

Industrial Temperature Controller

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Abstract - The “Industrial Temperature Controller” controls the temperature of any device according to its requirement for any industrial application. At the heart of the circuit is the ATMEGA328 microcontroller which controls all its functions. A temperature sensor RTD is used for sensing the temperature of the environment and the system displays the temperature on an LCD in the range of -55°C to $+150^{\circ}\text{C}$. This temperature is compared with the value stored by the user and if the temperature goes beyond the preset temperature then relay will switch off and if temperature goes below to preset value then relay will switch on. AC bulb is interfaced with the microcontroller which is done with the help of a relay.

Keywords: Industrial Temperature Controller, RTD Sensor, microcontroller and relay.

I. INTRODUCTION

Temperature controller is a system that monitors and controls the temperature of a room or any place under consideration such that if the temperature is higher than required, the system brings the temperature down. Similarly, if the temperature is lower, the system makes it high as required. Temperature controller can be manual or automatic. The former requires full human intervention to operate, while the latter requires little or not at all.

Temperature is one of the main parameter to control in most of the manufacturing industries like chemical, food processing, pharmaceutical etc. In these kinds of industries, some product need the required temperature to be maintained at highest priority the product will fail. So the temperature controller is most widely used in almost all the industries. The goal of this project is to design an ambient temperature measurement and control circuit. The motivation for the project is the fact that temperature measurement has become an integral part of any control system operating in a temperature sensitive environment and the various learning outcomes associated during the implementation of the project.

In this project, ON-OFF type controller has been implemented. Here, the set value for temperature can be externally set by user. The actual temperature is sensed by the temperature sensor. It is displayed on LCD with the set value. If it exceeds the set value, the relay is turned off. After then

when temperature falls below the specified limit again relay is turned on.

II. LITERATURE SURVEY

With the ever growing technology every field is being automated, controlling temperature being one of the most important process in industries, medical, biotechnology field etc... It has seen many innovations.

In [1] Rayan Mohamed Hamid et.al have discussed a cooling system which can control the temperature by using PIC microcontroller. Here the author has used GUI that is Graphical User Interface. The user can either control speed of fan manually or can set the temperature through the computer. The main disadvantage of this approach is that it has no heating system so the temperature of the surrounding can be reduced but can't be increased. Every time temperature has to be changed, the system has to be connected to a computer.

In [2] Mustafa Saad et.al has discussed an automatic fan speed controller. Here author uses pulse width modulation (PWM) technique to control the speed of the fan. Here as the temperature sensed by the sensor increases. The speed of the fan also increases. Here we cannot set any reference temperature according to our requirement and this system can be used only for cooling purpose.

In [3] A.L. Amoo et.al has used an AT89C51 microcontroller which receives the ADC signal which is sensed by the temperature sensor LM35. The sensed temperature is compared with the set value which is pre-defined by the user depending on this the speed of the fan differs. Control system can be classified as either open loop or closed loop. In open loop system output has no influence of the input action. Also open loop does not have feedback path. While closed loop system has a feedback path from the output of the controlled process to the input of the control system. So, closed loop system monitor the temperature and control the fan by switching to appropriate speed.

III. PROBLEM STATEMENT

Temperature control is one such field that is required. Automation empowers the commercial temperature controllers in order to modify the system specifications and characteristics as required over time without much human

intervention. The wide range of the weather changes in the environment demands a simple heating and cooling system.

In this system, automatic temperature controller is designed such that it can be even operated by a person without any specific background.

IV. METHODOLOGY

The block diagram of the proposed work is shown in Figure which explains different components of the system.

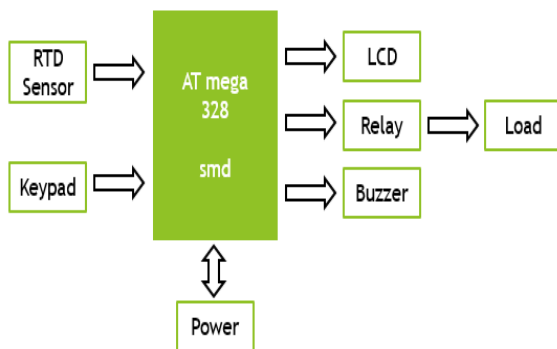


Figure 1: Block Diagram

In this project, we have used an Atmega 328 microcontroller to control the temperature of a confined area. The reference or the desired temperature is set using a keypad. RTD temperature sensor sends the analog voltage values depending on the surrounding temperature which is fed into the microcontroller, here temperature values are retained through calculations and then these values are compared with the reference values and necessary signals are sent. These signals either switch the relay till the sensor temperature reaches the reference or desired temperature. Microcontroller scans the signals for every 10seconds and RTD works with an accuracy of $\pm 1/4$ °C. Thus, making the circuit very effective.

V. CONCLUSION

We have designed implemented and verified an automatic temperature control system using a microcontroller. Our main objective is to make a system which fulfills the requirements in a cost-effective way. Components used in the implementation were easily available and economically affordable. This system maintains the temperature through its loads. The device which is being used in the project has a very simple form of structure.

Hence these devices have a very low cost compared to other devices which are currently present in the market. The systems are capable of providing huge contribution in the various fields as mentioned above. Nevertheless, these kinds of systems still need some kind of improvement for being a better alternative.

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