

Group – 11

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Experiment 4

Aim:

- Interfacing a temperature sensor (LM35).
- Displaying temperature on PC via serial monitor.
- Interfacing to PC with Processing.
- Display the temperature value with changing colour in Processing.
- Sound the buzzer when temperature is high.

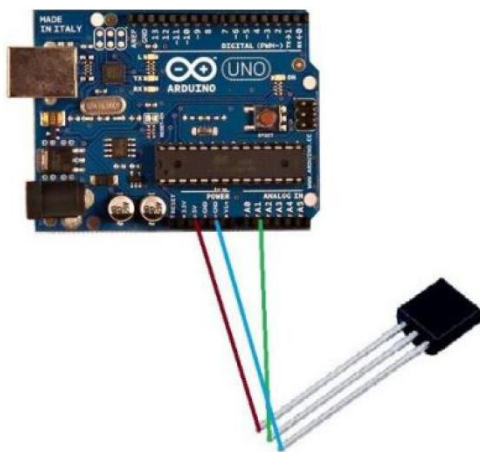
Interfacing a temperature sensor (LM35) and displaying temperature on PC

Sound the buzzer when temperature is high

Display the temperature value with changing colour in Processing

Circuit Diagram and Code

Video Link: <https://photos.app.goo.gl/CKsxbTUvvvqRuU9X8>



Display_Temp

```
int lmPin = A0;
const int buzzer = 9;
void setup() {
  pinMode(buzzer, OUTPUT);
  Serial.begin(9600); //
}
float tempC() {
  float raw = analogRead(lmPin); //
  float percent = raw/1023.0; //
  float volts = percent*5.0; //
  return 100.0*volts; //
}
void loop() {
  Serial.println(tempC()); //
  if(tempC()>25.0){
    tone(buzzer, 5000);
  }
  else{
    noTone(buzzer);
  }
  delay(200); // ms //
}
```

Color_Changing_with_Temperature

```
import processing.serial.*;
Serial myPort;
String myText="";
float temperature;
void setup(){
  size(300, 300);
  myPort = new Serial(this, "COM4", 9600);
  myPort.bufferUntil('\n');
}
void serialEvent (Serial myPort){
  myText = myPort.readStringUntil('\n');
}
void draw() {
  temperature = float(myText);
  background(0, 0, 0);
  if(temperature>=23 && temperature<=24){
    background(0,0,255);
    textSize(32);
    text(temperature, 120, 120);
  }
  if(temperature>24 && temperature<=25){
    background(0,255,0);
    textSize(32);
    text(temperature, 120, 120);
  }
  if(temperature>25){
    background(255,0,0);
    textSize(32);
    text(temperature, 120, 120);
  }
}
```

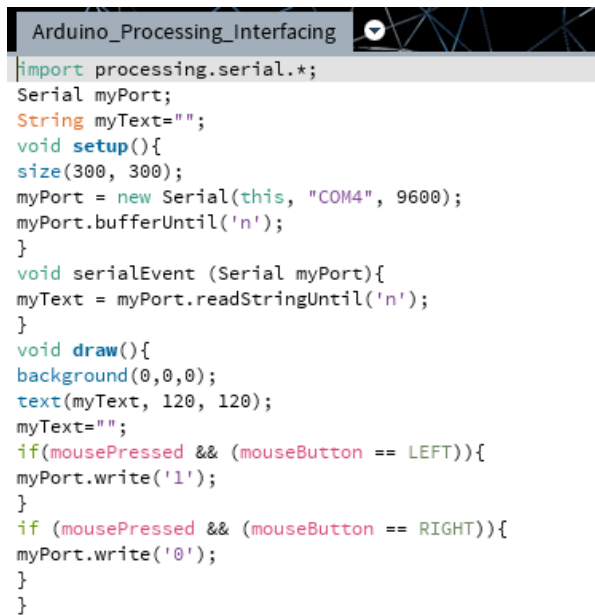
Interfacing to PC with Processing

Code

Video Link: <https://photos.app.goo.gl/kGmR52sCR9BPTKjb7>

Arduino_Processing_Interfacing

```
int led = 13;
int button = 9;
void setup() {
  pinMode(led, OUTPUT);
  pinMode(button, INPUT);
  Serial.begin(9600);
}
void loop() {
  if(Serial.available() > 0) {
    char ledState = Serial.read();
    if(ledState == '1'){
      digitalWrite(led, HIGH);
    }
    if(ledState == '0'){
      digitalWrite(led, LOW);
    }
  }
  int buttonState = digitalRead(button);
  if ( buttonState == HIGH) {
    Serial.println("Button is pressed");
    delay(500);
  }
}
```



```
import processing.serial.*;
Serial myPort;
String myText="";
void setup(){
  size(300, 300);
  myPort = new Serial(this, "COM4", 9600);
  myPort.bufferUntil('\n');
}
void serialEvent (Serial myPort){
  myText = myPort.readStringUntil('\n');
}
void draw(){
  background(0,0,0);
  text(myText, 120, 120);
  myText="";
  if(mousePressed && (mouseButton == LEFT)){
    myPort.write('1');
  }
  if (mousePressed && (mouseButton == RIGHT)){
    myPort.write('0');
  }
}
```

Conclusion

The LM35 is an ideal temperature sensor for measuring ambient temperature. It provides a linear output proportional to the temperature, with 0 V corresponding to 0 degrees C and an output voltage change of 10 mV for each degree C change. LM35s are easier to use than thermistors and thermocouples because they are linear and require no signal conditioning. The output of an LM35 can be connected directly to an Arduino analog input. Because the Arduino analog-to-digital converter (ADC) has a resolution of 1024 bits, and the reference voltage is 5 V, the equation used to calculate the temperature from the ADC value is:

temperature = ((5.0 * analogRead (TemperaturePin)) / 1024) * 100.0