Pazul, "Controller Area Network (CAN) Basics", Microchip technology Inc., AN713, May 1999.

[8] Wilfried Voss, A comprehensive guide to controller area network, Copperhill Media Corporation, 2005-2008.

[9] National Semiconductor, "LM35 Precision Centigrade Temperature Sensors Data sheet", National Semiconductor Corporation, November 2000. 10.

[10] L.A. Bryan and E.A. Bryan, Programmable Controllers, Second Edition, Atlanta Industrial Text Company, 1997. 11. S. Fries et al., "Security for the Smart Grid — Enhancing IEC 62351 to Improve Security in Energy Automation Control," Int'l. J. Advances in Security, vol 3, no. 3–4, 2010, pp. 169–83.