Grove - Temperature Sensor User Manual

Release date： 2015/9/22

Version： 1.0

Wiki: http://www.seeedstudio.com/wiki/Grove_-_Temperature_Sensor_V1.2

Bazaar: http://www.seeedstudio.com/depot/Grove-Temperature-Sensor-p-774.html?cPath=25_125

Document Revision History

Revision	Date	Author	Description
1.0	Sep 22, 2015	Loovee	Create file

Contents

Disclaimer

For physical injuries and possessions loss caused by those reasons which are not related to product quality, such as operating without following manual guide, natural disasters or force majeure, we take no responsibility for that.

Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

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1. Introduction

The Grove - Temperature Sensor uses a Thermistor to detect the ambient temperature. The resistance of a thermistor will increase when the ambient temperature decreases. It's this characteristic that we use to calculate the ambient temperature. The detectable range of this sensor is -40 - 125° C, and the accuracy is ±1.5° C

Note: This wiki works with Grove - Temperature sensor V1.1 as well, for V1.0 please refer to *Grove - Temperature Sensor*

2. Specifications

- Voltage: 3.3 ~ 5V
- Zero power resistance: 100 KΩ
- Resistance Tolerance: ±1%
- Operating temperature range: -40 ~ +125 ℃
- Nominal B-Constant： 4250 ~ 4299K

3. Getting Started

After this section, you can make Grove - Temperature Sensor V1.1/1.2 run with only few steps.

3.1 Preparations

Now we are making a simple demo to get data from Grove - Temperature Sensor V1.1/1.2 require following modules.

- Seeeduino v4.2

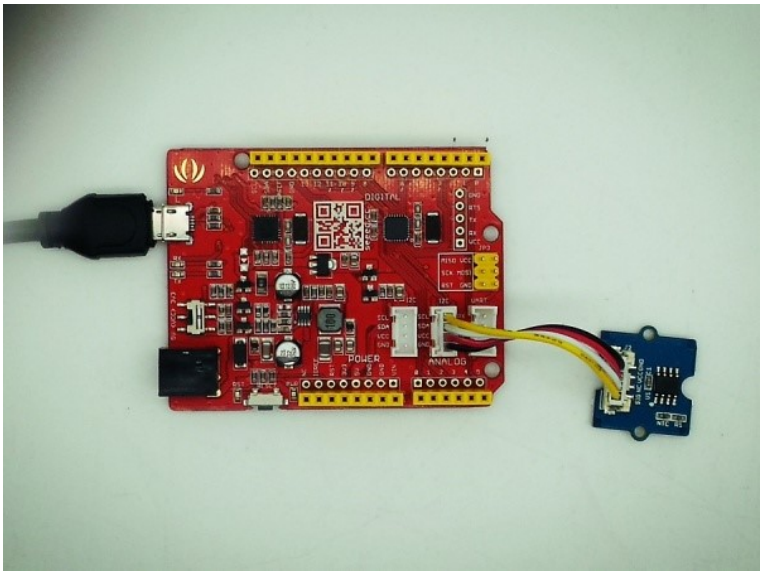
Seeeduino V4.2 is fully compatible with Arduino.

If this is your first time using Arduino, Please put hand on here to start your Arduino journey.

3.2 Connecting hardware

Just connect Grove - Temperature Sensor into A5 connector of Seeeduino v4.2

As shown below:



3.3 Download

Launch Arduino IDE and click **File>New** to open a new page.

Then copy below code into Arduino IDE:

```
// Demo code for Grove - Temperature Sensor V1.1/1.2
// Loovee @ 2015-8-26
```

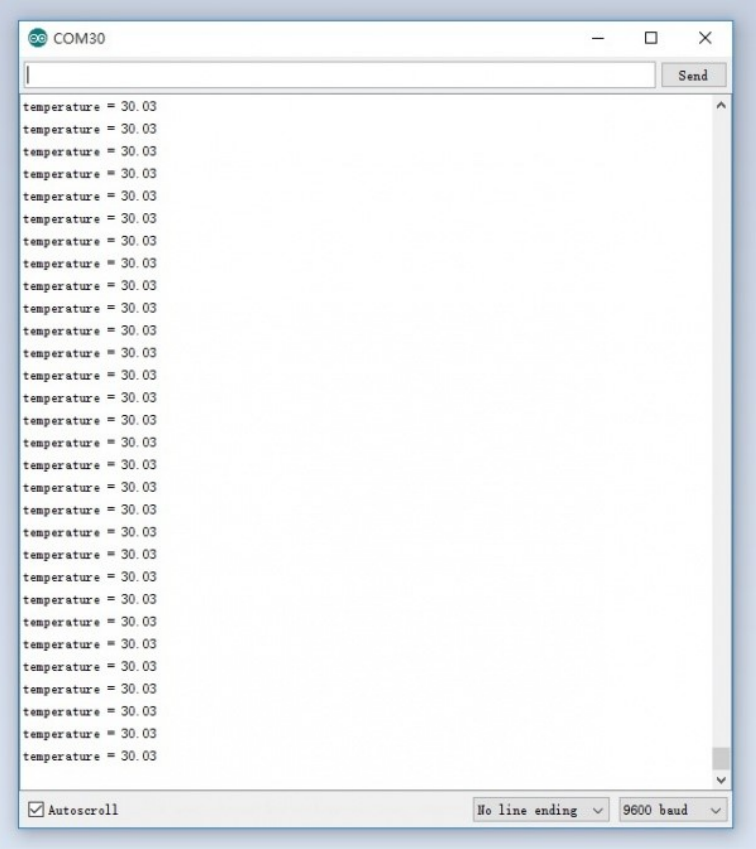
```
#include <math.h>

const int B=4275;                 // B value of the thermistor
const int R0 = 100000;            // R0 = 100k
const int pinTempSensor = A5;     // Grove - Temperature Sensor connect to A5

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

void loop()
{
    int a = analogRead(pinTempSensor );

    float R = 1023.0/((float)a)-1.0;
    R = 100000.0*R;

    //convert to temperature via datasheet ;
    float temperature=1.0/(log(R/100000.0)/B+1/298.15)-273.15;

    Serial.print("temperature = ");
    Serial.println(temperature);

    delay(100);
}
```

Click **Tools>Board** to choose Arduino UNO and select respective serial port.

Now click **Upload (CTRL+U)** to burn testing code. Please refer to here for any error prompt and you can also add comment on forum

3.4 Review Results

After upload completed, Open Serial Monitor of your Arduino IDE, you can get the temperature:


COM30
Send
temperature = 30.03
Autoscroll
No line ending
9600 baud

4. Reference

If you want to know how the algorithm of temperature coming, please refer to the below image:

1. Zero-power Resistance of Thermistor: R

   $R=R_0 \exp B(1/T-1/T_0)$ ·····(1)

   R: Resistance in ambient temperature T (K)

   (K: absolute temperature)

   R_0: Resistance in ambient temperature T_0 (K)

   B: B-Constant of Thermistor

2. B-Constant

   as (1) formula

   $B=\ell n (R/R_0) / (1/T-1/T_0)$ ·····(2)

3. Thermal Dissipation Constant

   When electric power P (mW) is spent in ambient temperature T_1 and thermistor temperature rises T_2, there is a formula as follows

   $P=C (T_2-T_1)$ ·····(3)

   C: Thermal dissipation constant (mW/°C)

   Thermal dissipation constant is varied with dimensions, measurement conditions, etc.