LM35 Temperature Sensor

Introduction

A lot of scenarios in real life require to measure temperature. In order to accurately measure temperature, it would require the temperature sensor. Mercury thermometer is for body temperature measurement, PT100 / PT1000 are generally used to measure temperature of industrial instrumentation, LM35, 18B20 is commonly used in daily life to take temperature, this experiment will be based on LM35 to measure temperature.

LM35 is a temperature sensor of precise integrated circuit temperature sensor, its output voltage is linearly proportional to the degree of Celsius temperature. Therefore, LM35 is far more superior than the absolute scale linear temperature sensor. LM35 series sensor has been calibrated when produced, the output voltage corresponds to the degree of Celsius temperature, so it's very convenient for application. The sensitivity of LM35 series sensor is 10.0 mV / ℃, the precision is between 0.4 ℃ and 0.8 ℃ (-55 ℃ to + 150 ℃ temperature range), and it is also with high reproducibility, low output impedance. Linear output and internal calibration accuracy make the readout or controlling circuit interfaces easy-to-use. It can work in single supply or the positive-negative power supply, and with the following features:

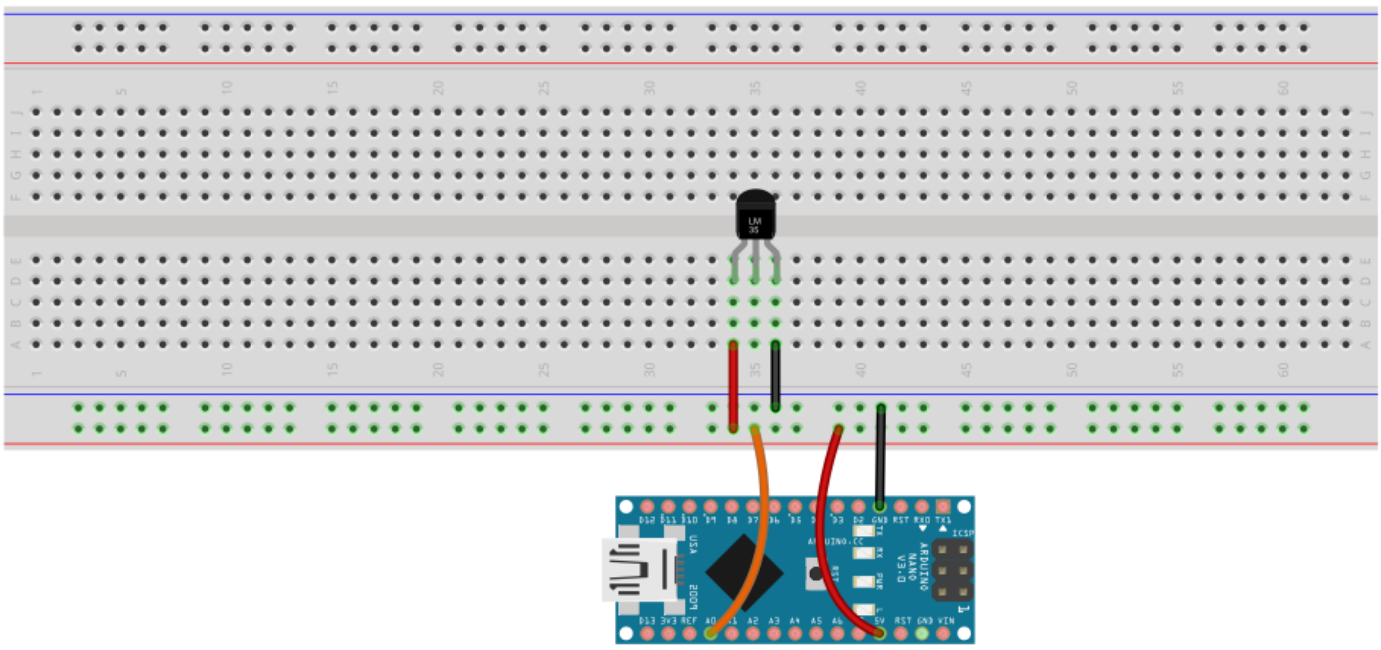
- It can be directly calibrated under Celsius temperature
- + 10.0 mV / ℃ linear scale
- It can ensure the precision of 0.5 ℃ (25 ℃)
- The rated temperature range is from - 55 ℃ to + 150 ℃
- It can be applied in long-distance
- Working voltage widely ranges from 4v to 30v
- Low power consumption, less than 60 uA
- In the still air, its self-heating effect stays low,less than 0.08℃
- The nonlinear data is only plus or minus 1/4 ℃
- When passing 1mA current through it, the output impedance is only 0.1Ω

Component List

- Arduino Nano Mainboard
- Breadboard
- USB cable
- LM35 Temperature Sensor*1

- Several jumper wires

Wiring of Circuit



Experiment Principle

Arduino collects the output value of LM35 through analogRead () function every 1 second. Firstly, we get the actual voltage by A/D analog-to-digital conversion former.

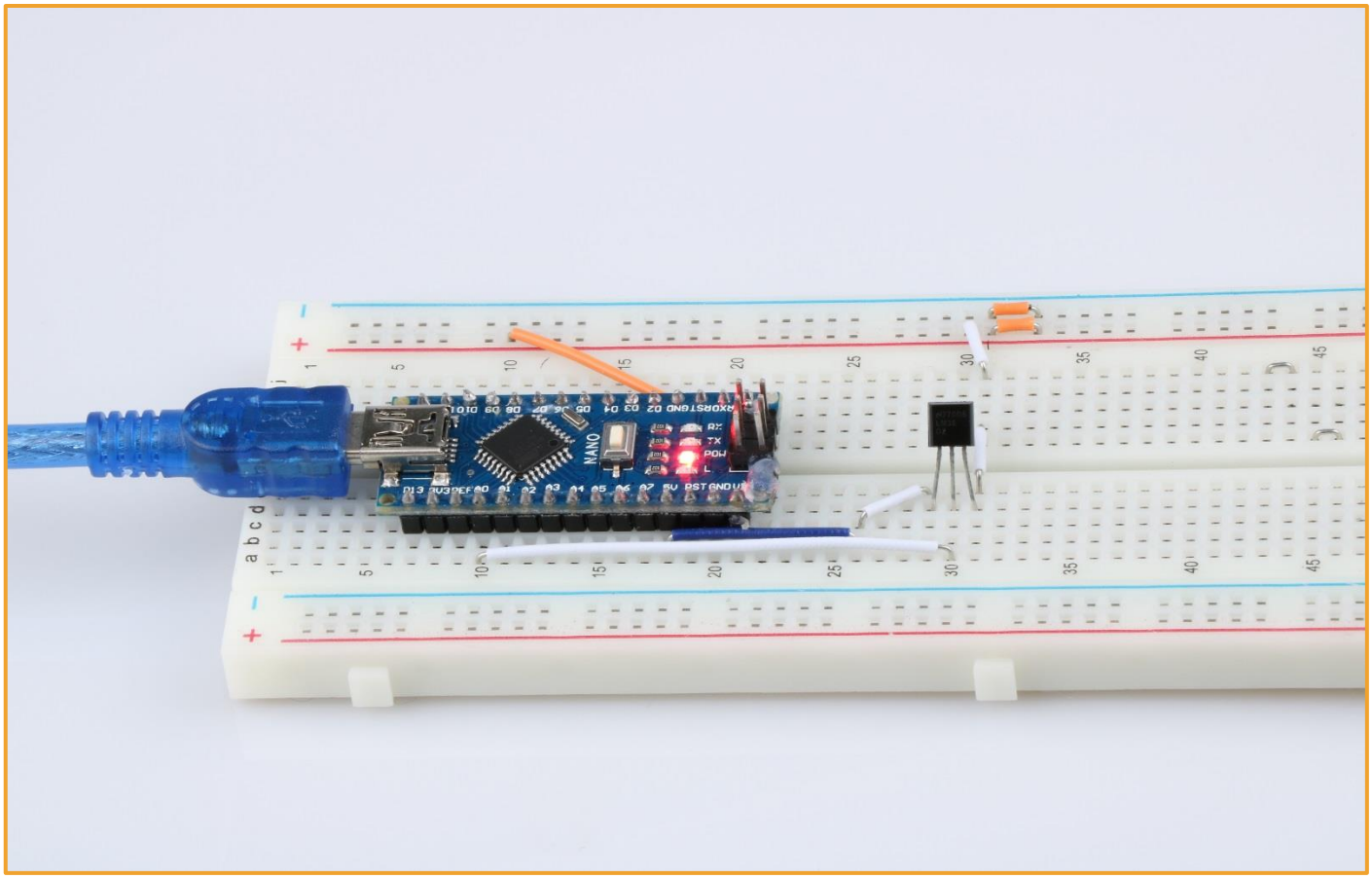
$$V_R = \frac{Value}{2^{10} - 1} \times V_{DD}$$ namely, V = Vad*5 / 1023 (5V)

Secondly, According to LM35 sensor precision: Temp = Vad (V) * 100 (℃ / V), we can get the corresponding temperature value.

Code

```
int Temp Pin = A0;              // analog pin line LM35 numble 2 wire
int val;
int dat;
float voltage = 0.0 ;
void setup()
{
    Serial.begin(115200);       //init serial Baud rate 115200
}
void loop()
{
    val = analogRead(Temp_Pin);       //  read analog raw data
    voltage = ( ( float )val )/1023;
    voltage = voltage * 5 ;           // convert analog value to real
voltage
    dat =  voltage * 100;             // convert voltage to temprature
    Serial.print("Current Temp : ");
    Serial.print(dat);
    Serial.println("C");
    delay(500);                       // Delay 0.5 s
}
```

Experiment Result



COM26

Send

```
Current Temp : 27C
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Autoscroll No line ending 115200 baud