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# Coding Program for Automatic Temperature Controller

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**ABSTRACT:** The switching terminal of the relay has been connected in series to the live terminal of the mains that powers an electrical heating or cooling by peltier plate. Thermoelectric cooling (peltier cooler) is the cooling element in our system it can reduce the use of electricity to produce cooling effect and also meet today's energy challenges. Therefore, the need for thermoelectric cooler in developing countries is very high where long life and low maintenance are needed. The circuit can be employed in managing the temperature of drying compartments such as House warmer, heating furnace, incubators, and others. The temperature range of the system is between - 4°C and 130°C with a resolution of 0.5°C.

## I. INTRODUCTION

The heart of the circuit designed is the ARDUINO NANO . Micro controller - based temperature control has become so important that it acts as benchmark for testing and simulation of particular sensors for detection and monitoring of temperature automatically. Various types of projects like minor projects as well as major projects are carried out on suitable hardware and software platform . This paper presents an application of control theory using ICT and hardware-based temperature control including design of a circuit (hardware) and implementation and testing on Arduino nano board. The test results are displayed with the help of LCD display. The program is written in Arduino IDE and facilitates the display of temperature in degree centigrade and also in Fahrenheit. The Arduino nano board facilitates the temperature measurements input to the fan and cooling system ON/OFF that is automatically done based on varied values of temperature. As the name implies, a temperature controller is an instrument used to control temperature. The temperature controller takes an input from a temperature sensor and has an output that is connected to a control element such as a heater or fan. To accurately control process temperature without extensive operator involvement, a temperature control system relies upon a controller, which accepts a temperature sensor such as a thermocouple or RTD and LM35 as input. It compares the actual temperature to the desired control temperature, or set-point, and provides an output to a control element.

## II. LITERATURE SURVEY& REVIEW

The work is focused mainly on temperature control, and no other parameter is involved. This seems to be robust way of handling only temperature control on automatic basis. This can be extremely useful for persons of physical disability. Soft computing method could be used to make it more robust and fuzzy controlled. [1] This is completely Eco-friendly project multipurpose and portable. As the cooling are of small size , silent contains no liquids or gases, have no moving parts and have a long life. The coefficient of performance of this refrigerator is much smaller than that of a conventional compressor -type refrigerator when the required cooling capacity is high We have been successful in designing a system that fulfill the proposed goals. However we do realize the limitations of this system. The present design can be used only for light heat load to lower its temperature to a particular temperature. The system is unable to handle fluctuations in load. Extensive modifications need to be incorporated before it can be released for efficient field use. [2]

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## III. OBJECTIVE

1] To prepare the coding program for Automatic cooling.
2] To analyses the automatic temperature controller system so that It is of less cost, portable,very low power consumption.

## IV. CODING

```
#include<Wire.h>
#include <OneWire.h>
#include <DallasTemperature,h>
#include <LiquidCrystal.h>
const int rs = 7, en = 6, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
#define HEAT_Relay  10
#define COOL_Relay  11
#define Mode 12
float temp;
#define ONE_WIRE_BUS A1
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);
//-------------------------------------------------------------------------
void setup() {
Serial.begin(9600);
lcd.begin(16, 2);
lcd.print("COOL ");
lcd.setCursor(0, 1);
lcd.print("SYSTEM");
pinMode(Mode, INPUT_PULLUP);
pinMode(HEAT_Relay, OUTPUT);
pinMode(COOL_Relay, OUTPUT);
digitalWrite(HEAT_Relay, HIGH);   //OFF CONDITION;
digitalWrite(COOL_Relay, HIGH);
delay(2000);
lcd.clear();
}
//---------------------------------------------------------
void loop() {
sensors.requestTemperatures();
temp=sensors.getTempCByIndex(0);
Serial.print("Temp:");
Serial.print(temp);
Serial.println("");
lcd.setCursor(0, 0);
lcd.print(String("T: ") + temp + " C");        // Get Temprature from sensor
//=========================================
if(digitalRead(Mode) == LOW){
if(temp>=50){
digitalWrite(HEAT_Relay, HIGH);   //OFF CONDITION;
digitalWrite(COOL_Relay, LOW);
lcd.setCursor(0, 1);
lcd.print("Cooling Start...");
}
else if(temp<=40){
digitalWrite(HEAT_Relay, LOW);
```

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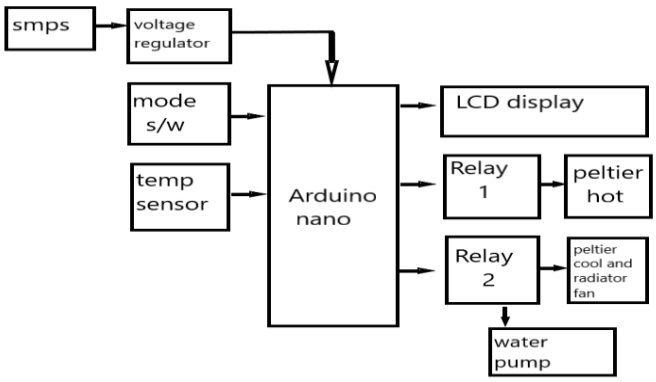
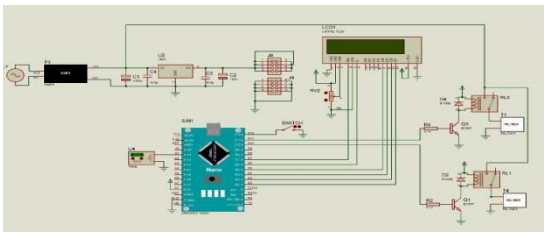
```
digitalWrite(COOL_Relay, HIGH);
lcd.setCursor(0, 1);
lcd.print("Cooling stop....");
}
}
else{
digitalWrite(HEAT_Relay, HIGH);
digitalWrite(COOL_Relay, LOW);
lcd.setCursor(0, 1);
lcd.print("Manual Cooling  ");
}

//--------------------------------------------------
}
```

## V. BLOCK DIAGRAM




Smps is connected with voltage regulatorwhich controls voltage in Audrino Nano.
A switch is attached with Audrino nano for manual and automatic cooling and temperature sensor to read temperature.
LCD display is connected with Audrino nano to detect the temperature.
Also relay 1 and relay 2 are connected with Audrino Nano to control both the heating and cooling peltier.

## VI. CIRCUIT DIAGRAM



Circuit is constructed using Arduino nano and DS 1820 temperature sensor and other components. We are using 16×2 LCD to display current temperature and set points. DS 1820 gives analog output proportional to the temperature which is given to Arduino analog input A0. Which is then compared with set points if it is more than set point, It means the temperature is more so we turn off the heating element such as heater which is connected to relay output. If temperature is less we turn on the relay (heater). We are displaying status of heater on off on the LED and LCD also. Two tactile switches are used to set the temperature set point.
In the above circuit diagram is Automatic temperature controller with Cooling system. In this circuit Arduino nano board is used (ATmega 328pm) which is the brain of the System. The Arduino nano read switch status it may be cooling state or Cooling stop state. When the user select cooling status then the circuit read temperature using temperature sensor U4 DS1820, and display the temperature value on LCD which 16x2 display. When IC read Temperature is greater than 50°C then the IC send logic low signal to the transistor Q1 via base resistor R2 then the

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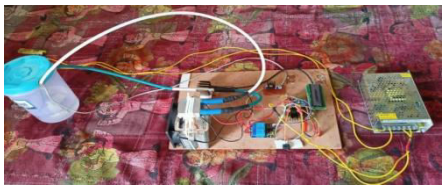
transistor is going to the cut-off resion then the red relay will off and heating peltier will off Heating then the IC send logic High to the transistor Q3 via base resistor Ry to the transistor Q3 act as a switch and relay RL3 will Active and peltier T1 supply will start and pump will start. The peltier T1 is cooling peltier it cools water supply flow on Hot peltier using Almunium pipe.
The hot peltier T4 temperature decreasing.
If the temperature decrease less than 40°C the work will be vice versa. The all perameter or status display on LCD the LCD is Alpha numeric LCD dlisplay. Which is used for display 16x2 characters by Arduino commons and control. The Arduino nano pins 2,3,4,5,6 and 7 will connected with Arduino LCD D7, D6, D5, D4, RS and Enable gain.
The all components required 5V DC supply accept peltier module, but our comming voltage is 12V DC so we used voltage regulator circut . The capacitor C1 and C2 is filter and voltage slablity capacitor where as C4 and C3 is noise remover capacitor and it will remove remove noise, AC components and spike of the voltages. The voltage regulator IC 780s U2 will convert upcoming 12V in constant 5V supply and gives to the all circuits. In the J8 and J9 External 5V supply.

## VII. WORKING



1. We supply 220 V to the Smps .It converts voltage by voltage regulator from 220 to 12 V
2. 12V is required for Audrino Nano to function Audrino Nano is connected with relay circuit and LCD display screen. Audrino Nano work as a microcontroller it controls all the functions and programming.
3. We can change the program for difference in temperature . We had set 40°C as minimum temperature and 50°C as maximum temperature from programming.
4. Relay circuit has 2 Relays it controls both the peltier as temperature increases by 50°C it turns off the the heating peltier and turns on cooling peltier which is mounted on radiator and heat sink . As relay is connected with Radiator fan and heat sink, also a water block is mounted on peltier which is on radiator module.
5. It turns on by relay and cooling process starts. Peltier starts cooling so as water block which is mounted on peltier becomes cool.
6. There is water tank in which small water pump is mounted, tank is filled with water and there are two pipes connected to water block one is connected with water pump and another is leaved in water tank.
7. The water pump takes water from tank to the water block then in water block, water is cooled and comes out from another pipe as cold water which is passed by heating system and pipe is covered with aluminium plate it becomes cool and also cools the heated system .
8. This process continues until temperature becomes 40°C as the temperature becomes 40°C cooling system stops and heating peltier starts by relay and the process goes on .
9. Temperature sensor is connected with heating system and arduino nano so, on LCD screen we get the temperature readings by arduino nano.

## VIII. RESULT

If we do manual cooling it's minimum temperature is 31°C. As we start switch automatic cooling starts it automatically start cooling as temperature increases from 50°C and stops cooling as temperature goes below 40°C We get a slight difference between fix temperature. Upto 5 to 6 °C increase in Heating peltier as heating process is more faster than cooling process. We get less than 1°C difference in cooling temperature.

## IX. CONCLUSION

Controlling the temperature is a major problem in our rapidly evolving world and it needs cost-efficient solutions. This Temperature Control System shows a way to get the temperature value and displaying the value on a graphical LCD via

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Audrino nano . In this Project temperature values are measured in analog form, and then it is converted to digital by the Audrino nano.The user can configure a set-point temperature value and control an external heating and/or cooling device by using the Temperature Control System. The system can be used as the basis for developing custom solutions for networked and stand alone data collection and control equipment. It can be centrally powered due to its low current requirement and its small size makes it more portable, allowing it to be placed almost anywhere.

## X. FUTURE SCOPE

Use as cooling purposes .The project can be enhance in future by increasing the number of peltier plates and radiator fan; so it will help in industries and for medical purpose(peltier - cooled incubator for blood bank). The project can be enhance in future by supplying the power form renewable source such as solar panel. So it can be used in electricity shortage area or in solar energy hotspots zones.

## REFERENCES

1.Elavarasan E *1 , Saravanan S *2, Abhishek Kumar 1 , Anaitullah 2 , Ashok Sah 3 , Karan Kumar S 4 Design and Fabrication of Mini Refrigerator with Thermoelectric Cooling

2.Professor.H. P. Thakre 1 , Akhil K. Gonde2 , Swapnil D. Balge3 , Shubham D. Dhawale4 , Ashwin P. Waghade5 , Akshay N. Sabal6 , Prajkta K. Nagrale AUTOMATIC TEMPERATURE CONTROLLER FOR VARIOUS APPLICATIONS

3. 3. LAWAL, B.Y.1 , DADA, J.B.2 and AHMED-ADE, F.3 Construction of an Automatic Temperature Controller for Monitoring Heating and Cooling Systems

4. Rishikesh S. Sabale1, Prof.J.V. Bute2 Microcontroller based Temperature Controller System

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