MODULE ON MICROCONTROLLER PROGRAMING

Title

Using temperature sensor for Arduino applied for COVID19

Required elements

- 1x Arduino Uno
  https://ardushop.ro/ro/home/29-placa-de-dezvoltare-uno-r3.html
- 1x Breadboard
  https://ardushop.ro/ro/electronica/33-breadboard-830.html
- 1x Temperature Sensor Lm35
  https://ardushop.ro/ro/electronica/192-senzor-temperatura-lm35dz.html
- 1x Set of jumper wires
  https://ardushop.ro/ro/electronica/28-65-x-jumper-wires.html

Apps

- Arduino IDE

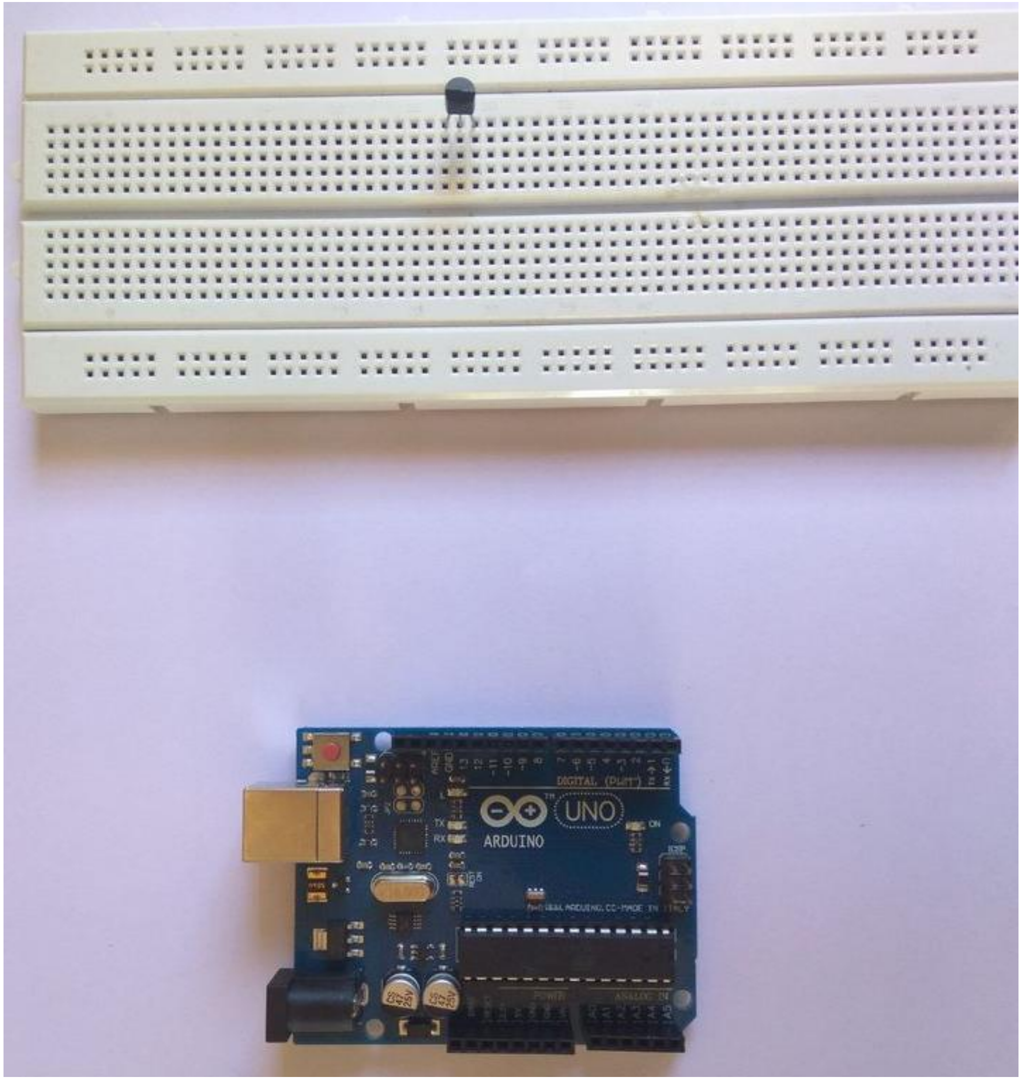
  or
- Arduino Web Editor

Description

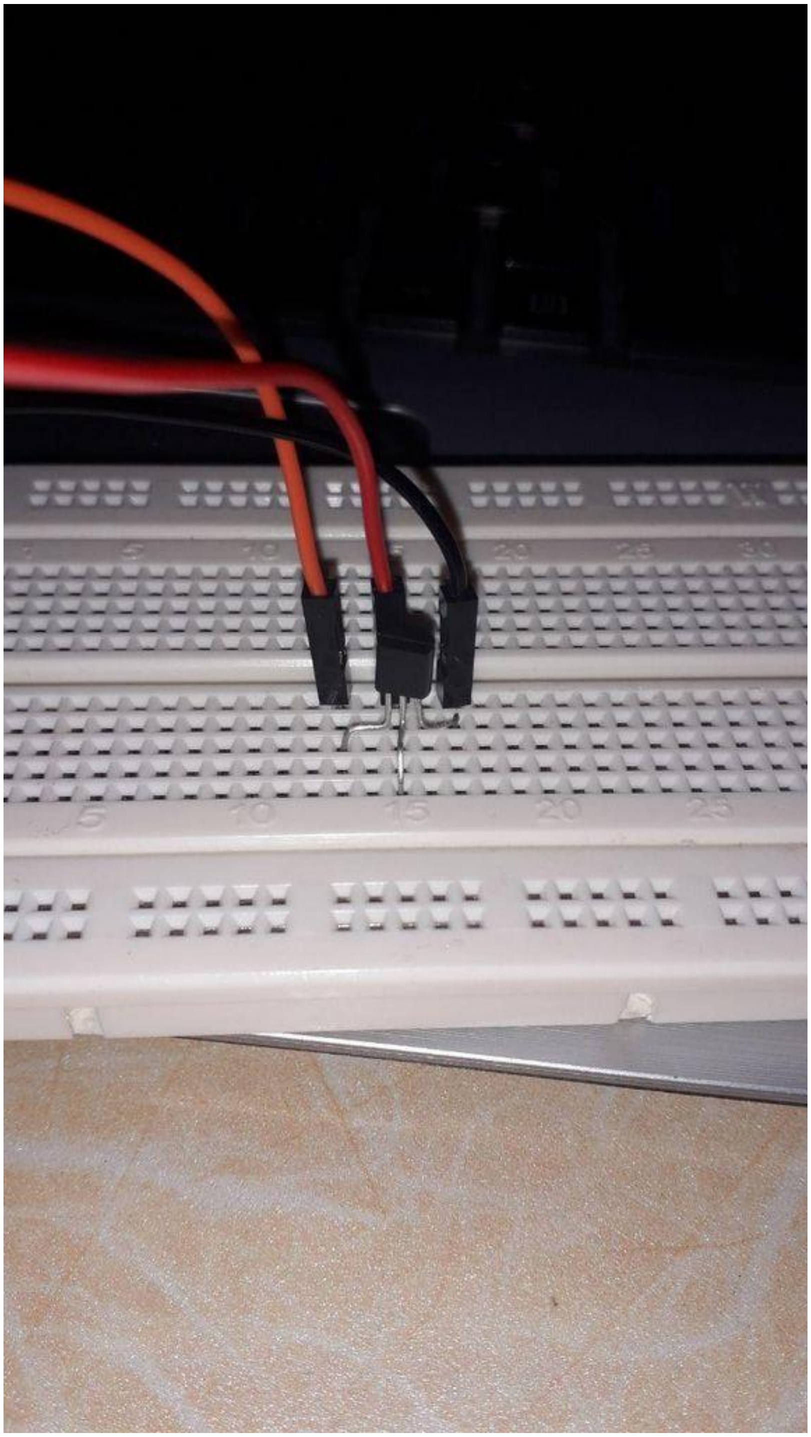
The lm35 is an analog linear temperature sensor. This means that the output voltage is proportional to the temperature. The output voltage rises by 10mv for every 1 degree Celsius rise in temperature. The Arduino can read input from 0-5v. The Arduino stores this as a 10bit number(0-1023). The method that i am going to use now can be used to measure temperature from 2 degree Celsius to the maximum temperature that your lm35 can measure.

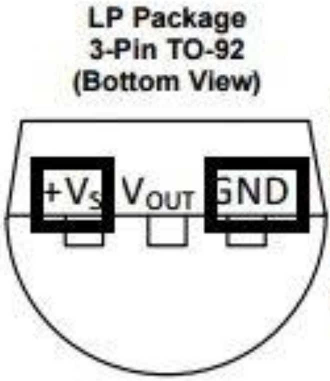
Construction of the Project

At the beginning we will have the breadboard with the sensor on it and the Arduino which we will connect to the sensor.



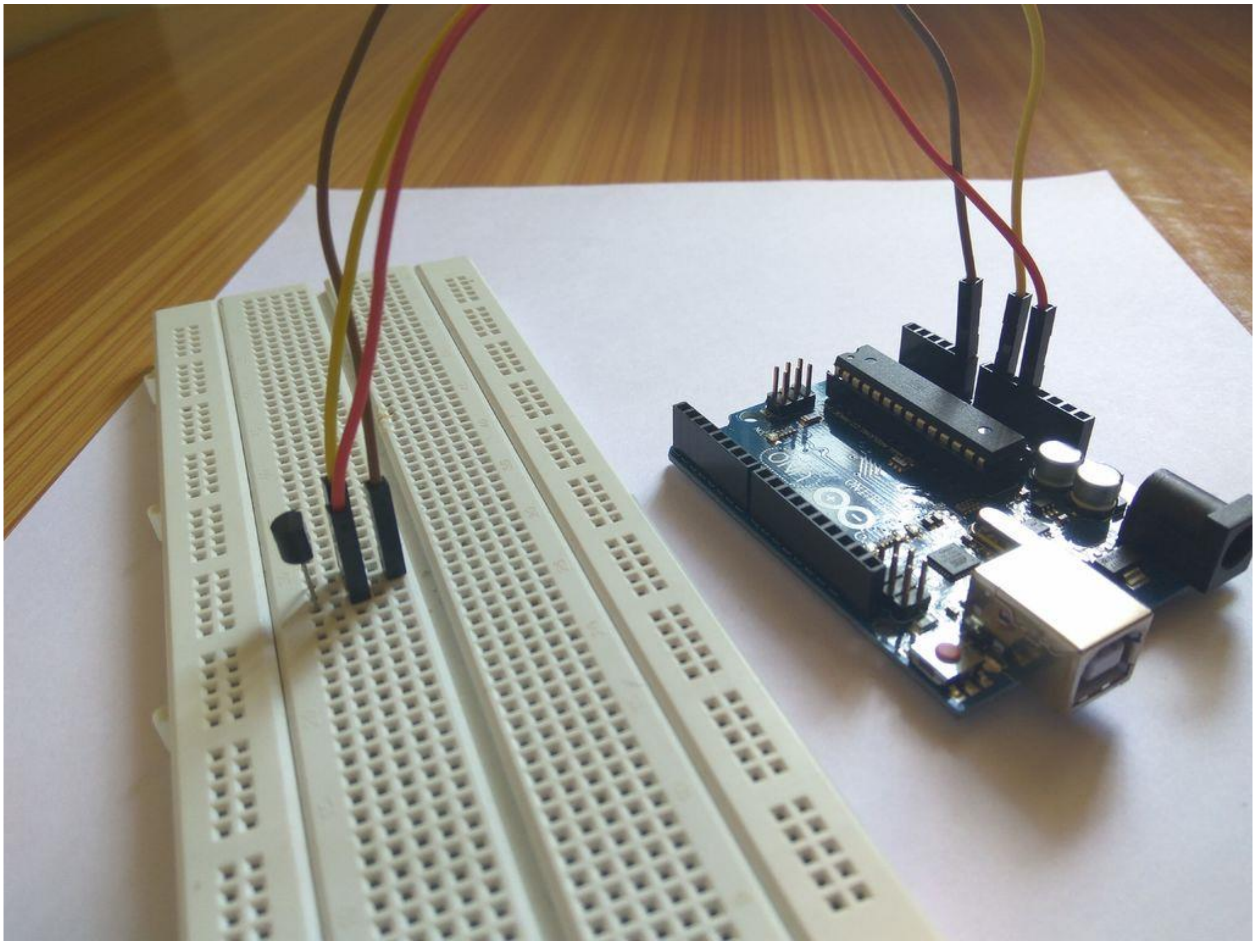
Step 1: Making the Connections





Vs and gnd are interchanged in my case

Connect the Vs pin to the 5v pin on the Arduino and ground to one of the 2 ground pins on the power rail. Connect the Vout pin to one of the analog pin, A0 in our case.



The lm35 that we used has the ground pin and the Vs pin interchanged compared to the Texas Instruments one, the data sheet for which is commonly available. If you have interchanged the pins while connecting the sensor it will get hot so you'll know if its incorrect.

Tip:

The temperature that you get is not reliable if you connect many jumper cables together to make the wire long.

Step 2: The Code

First we need the setup.

```
int temppin = 0;

float temp;

void setup()
{

 Serial.begin(9600);

}
```

Here we are initializing the temperature of the pin we will be working with and the variable that is going to store the temperature of the person.

After that we've written a function called loop.

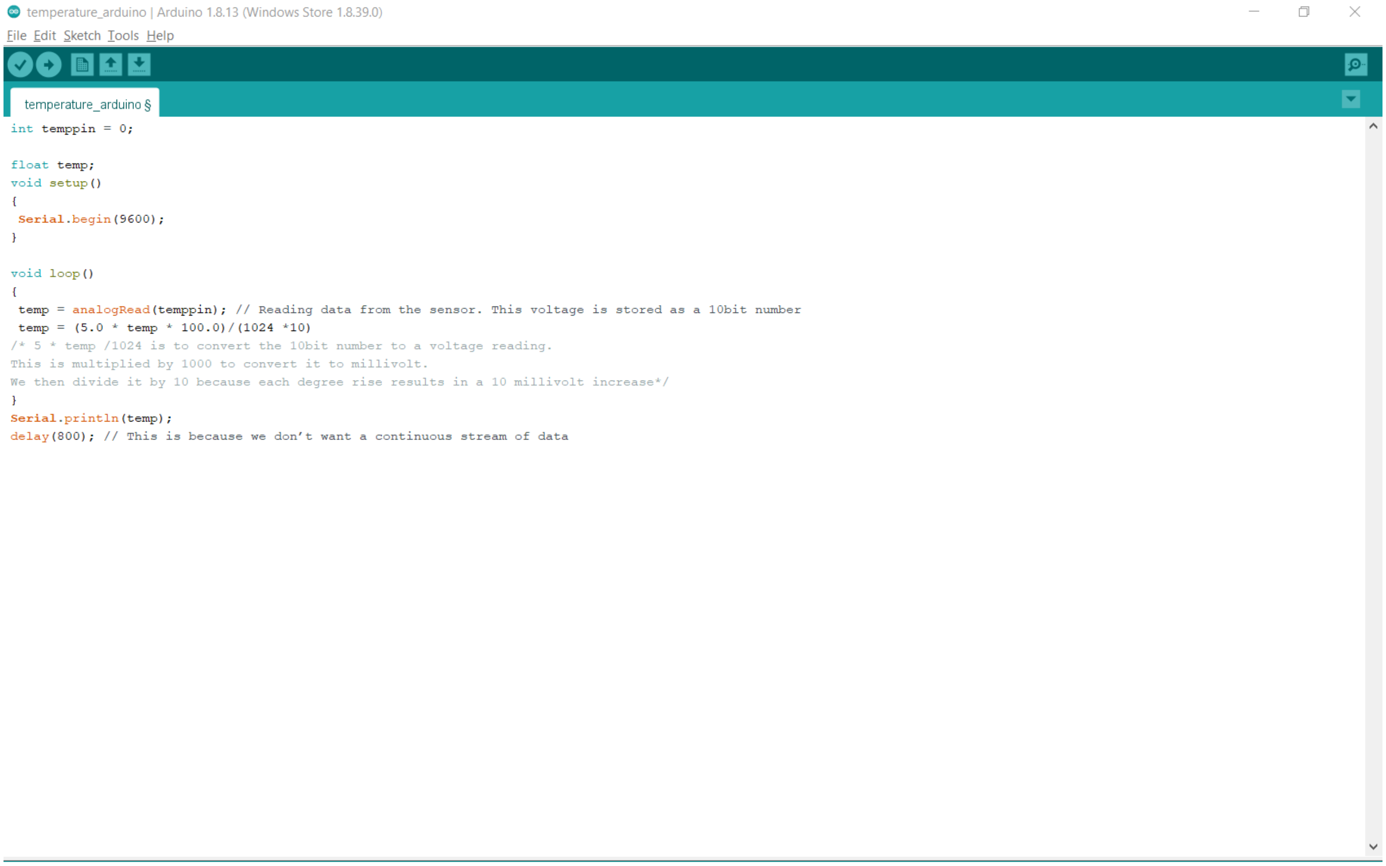
```
void loop()
{

 temp = analogRead(temppin); // Reading data from the sensor. This voltage
is stored as a 10bit number

 temp = (5.0 * temp * 100.0)/(1024 *10)

}
```

This function lets the variable temp to read the data that it is given from the sensor. And the voltage will be stored as a 10 bit number.

After that we use a simple formula, 5.0 (.0 so that I takes all the real numbers and their decimals when using the operators) * temp * 100.0(the same story we've presented previously) / 1024 * 10 -> **(5.0 * temp *100.0) / (1024. 10)**

The 5 * temp / 1024 part is to convert the 10bit number to a voltage reading.This will be multiplied by 1000 to convert it to millivolts and then divided by 10 because each degree rise results in a 10 millivolts increase.

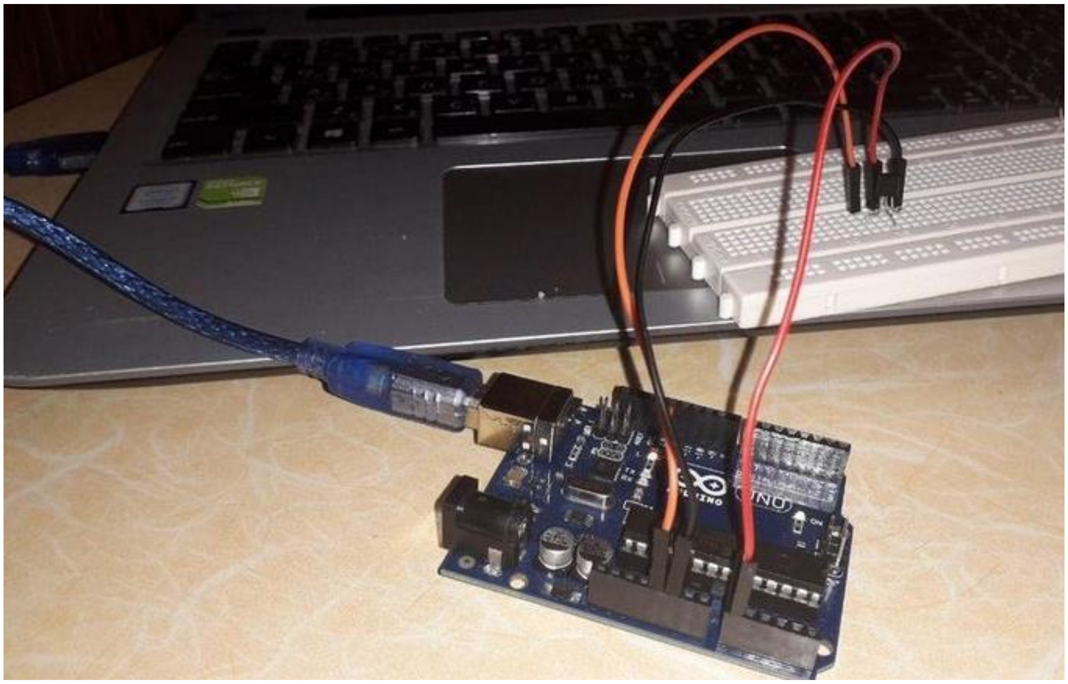
After that we wrote the sketch in our Arduino IDE.



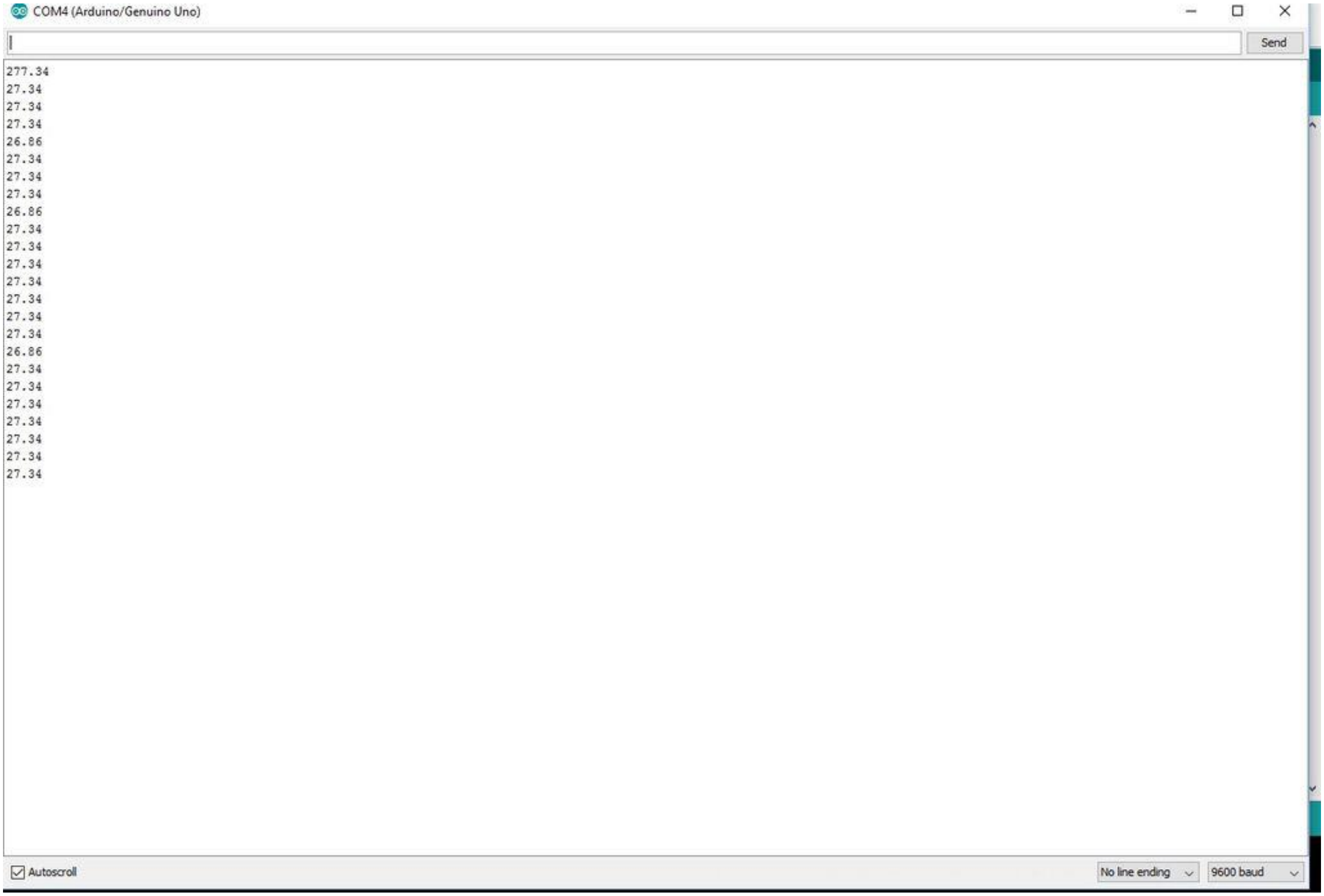
temperature_arduino | Arduino 1.8.13 (Windows Store 1.8.39.0)
File Edit Sketch Tools Help
temperature_arduino §

```
int temppin = 0;

float temp;
void setup()
{
 Serial.begin(9600);
}

void loop()
{
 temp = analogRead(temppin); // Reading data from the sensor. This voltage is stored as a 10bit number
 temp = (5.0 * temp * 100.0)/(1024 *10)
/* 5 * temp /1024 is to convert the 10bit number to a voltage reading.
This is multiplied by 1000 to convert it to millivolt.
We then divide it by 10 because each degree rise results in a 10 millivolt increase*/
}
Serial.println(temp);
delay(800); // This is because we don’t want a continuous stream of data
```

Then we uploaded the code to the Arduino Uno, which now should look something like that:



Step 3: Check the Temperature



```
277.34
27.34
27.34
27.34
26.86
27.34
27.34
27.34
26.86
27.34
27.34
27.34
27.34
27.34
27.34
27.34
26.86
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27.34
27.34
27.34
27.34
27.34
27.34
```

No line ending
9600 baud

Here we can see the temperature of the subject on which we tested our Arduino controlled temperature reader.

The Source Code

```
int temppin = 0;

float temp;

void setup()
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```

Here we have the Source Code with some comments that should help everyone have a better understanding about what we did.

Price List

- 1x Arduino Uno - 19,84 Ron
- 1x Breadboard - 9,96 Ron
- 1x Temperature sensor Lm35 - 13,39 Ron
- 1x Set of jumper wires - 13,28 Ron

Total price of the required elements is 56.47 Ron

Useful Links

- https://arduinomodules.info/
- https://learn.sparkfun.com/tutorials/what-is-an-arduino/all
- https://www.youtube.com/watch?v=nL34zDTPkcs
- https://www.youtube.com/watch?v=QO_Jlz1qpDw
- https://randomnerdtutorials.com/9-arduino-compatible-temperature-sensors-for-your-electronics-projects/