FLAME SCANER CIRCUIT

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ABSTRACT: *Flame Scanner Circuit is the complex project designed to decrease the danger of human life in Power Plants. The project aims to avoid any accumulation of fuel, avoid explosion and to decrease the human efforts by making the system digitized in Thermal Power Plants. It comprises of LDR (Light Dependent Resistor) which sense the intensity of the burning fuel to determine whether the fuels are burning efficiently. It produces the electric pulses according to the intensity of light emitted by the flame and transfer it to the controller which then determines whether to stop or to continue the process of passing the catalyst to burn the fuels.*

*KEYWORDS:-*LDR,Power Plant,Accumulation.

I.   INTRODUCTION

In this project we will create a fire or a flame detector with Arduino and the LDR (Light Dependent Resistor), Temperature sensor (LM35) this optical flame sensor allows to detect the existence of combustion by the light emitted by fire. This system currently is in the analog form and our objective is to make it digitized. Such an Flame detecting system consist of electronic control assembly, which controls the output load by analyzing the output of all the scanner elements and by comparing it with the predetermined values. The output load can be a motor which control the movement of the Oil Gun and the Igniter Rod. The Light Dependent Resistor (LDR) is the component that has the variable resistance that changes with the light intensity that falls upon it. This allows them to be used in the light sensing circuits. The resistance of the LDR is inversely proportional to the intensity of light falling on it when the intensity of the light is high its resistance gets lower. The temperature sensor (LM35) is used to sense the temperature of the flame. And compare the values of the value of predetermined set threshold values . As we also need to check the quality of flame. The Pic microcontroller is used as the controller unit to form the co-ordination between the various parts of the assembly. It basically decides whether the burning is done properly or not and decides whether to allow process to continue or to generate plant trip logic. In this project 4 scanners are fixed on the sides of the burner, which sends data to the control room based on the intensity of the flames and displayed on the LCD screen. By comparing the values of LDR and temperature sensor with predetermined threshold values the controller decides whether to stop or to continue the process.

II.   RELATED WORK

There have been continuous rise in digitization in recent past and it has become a concern over analog system especially in thermal power plant. Digitization I the best technique to nullify human danger and effort. The researchers nowadays are proposing approach that reduces human danger.Goodarz Sabetian Fard Jahromy Hatam Mohammadi Kamrava Electrical Engineering Department, Islamic Azad University, Fasa Branch, Fasa , Iran.Science and Investigation Journal ISSN: 2251-8576Proposed a work by combining the Photo effect of semiconductor material and photo conductive cell. The method seems to be quite effective on paper but not implemented on real time power plants. As the digital instruments need have high temperature coefficient To sustain on approximately 1500 degree Celsius.

III.   PROPOSED   ARCHITECTURE   AND   WORKING

The light from the flames of burning fuels is incident on the flame scanner circuit which consist of the LDR. The LDR has the property of variable resistance depending upon the intensity of the light incident on it. When the light is incident on the LDR its resistance gets reduced and generate an electric pulse of the analog form depending upon the intensity of the light. We have used four LDR on the sides of the boiler and these four LDR comprises the Flame Scanner Circuit. The output of the

LDR is very low to be processed by the Controller. The driver circuit consist of various amplifiers which are used to boost the LDR current to levels needed for controller to process the further working. Solenoid Valve is the electrically controlled valve is the first component to be activated. It supplies the catalyst to the fuel to ignite the flame. Igniter rod is basically used to ignite the fuels by igniting the catalyst. Once the fuels are ignited the Flame Scanner Circuit is activated. If the fuel is burning efficiently controller puts the plant on hold and retracts the igniter rod.But if the flame is not generated properly, controller switched off the solenoid valve and also retracts the igniter rod and generates plant trip logic. The controller checks this condition for three times. If the fuels are not burning properly there is accumulation of black smoke in the boiler. To remove this smoke the controller initiates purging process. During the purging process no command can be given to the plant for half hour.

If the plant is in running condition and the intensity of the flame is falling it suggests controller that there is some problem. If out of the 4 flame scanner circuit if 2 circuits has output at least equals to threshold value then it is still acceptable. But if 3 circuits has the output less than or equals to threshold value, then controller will generate the plant trip logic . Temperature is the degree of hotness or coolness of a body. When the temperature changes the internal resistance also changes to the corresponding material. A sensor is call transducer. The output of the transducer is in the form of voltage current, resistance, or capacitance. The block diagram summarizes the above discussion.

Fig-2:Intensity and Tempreture reading

**Fig-3:**Ignitor   rod   and   oil   gun   status
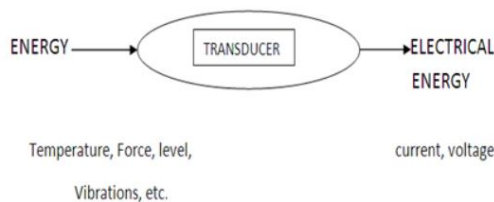

Fig-1:LDR working block
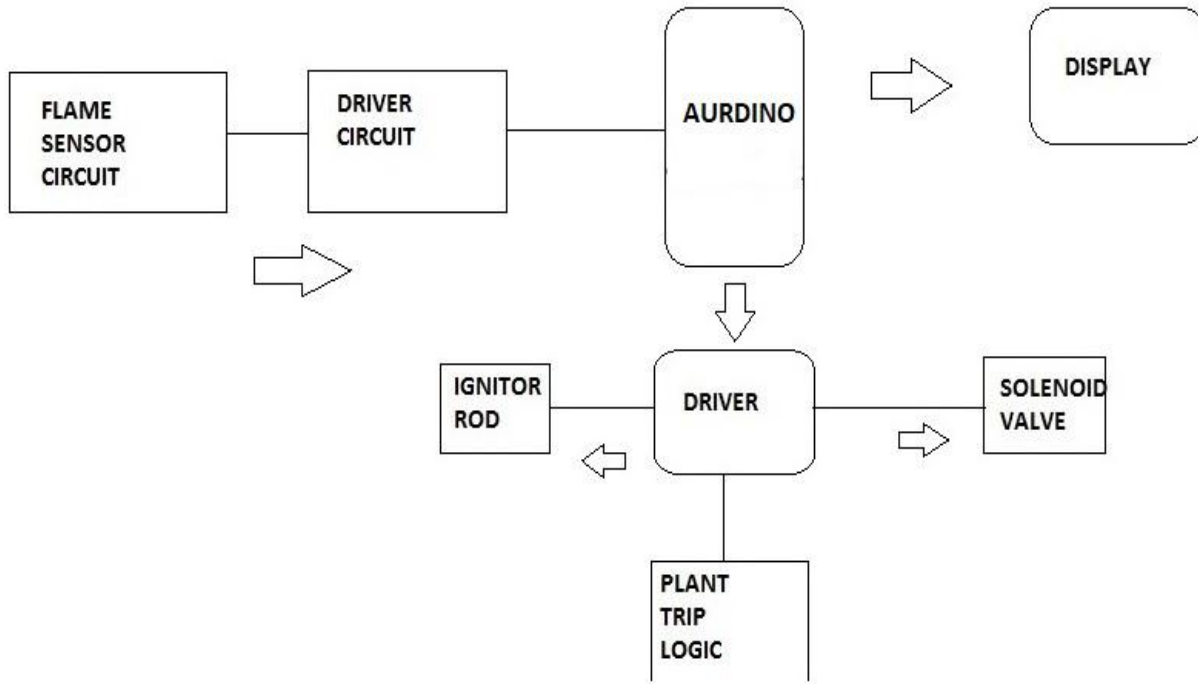
Fig-4: Block DIagram

In this development, high temperature is calculated; temperature measurement is significant in industry. In industry, there are different types of high temperature measurement, according to the variety temperature. For example, LM35 is used to measure the temperature in the range of $55°C$ to $+150°C$. The LM35 series are precision integrated circuit temperature sensors whose output voltage is linearly proportional to the Celsius high temperature. The LM35 hence has an improvement more than linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. If we want to measure temperature greater than $1000°C$ we have to use Thermocouples. To interface the servo motor with PIC18F4550 microcontroller and generate pulses to rotate the servo spline in step angles (of $45°$) from $0°$ to $180°$. Please check the Video tab to see these rotations.
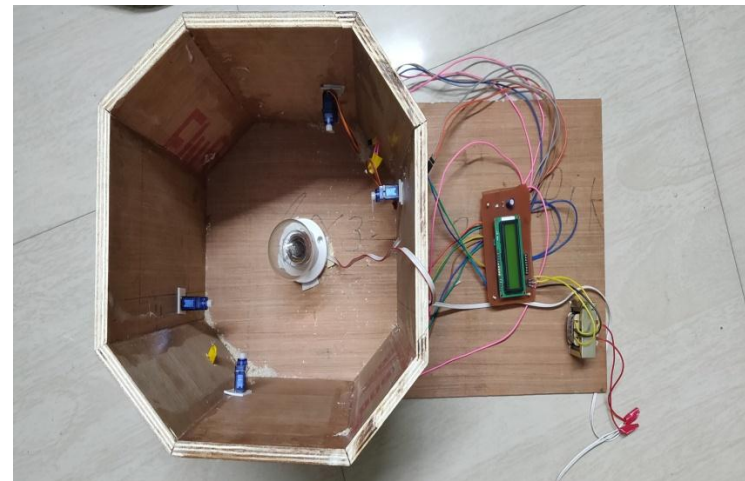
After reaching $180°$ position, the spline is brought back to $0°$ position and the rotation thus continues.

Fig-5: Model
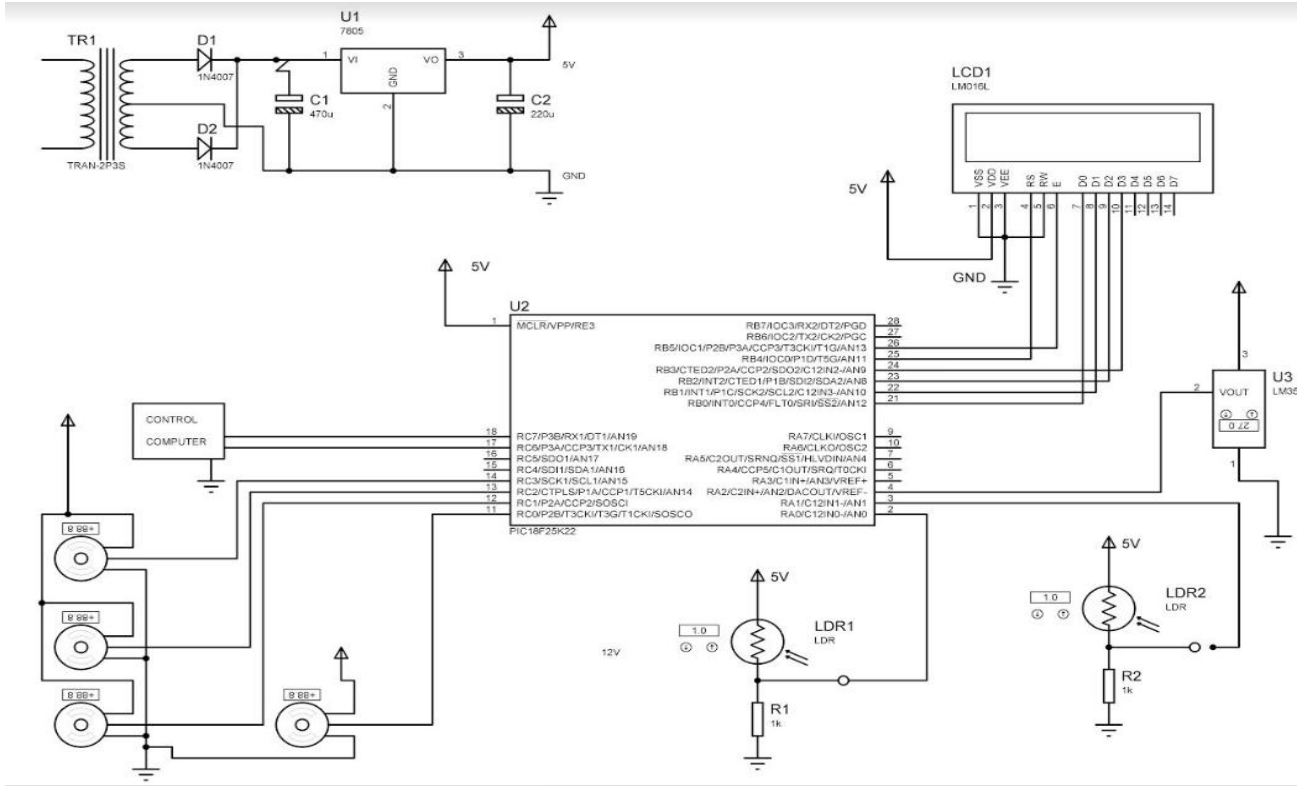
IV.   BENEFITS OF PROPOSED APPROACH

The proposed approach provides secure and easy way to detect the flame in an thermal power plant .It make use of of various scanner namely LDR and Temperature sensor and an controlling unit by microcontroller .It not and real time implementation but and over all basic model to explain the process flow .One of the benefit is education of extra fuel which is major concern of 21st century .Another major benefit is of human danger as in previously used system human danger was a very big issue but by making system digital human danger totally cutoff from the system.

V.   CONCLUSION

In this paper ,we proposed an innovative approach to sync all the mechanical sytems with the microcontroller to make digital flame scanner system.

VI.   REFERENCE

1.Goodarz Sabetian Fard Jahromy Hatam Mohammadi Kamrav Electrical Engineering Department, Islamic Azad University, Fasa Branch, Fasa , Iran.International Science and Investigation Journal ISSN: 2251-8576

2.Pic microcontroller and Embedded system by Muhammad Ali Mazidi