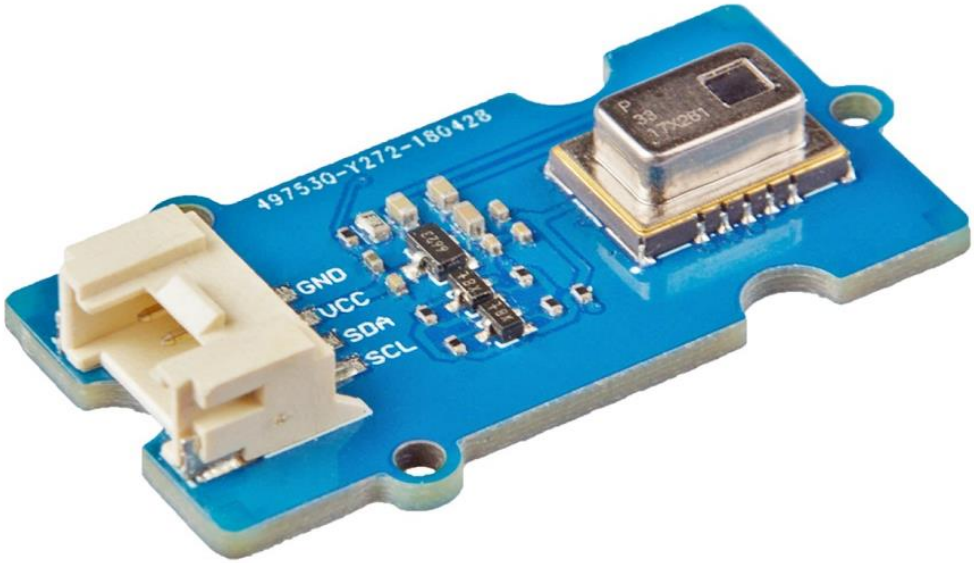
Grove - Infrared Temperature Sensor Array(AMG8833)



The Grove - Infrared Temperature Sensor Array (AMG8833) is a high precision infrared array sensor which based on advanced MEMS technology. It can support temperature detection of two-dimensional area: 8 × 8 (64 pixels) and maximum 7 meters detection distance.

We provide both Arduino and Raspberry Pi demo for this sensor. It will be a perfect module to make your own thermal camera.

Features

- Temperature detection of two-dimensional area: 8 × 8 (64 pixels)
- I2C output (capability of temperature value output)
- High precision
- Long detection distance

Specification

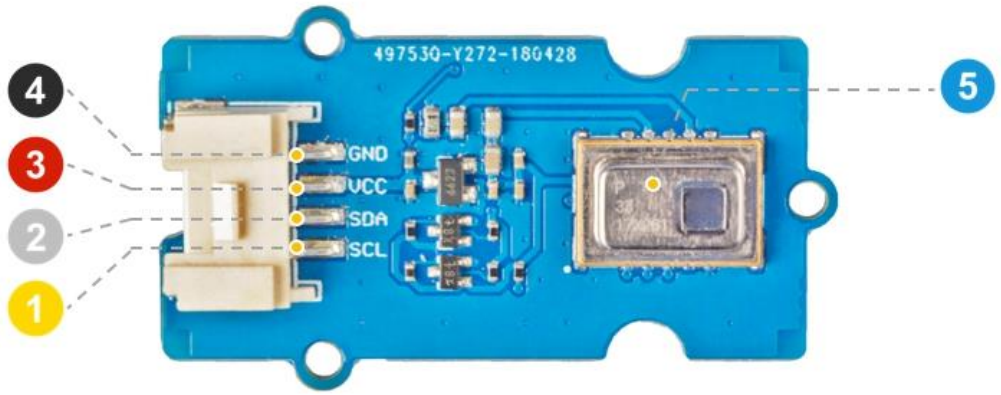
Item	Value
Operating Voltage	3.3V / 5V
Temperature range of measuring object	0 °C to 80 °C +32 °F to +176 °F
Operating temperature range	0 °C to 80 °C +32 °F to +176 °F
Storage temperature range	−20 °C to 80 °C –4 °F to +176 °F
Temperature accuracy	Typical ±2.5 °C ±4.5 °F
Viewing angle	Typical 60 °
Optical axis gap	Within Typical ±5.6 °
Number of pixel	64 (Vertical 8 × Horizontal 8 Matrix)
External interface	I^2C
I^2C Address	0x68(default) \ 0x69(optional)

Typical Applications

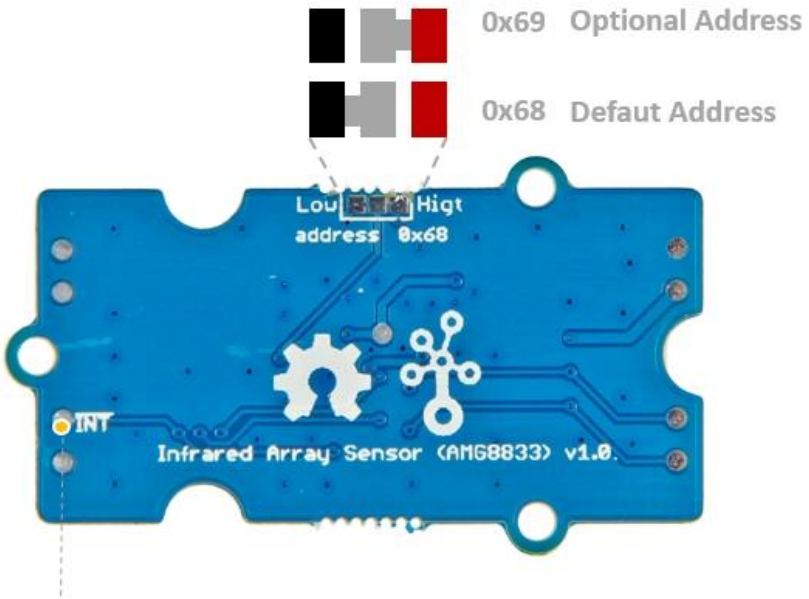
- High function home appliances (microwaves and air-conditioners)
- Energy saving at office (air-conditioning/lighting control)
- Digital signage
- Automatic doors/elevators

Hardware Overview

Pin Out



4 GND: connect this module to the system GND
3 VCC: you can use 5V or 3.3V for this module
2 SDA: I²C serial data
1 SCL: I²C serial clock
5 the AMG8833 module

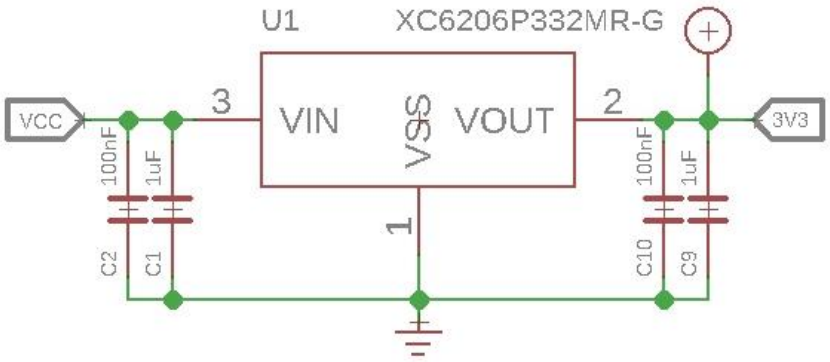


$\overline{\text{INT}}$ Pin

normally has same voltage as VDD, when interrupting, same as GND (0V)

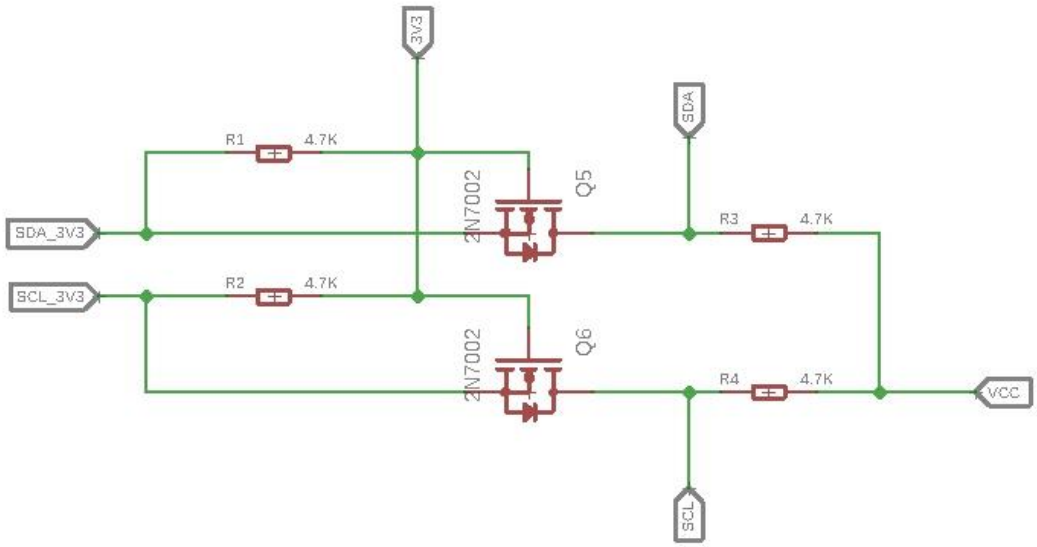
Schemaitc

Power



The typical voltage of AMG8833 is 3.3V, so we use the XC6206P33 chip to provide a stable 3.3V. The input of XC6206P33 ranges from 1.8V to 6.0V, so you can use this module with your Arduino both in 3.3V and 5V.

Bi-directional level shifter circuit



This is a typical Bi-directional level shifter circuit to connect two different voltage section of an I²C bus. The I²C bus of this sensor use 3.3V, if the I²C bus of the Arduino use 5V, this circuit will be needed. In the schematic above, **Q6** and **Q5** are N-Channel MOSFET 2N7002A, which act as a bidirectional switch. In order to better understand this part, you can refer to the AN10441

Platforms Supported

Arduino	Raspberry Pi	BeagleBone	Wio	LinkIt ONE

Caution
The platforms mentioned above as supported is/are an indication of the module's software or theoritical compatibility. We only provide software library or code examples for Arduino platform in most cases. It is not possible to provide software library / demo code for all possible MCU platforms. Hence, users have to write their own software library.

Getting Started

Play With Arduino

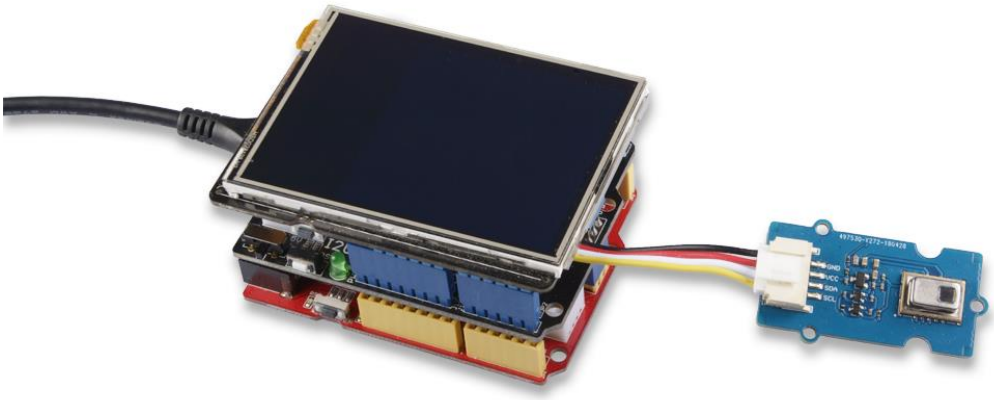
Hardware

Materials required

Seeeduino V4.2	Base Shield	Infrared Temperature Sensor Array	2.8 TFT Touch Shield V2.0
			

Note
1 Please plug the USB cable gently, otherwise you may damage the port. Please use the USB cable with 4 wires inside, the 2 wires cable can't transfer data. If you are not sure about the wire you have, you can click here to buy
2 Each Grove module comes with a Grove cable when you buy. In case you lose the Grove cable, you can click here to buy.

- **Step 1.** Connect the Grove - Infrared Temperature Sensor Array (AMG8833) to port **I²C** of Grove-Base Shield.
- **Step 2.** Plug Grove - Base Shield into Seeeduino.
- **Step 3.** Plug 2.8 TFT Touch Shield V2.0 into the Grove - Base Shield.
- **Step 4.** Connect Seeeduino to PC via a USB cable.



Note
If we don't have Grove Base Shield, We also can directly connect this module to Seeeduino as below.

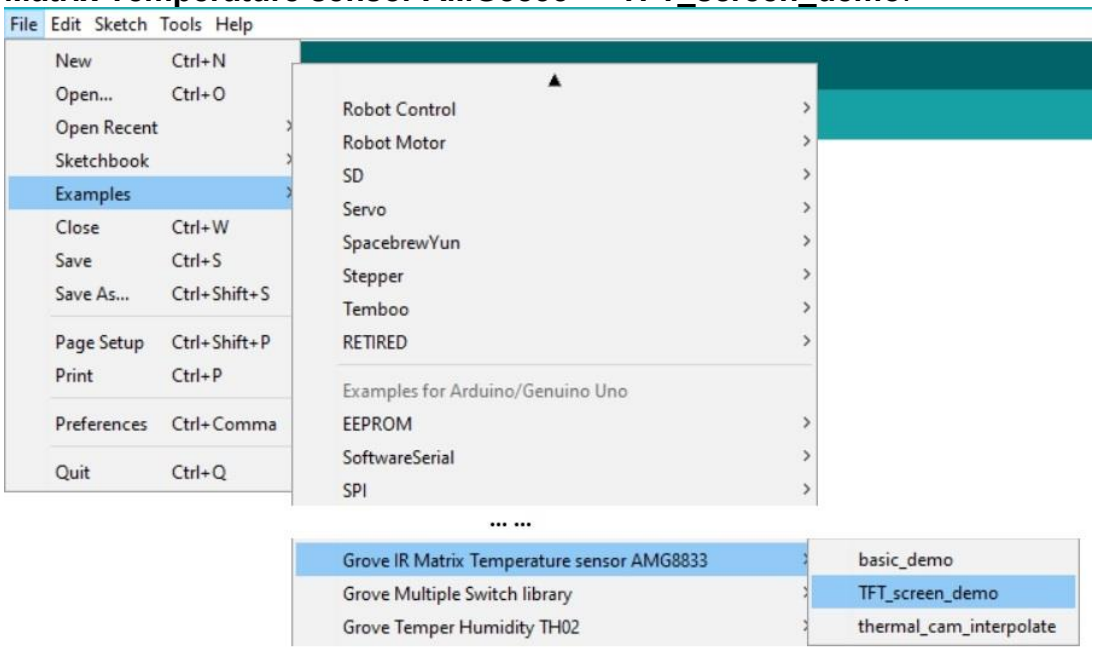
Seeeduino	Grove Cable	Grove - Infrared Temperature Sensor Array (AMG8833)
GND	Black	GND
5V or 3.3V	Red	VCC
SDA	White	SDA
SCL	Yellow	SCL

Software

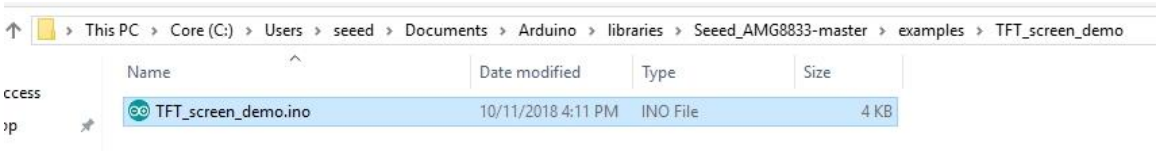
Note
If this is the first time you work with Arduino, we strongly recommend you to see Getting Started with Arduinobefore the start.

- **Step 1.** Download the Seeed_AMG8833 Library from Github.
- **Step 2.** Refer to How to install library to install library for Arduino.

- **Step 3.** Restart the Arduino IDE. Open the example, you can open it in the following three ways：
  a. Open it directly in the Arduino IDE via the path: **File → Examples → Grove IR Matrix Temperature sensor AMG8833 → TFT_screen_demo**.



  b. Open it in your computer by click the **TFT_screen_demo.ino** which you can find in the folder **XXXXArduino\libraries\Seeed_AMG8833-master\examples\TFT_screen_demo**, **XXXX** is the location you installed the Arduino
IDE.



  c. Or, you can just click the icon in upper right corner of the code block to copy the following code into a new sketch in the Arduino IDE.

```
 #include <stdint.h>
1#include <TFTv2.h>
 #include <SPI.h>
2
 #include "Seeed_AMG8833_driver.h"
3

4AMG8833 sensor;

5#define TFT_PIXELS_NUM   30

6void parse_int_status(u8* status)
 {
7    u8 val=0;
```

```
    for(u32 i=0;i<8;i++)
    {
        if(status[i])
        {
            for(u32 j=0;j<8;j++)
            {
                if(status[i]&((1<<j)))
                {
                    Serial.print("pixel ");
                    Serial.print(8*i+j+1);
                    Serial.println("interrupt is generated!!!");
                }
            }
        }
    }
}

void print_status(u8* status)
{
    for(u32 i=0;i<8;i++)
    {
        Serial.print(status[i],HEX);
        Serial.print("  ");

    }
    Serial.println("  ");
}




void setup()
{
    Serial.begin(115200);
    sensor.init();
    TFT_BL_ON;
    /*2.8 TFT screen. url:https://www.seeedstudio.com/2.8-TFT-Touch-Shield-V2.0-p-1286.html*/
    Tft.TFTinit();
}



void loop()
{
    u8 val=0;
    float pixels_temp[PIXEL_NUM]={0};
    u16 color[PIXEL_NUM]={0};
    /*Read temperature*/
    sensor.read_pixel_temperature(pixels_temp);
    /*Different temperature correspond to different color.*/
    for(u32 i=0;i<PIXEL_NUM;i++)
    {
        if(pixels_temp[i]<29)
        {
            color[i]=BLUE;
        }
```

```
        else if((pixels_temp[i]>=29)&&(pixels_temp[i]<30))
        {
            color[i]=GREEN;
        }
        else if((pixels_temp[i]>=30)&&(pixels_temp[i]<31))
        {
            color[i]=YELLOW;
        }
        else if((pixels_temp[i]>=31)&&(pixels_temp[i]<33))
        {
            color[i]=0xfd00;
        }
        else
        {
            color[i]=RED;
        }
    }
    /*Use a TFT screen to display.*/
    for(u32 i=0;i<PIXEL_NUM;i++)
    {

Tft.fillScreen(TFT_PIXELS_NUM*(i%8),TFT_PIXELS_NUM*(i%8+1),TFT_PIXELS_NUM*(8
-i/8),TFT_PIXELS_NUM*(7-i/8),color[i]);
    }
}
```

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```

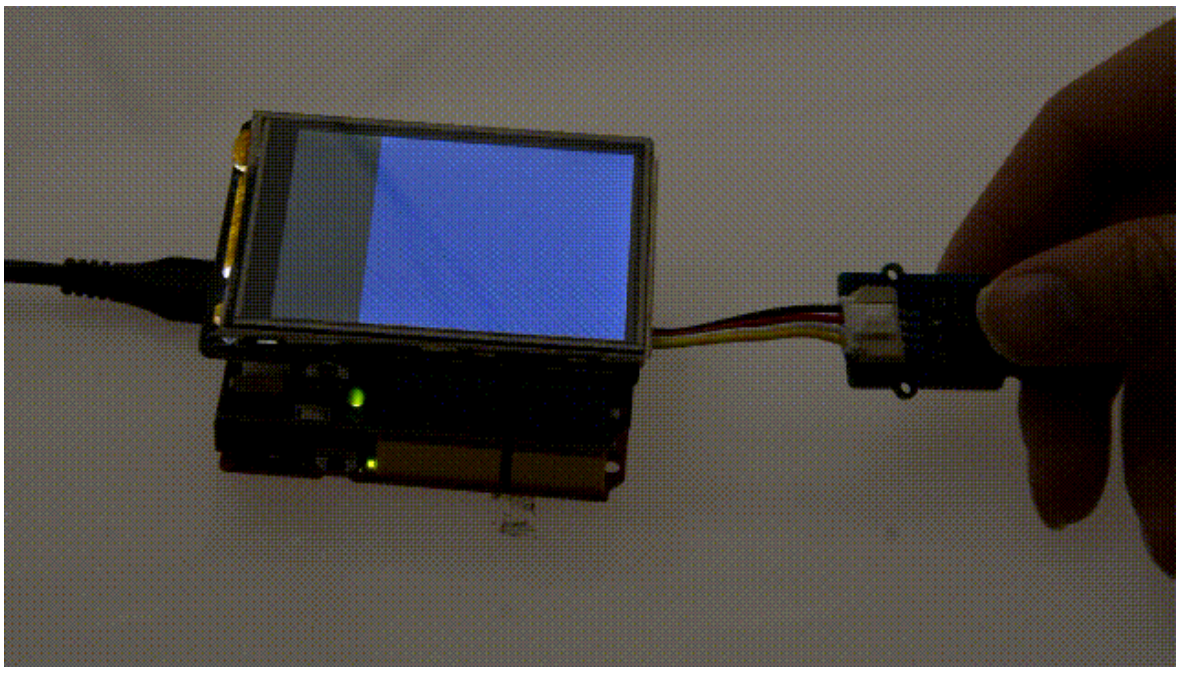
```
3
```

Attention
The library file may be updated. This code may not be applicable to the updated library file, so we recommend that you use the first two methods.

- **Step 4.** Upload the demo. If you do not know how to upload the code, please check How to upload code.

Success

If every thing goes well, you will see the TFT screen shows the temperature map.



Play with Raspberry

Note
If this is the first time you play with a raspberry pi, please refer to the Get start with a raspberry Pi.

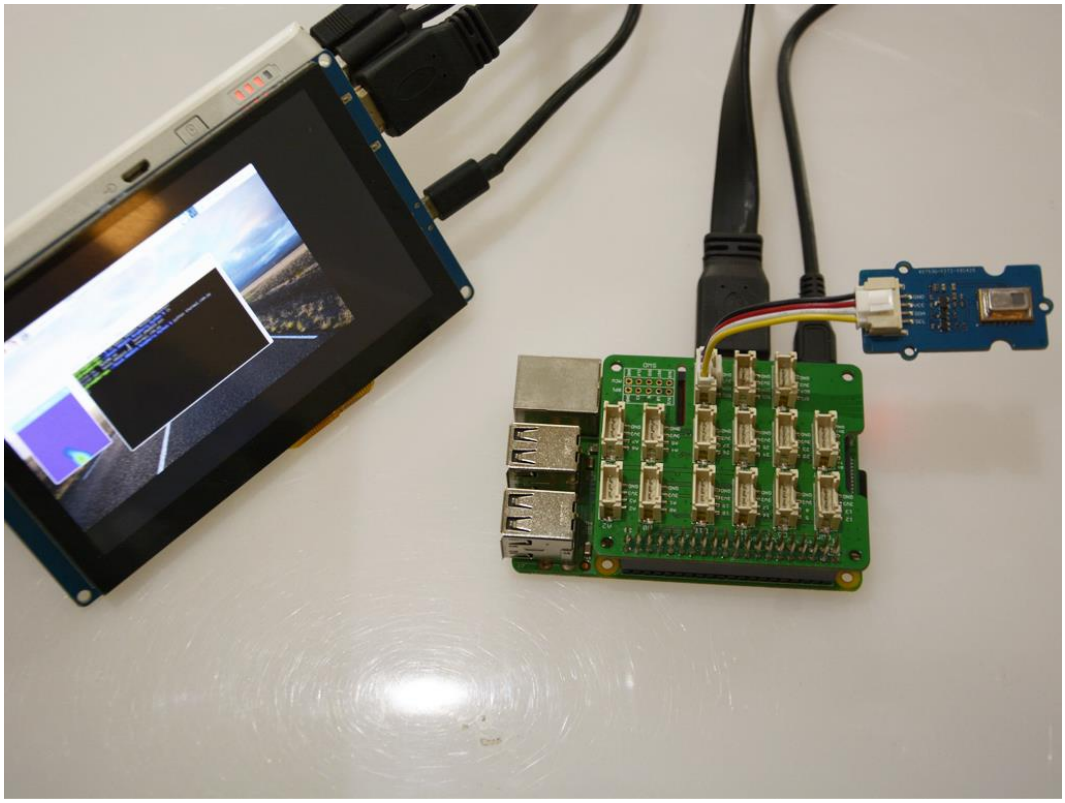
Hardware

Materials required

Raspberry Pi	Grove Base Hat for Raspberry Pi	Infrared Temperature Sensor Array	5 inch 800x480 Capacitive TouchScreen
			

Tip
If you do not have a Pi-Screen you can use the PC monitor, or you can use the VNC Viewer to display the result remotely.

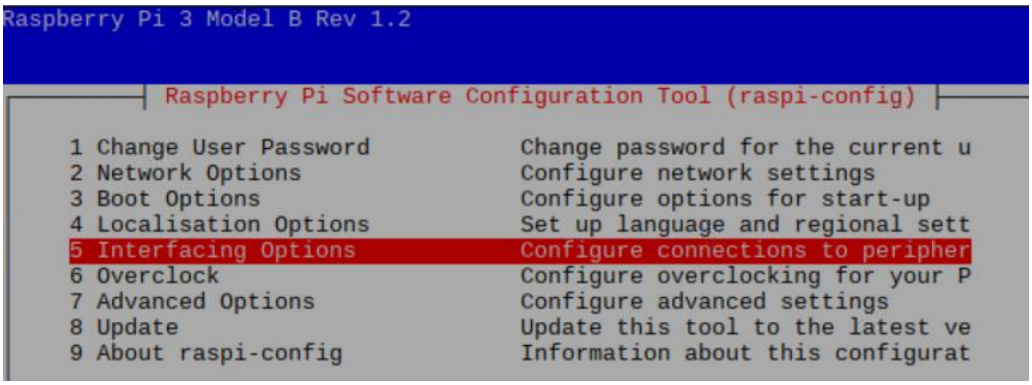
- **Step 1.** Connect the Grove - Infrared Temperature Sensor Array (AMG8833) to port **I²C** of Grove Base Hat for Raspberry Pi.
- **Step 2.** Plug Grove Base Hat for Raspberry Pi into Raspberry Pi.
- **Step 3.** Connect the 5 inch 800x480 Capacitive TouchScreen with the Raspberry Pi via the HDMI cable.
- **Step 4.** Connect Raspberry Pi to PC via a micro-USB cable, power the 5 inch 800x480 Capacitive TouchScreen via another micro-USB cable.



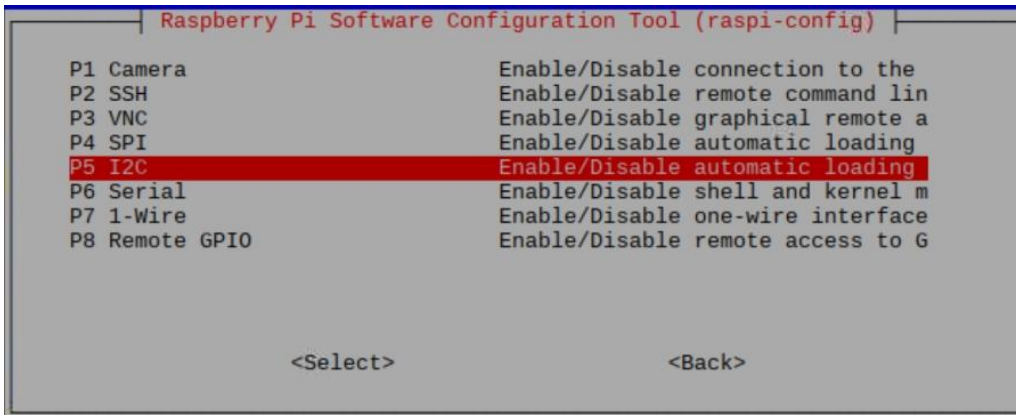
Software

- **Step 1.** Open the I²C interface for your raspberry pi. You can open a terminal and tap the following command.

```
1sudo raspi-config
```

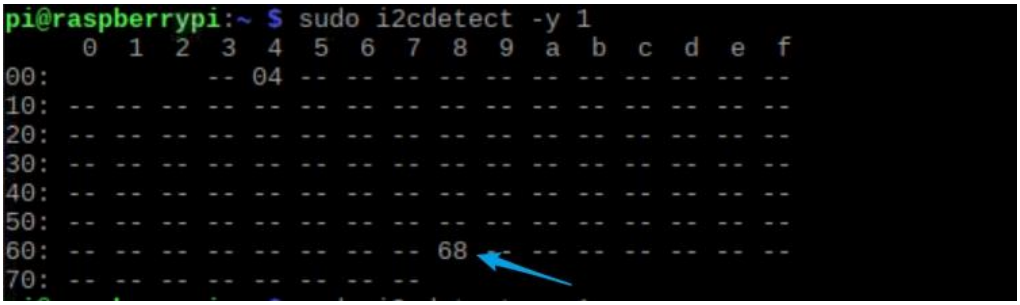


- **Step 2.** When you see the picture above, choose **Interfacing Options**, then choose **I2C** to enable the I²C interface.



- **Step 3.** When you finish, you can use the following command to check.

```
1sudo i2cdetect -y 1
```



You can see the I²C address, which means the raspberry has detected the sensor. If not, please do step1~3 again. Ok, let's move on.

- **Step 4.** Tap the following commands in the terminal to install related dependencies.

```
sudo apt-get update
sudo apt-get install -y build-essential python-pip python-dev python-smbus
git
sudo apt-get install -y python-scipy python-pygame
 sudo pip install colour
```

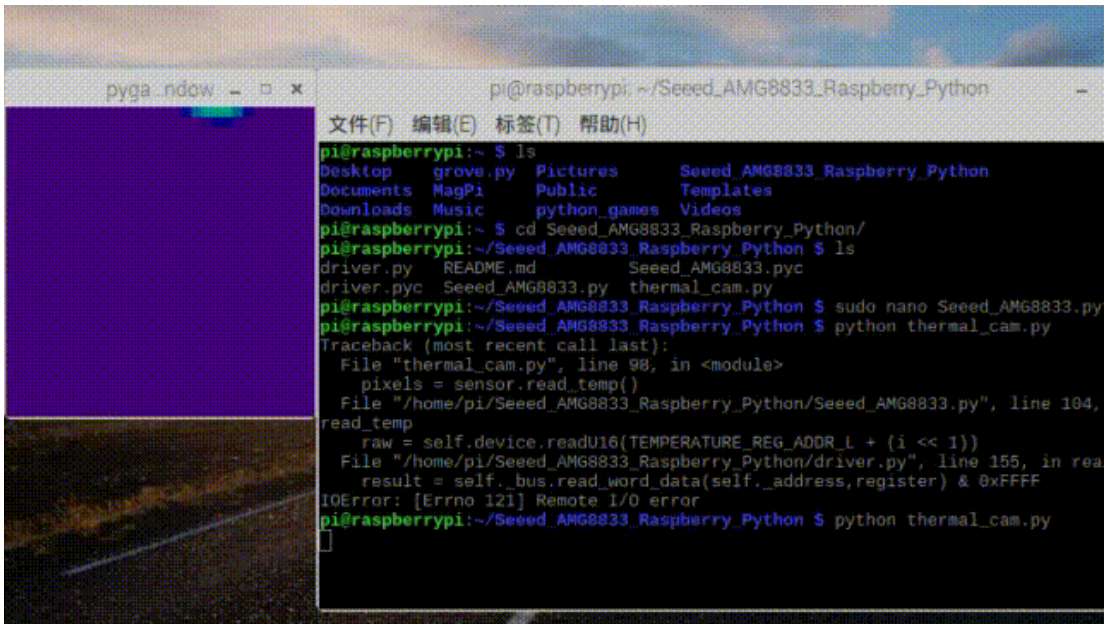
- **Step 5.** Download the Seeed AMG8833 Python Library.

```
git clone https://github.com/Seeed-Studio/Seeed_AMG8833_Raspberry_Python.git
```

- **Step 6.** Go into the AMG8833 folder, and run the demo.

```
pi@raspberrypi:~ $ cd Seeed_AMG8833_Raspberry_Python/
pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ ls
driver.py   README.md          Seeed_AMG8833.pyc
driver.pyc  Seeed_AMG8833.py   thermal_cam.py
pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ python thermal_cam.py
```

Success
If everthing goes well, you will see.



Resources

- **[Zip]** Grove - Infrared Temperature Sensor Array (AMG8833) Eagle Files
- **[Zip]** Seeed AMG8833 Arduino Library
- **[Zip]** Seeed AMG8833 Python Library
- **[PDF]** AMG8833 DATASHEET
- **[PDF]** XC6206 DATASHEET

Project

This is the introduction Video of this product, simple demos, you can have a try.

Tech Support

Please do not hesitate to submit the issue into our forum