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Design and Fabrication of Automatic Temperature Controller with Cooling System

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ABSTRACT: Over the last decade, advances in electronics have made devices smaller, cheaper and faster. This project is about how the speed of a fan can be controlled, based on temperature sensor. It is also a part of smart home application where the fan will gradually increase its speed if the temperature is increasing. In general, home appliance fans need to be operated manually with the help of regulators with the variation of temperature, thus requires a repeatedly extra effort for regulating the fan speed which acts to our agony. So as to reduce this extra effort and to add comfort, it is intended in this paper designing an "Automatic Temperature Controlled Fan". In this project the main intension is to control the fan by heating the sensor, i.e. the thermistor, where the speed of the fan is dependent and controlled by any device's temperature like PC. As the temperature of the device increases or decreases, the speed of fan increases or decreases respectively. So it can be used mainly as a cooling device. By modifying the circuits lightly, it can also be used to control the room temperature, depending on the property of thermistor. The thermistor used in the circuit here, decreases its resistance with increasing temperature, hence the electrical conductivity also increases, increasing voltage across it**,** resulting in an increment in the speed of the fan. Thus, it is possible to control the speed of the fan automatically when the device's temperature varies. Experiment can be followed to evaluate whether this circuit can save energy through the use of temperature sensor and thus promote efficiency.

I. INTRODUCTION

In this project we are fabricate the temperature controller with cooling system. It is a new innovative concept. This concept is very helpful for so many areas. One of the attractive features of thermoelectric (TE) technology is that it offers an incredible degree of controllability. With a properly 'tuned' controller, it is possible to maintain systems well within 0.1° C of set point. Unfortunately, many off-the-shelf solutions for temperature control are not wellsuitedtothethermoelectricworldbecausetheyweredesignedforheating or cooling hardware that is very different and often far less responsive than TE devices. This leaves designers groping for alternatives. This guid e is intended to offer designers some practical guidance in exploring the vast range of possibilities. When it comes to temperature control, while Tellurex Corporation offers a number of alternatives, it truly specializes in providing solutions for high -volume applications where a low-cost, custom controller is suitable. In most cases, we can adapt a previous design to new systems and then provide circuit boards which are custom populated. In those cases, which require unique approaches, we can rely upon our extensive experience to arrive at optimal solutions. Type of input sensor (thermocouple, RTD) and temperature range and Type of output required (electromechanical relay, SSR, analog output)

II. EXISTING TECHNIQUES

1. Madhukar, Water is the ubiquitous chemical substance, composed of hydrogen and oxygen, that is essential for the survival of many known formsoflife.Intypicalusage,waterrefersonlytoitsliquidformorstate,but the substance also has a solid state, ice, and a gaseous state, water vapor orsteam. Water covers 71% of the Earth's surface. On Earth, it is found mostly in oceans and other large water bodies, with 1.6% of water below ground in aquifersand0.001%intheairasvapor,cloudsandprecipitation.Oceanshold 7% of surface water, glaciers and polar ice caps 2.4%, and other land surface water such as rivers, lakes and ponds 0.6%. A very small amount of the Earth's water is contained within biological bodies and manufactured products. Water moves continually through a cycle of evaporation or transpiration precipitation, and runoff , usually reaching these. Overland, evaporation and transpiration contribute to the precipitation overland.

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2. Aakanksha Pimpalgaonkar, Clean, fresh drinking water is essential to human and other life forms. Access to safe drinking water has improved steadily and substantially over the last decades in almost every part of the world. There is a clear correlation between access to safe water and GDP per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. Waterplays animportantroleintheworldeconomy,asitfunctionsasasolventforawide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70 percent of freshwater is consumed by agriculture.

3.R. Suguna, the output from the controller may take one of several forms. The most common forms are time proportional and analog proportional. A time proportional output applies power to the load for a percentage of a fixed cycle time. For example, witha10 second cycle time, if the controller output were set for 60%, the relay would be energized for 6 seconds, and de-energized for 4 seconds. Time proportional outputs are available in three different forms// electromechanical relay, triacor ac solid state relay, or a dc voltage pulse The electromechanical relay is generally the most economical type, and is usually chosen on systems with cycle times greater than 10 seconds, and relatively small loads. An ac solid state relay or dc voltage pulse are chosen for reliability, since they contain no moving parts. Recommended for processes requiring short cycle times, they need an additional relay, external to the controller, to handle the typical load required by a heating element. These external solid-state relays are usually used with an ac control signal for ac solid state relay output controllers, or with a dc control signal for dc voltage pulse output controllers. An analog proportional outputisusuallyananalogvoltageorcurrenttheoutputlevelfromthisoutput type is also set by the controller; if the output were set at 60%, the output level would be 60% of 5V, or 3V. With a 4 to

20mA output, 60% is equal to or 13.6 mA. These controllers are usually used with proportioning valves or power controllers.

4.Tarun Kumar Das When you choose a controller, the main considerations include the precision of control that is necessary, and how difficult the process is to control. For easiest tuning and lowest initial cost, the simplest controller which will produce the desired results should be selected. Simple processes with a well matched heater and without rapid cycling can possibly use on-off controllers. For those systems subject to cycling, or with an unmatched heater, a proportional controller is needed. There are also other features to consider when selecting a controller. These include auto- or self tuning, where the instrument will automatically calculate the proper proportional band, rate and reset values for precise control; serial communications, where the unit can “talk” to a host computer for data storage, analysis, and tuning; alarms, that can be latching non-latching set to trigger on high or low process temperatures or if a deviation from set point is observed; timer’s /event indicators which can mark elapsed time or the end/beginning of an event. In addition, relay or triac output units can be used with external switches, such as SSR solid state relays or magnetic contactors, in order to switch large loads up to75.

5.B. Levarda, the third controller type provides proportional with integral and derivative control, or PID. This controller combines proportional control with two additional adjustments, which helps the unit automatically compensate for changes in the system. These adjustments, integral and derivative, are expressed in time-based units; they are also referred to by their reciprocals, RESET and RATE, respectively. The proportional, integral and derivative terms must be individually adjusted or “tuned” to a particular system, using a “trial and error” method. It provides the most accurate and stable control of the three controller types, and is best used in systems which have a relatively small mass, those which react quickly to changes in energy added to the process. It is recommended in systems where the load changes often, and the controller is expected to compensate automatically due to frequent changes in set point, the amount of energy available, or the mass to be controlled. Rate and reset are methods used by controllers to compensate for offsets and shifts in temperature. When using a proportional controller, it is very rare that the heat input to maintain the setpoint temperature will be 50%; the temperature will either increase or decrease from the setpoint, until a stable temperature is obtained. The difference between this stable temperature and the set point is called offset. This offset can be compensated for manually or automatically. Using manual reset, the user will shift the proportional band so that the process will stabilize at the setpoint temperature. Automatic reset, also known as integral, will integrate the deviation signal with respect to time, and the integral is summed with the deviation signal to shift the proportional band. The output power is thus automatically increased or decreased to bring the Time Process with Temperature Offset PB SPTemp.

III. PROPOSED TECHNIQUE

In this project we are using temperature sensor for measuring the room temperature. The temperature sensor after sensing the room temperature sends signals to the control unit. The room temperature which is to be maintained is

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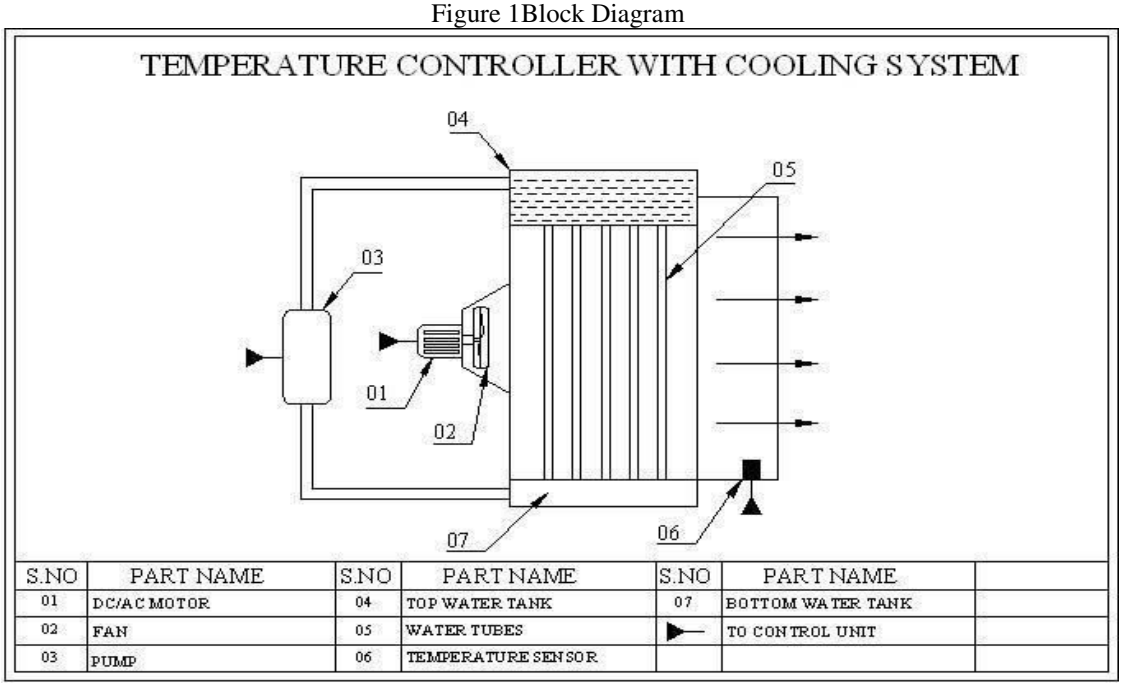
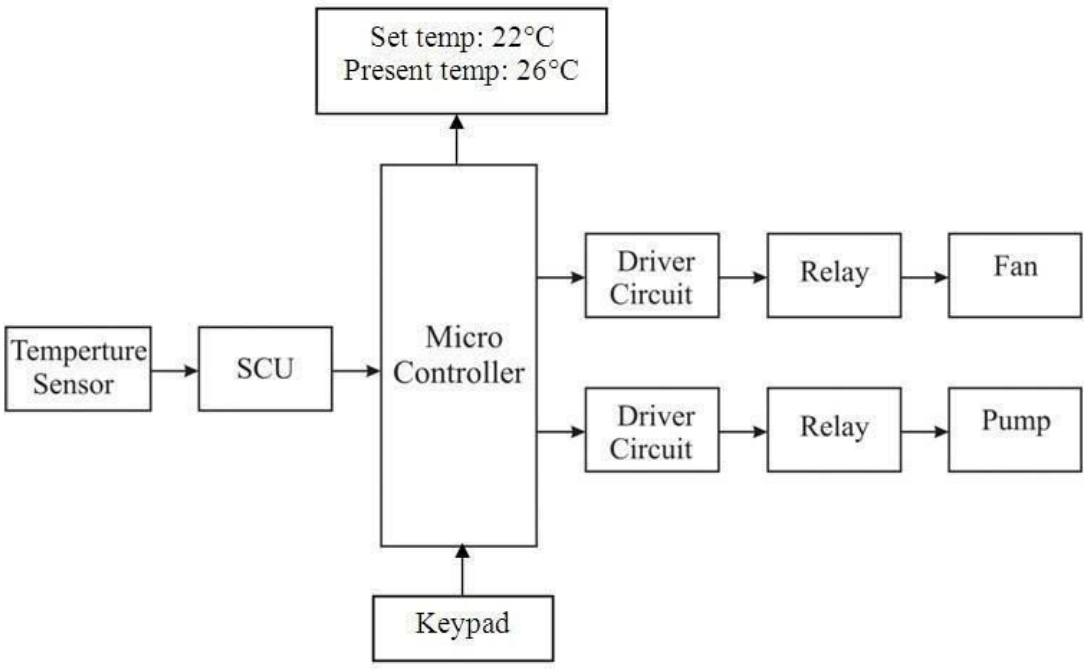
already fed in the control unit. If the measured temperature value is higher than these temperature value, the control unit switches ON the fan. Air is passed inside the system and the system carries horizontal tubes in which water is passed. As the air passes on the water tubes the air gets cooled and cold air is supplied to the room. The temperature sensor repeatedly measures the room temperature and sends the signals to the control unit. If the measured temperature and the actual temperature are same or less, then the control unit switches OFF the fan This process is repeated several times. A pump can be used to circulate the water from lower tank to the uppertank.

Figure 1Block Diagram



S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME	
01	DC/AC MOTOR	04	TOP WATER TANK	07	BOTTOM WATER TANK	
02	FAN	05	WATER TUBES		TO CONTROL UNIT	
03	PUMP	06	TEMPERATURE SENSOR			

Figure 2 Temperature Controller Using Cooling System



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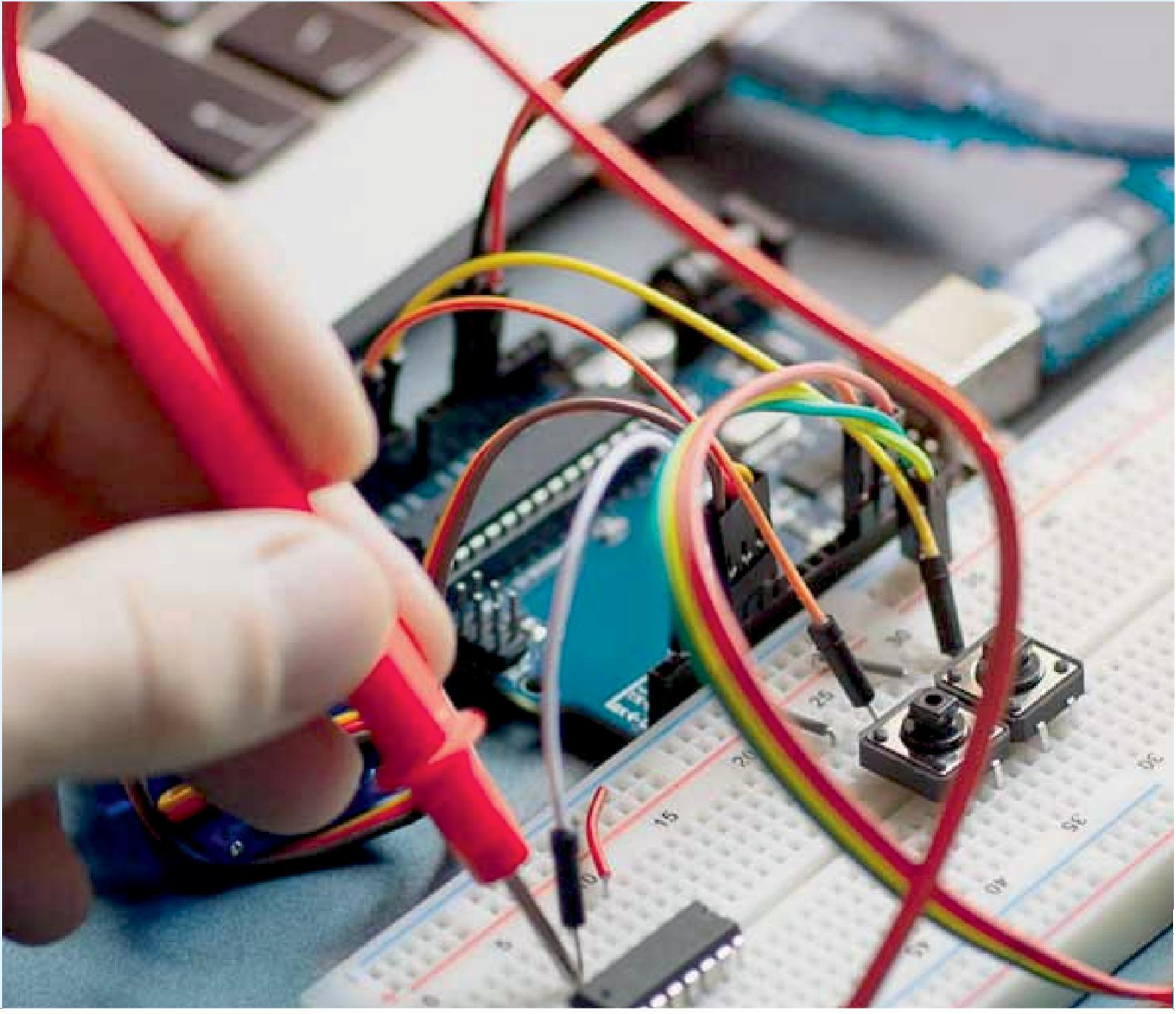
IV. CONCLUSION

The project carriedout by us will make an impressing mark in the field of water boiling industries as well as home appliance. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time. While TE technology is very controllable, there are a great many things to consider in arriving at the best solution. Every desire comes at a cost, so each must be contemplated thoroughly before proceeding. The more that cost is a constraining force in choosing a design path, the more diligent the designer must be in reigning in the 'wish list' to focus on what is absolutely necessary.

REFERENCES

[1] Madhukar S. Chavan, V.S.Suryavanshi & S.S.Sankpal, “AVR Microcontroller Based Temperature Control System, ”IJARCSMS, ISSN2321-
7782,2014.
[2] Mansi Jha, “A Precision Temperature Controller Using Embedded System” IJSRPISSN 2250-3153,2013.
[3] R. Suguna, V. Usha, Mr. S. Chidambaram “A temperature control by using PID based SCR control system” ISSN: 2278- 8735,2014.
[4] Tarun Kumar Das, Yudhajit Das, “Design of A room temperature and humidity controller using fuzzy logic” AJER ISSN 2320 -0847, 2013. [5] B. Levarda & C. Budaciu, “The Design of Temperature Control System Using PIC 18F46201,” ICSTC, PP 282- 286,2010.
[6] M. Suruthi, S. Suma, “Microcontroller Based Baby Incubator Using Sensors,” IJIRSET, ISSN 2319-8753,2015.
[7] I.G. Saidu& M. Momoh& A.S. Mindaudu, “Temperature Monitoring& Logging System Suitable for Use in Hospitals, Incorporating GSM Text Messaging,” IJIST,2013



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