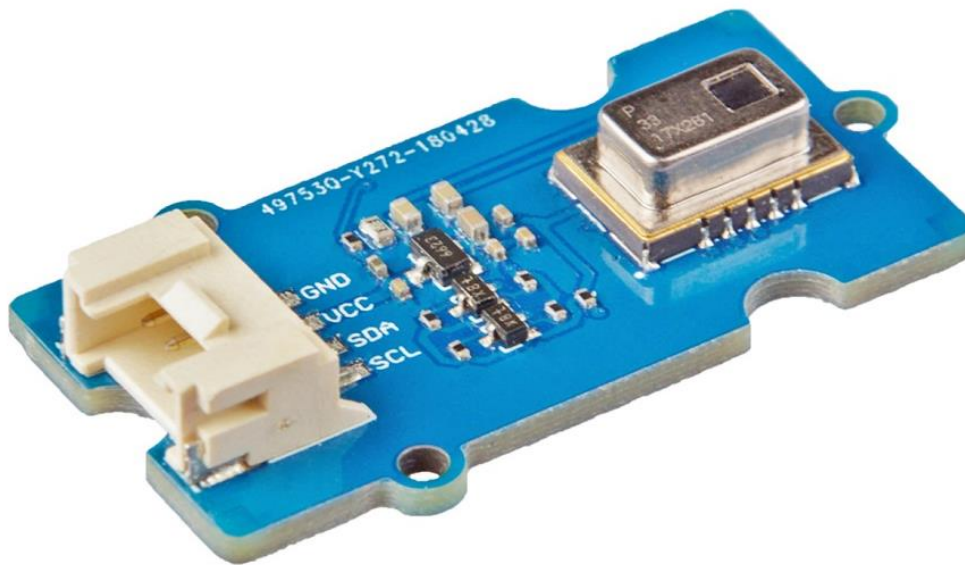


# Grove - Infrared Temperature Sensor Array(AMG8833)



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:  $8 \times 8$  (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:  $8 \times 8$  (64 pixels)
- I2C output (capability of temperature value output)
- High precision
- Long detection distance

## Specification

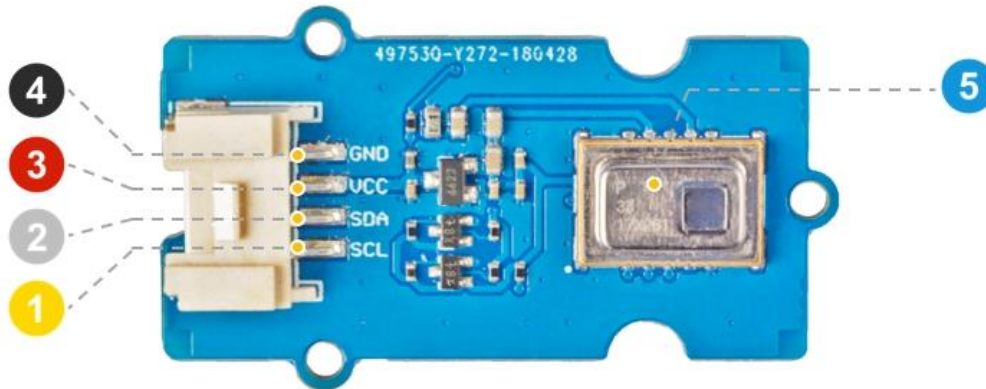
Item	Value
Operating Voltage	3.3V / 5V
Temperature range of measuring object	0 °C to 80 °C +32 °F to +176 °F
Operating temperature range	0 °C to 80 °C +32 °F to +176 °F
Storage temperature range	-20 °C to 80 °C -4 °F to +176 °F
Temperature accuracy	Typical $\pm 2.5$ °C $\pm 4.5$ °F
Viewing angle	Typical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

## Typical Applications

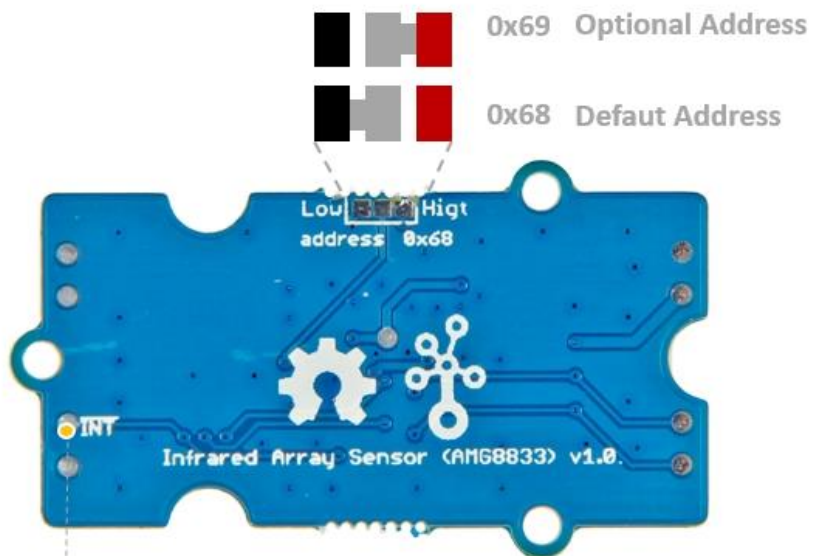
- High function home appliances (microwaves and air-conditioners)
- Energy saving at office (air-conditioning/lighting control)
- Digital signage
- Automatic doors/elevators

## 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: I<sup>2</sup>C serial data
- 1 SCL: I<sup>2</sup>C serial clock
- 5 the AMG8833 module

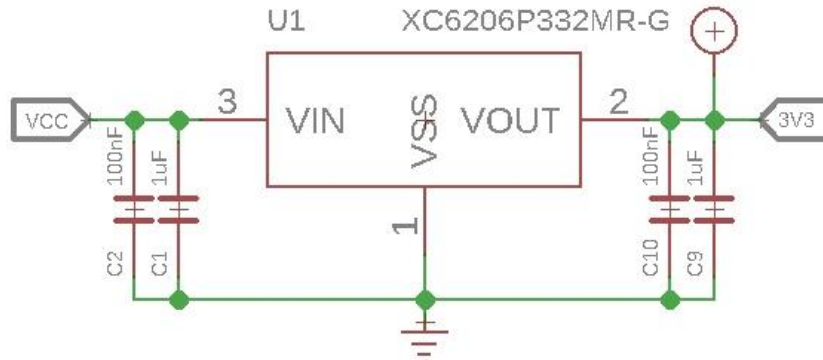


#### **INT Pin**

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

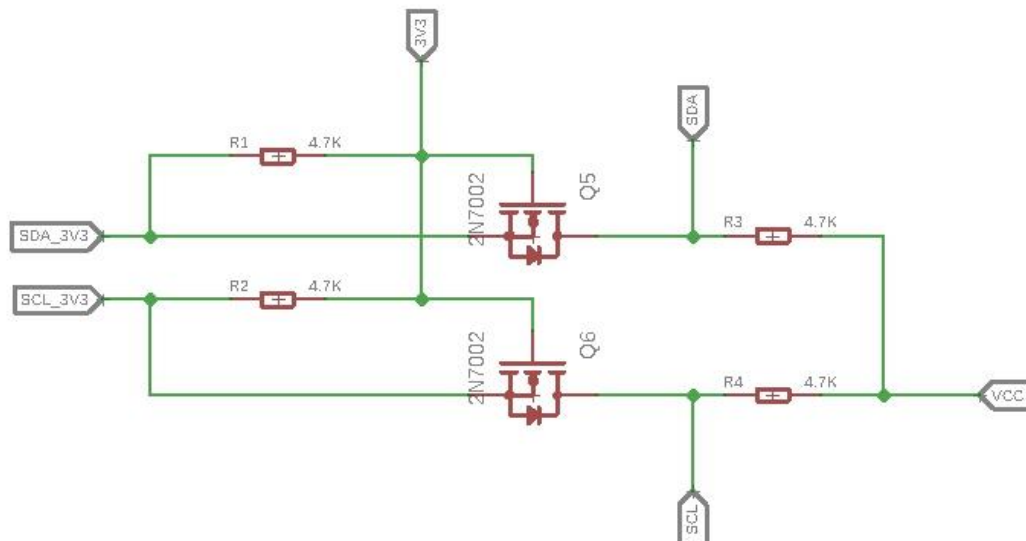
## Schematic

### Power




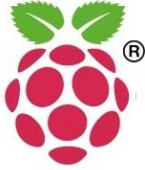


The typical voltage of AMG8833 is 3.3V, so we use the [XC6206P33](#) chip to provide a stable 3.3V. The input of XC6206P33 ranges from 1.8V to 6.0V, so you can use this module with your Arduino both in 3.3V and 5V.

### Bi-directional level shifter circuit



This is a typical Bi-directional level shifter circuit to connect two different voltage section of an I<sup>2</sup>C bus. The I<sup>2</sup>C bus of this sensor use 3.3V, if the I<sup>2</sup>C 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 theoretical 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

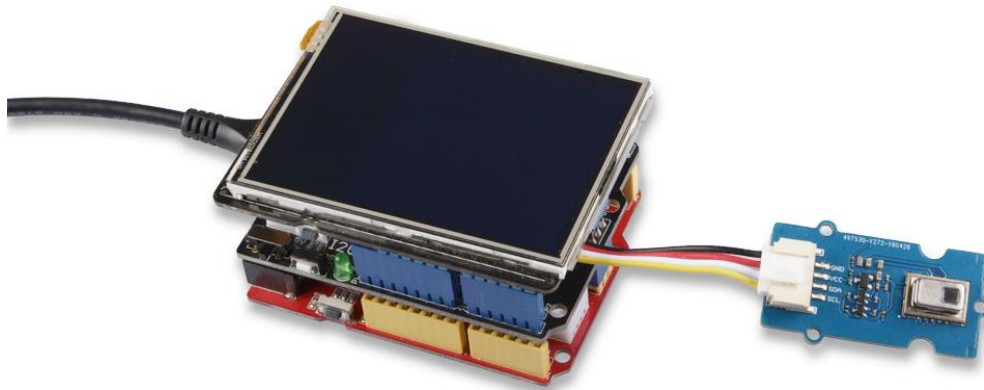
Seeeduino V4.2	Base Shield	Infrared Temperature Sensor Array	2.8 TFT Touch Shield V2.0
			

### 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 I<sup>2</sup>C 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

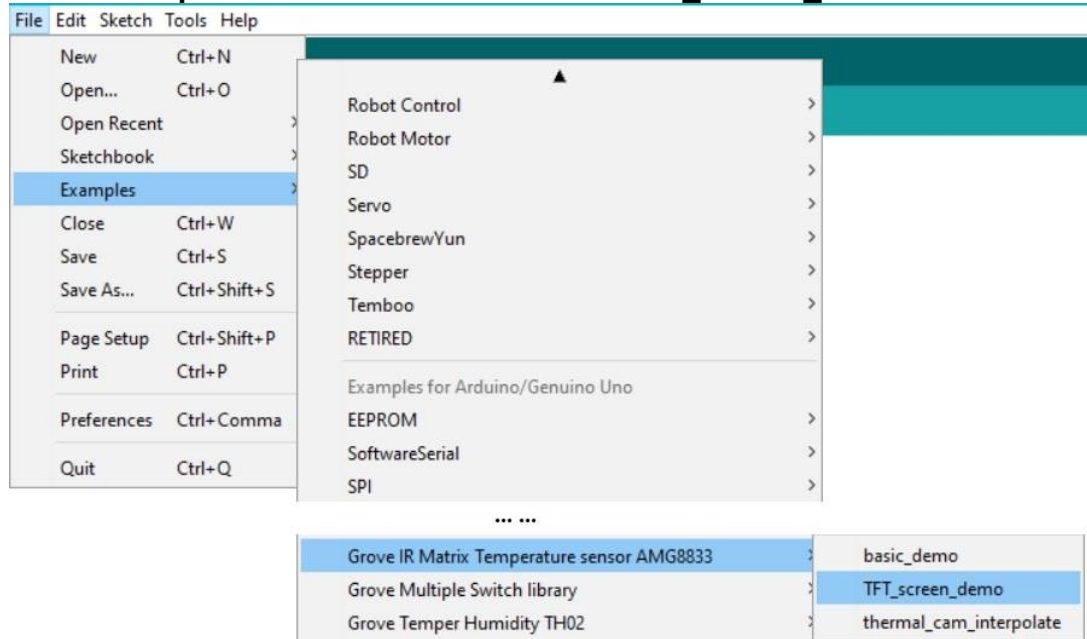
### Note

If this is the first time you work with Arduino, we strongly recommend you to see [Getting Started with Arduino](#) before the start.

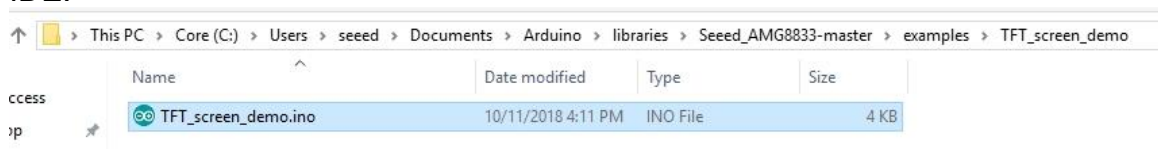
- **Step 1.** Download the [Seeed\\_AMG8833](#) Library from Github.
- **Step 2.** Refer to [How to install library](#) to install library for Arduino.


- **Step 3.** Restart the Arduino IDE. Open the example, you can open it in the following three ways :

- Open it directly in the Arduino IDE via the path: **File** → **Examples** → **Grove IR Matrix Temperature sensor AMG8833** → **TFT\_screen\_demo**.



- Open it in your computer by click the **TFT\_screen\_demo.ino** which you can find in the folder **XXXXArduino\libraries\Seed\_AMG8833-master\examples\TFT\_screen\_demo**, **XXXX** is the location you installed the Arduino IDE.



- 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 "Seed_AMG8833_driver.h"
3

4AMG8833 sensor;

5#define TFT_PIXELS_NUM 30

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

```

8   for(u32 i=0;i<8;i++)
9   {
10      if(status[i])
11      {
12          for(u32 j=0;j<8;j++)
13          {
14              if(status[i]&((1<<j)))
15              {
16                  Serial.print("pixel ");
17                  Serial.print(8*i+j+1);
18                  Serial.println("interrupt is generated!!!");
19              }
20          }
21      }
22  }
23  }
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```



```

6     else if((pixels_temp[i]>=29)&&(pixels_temp[i]<30))
3         {
7             color[i]=GREEN;
3         }
8     else if((pixels_temp[i]>=30)&&(pixels_temp[i]<31))
3         {
9             color[i]=YELLOW;
4         }
0     else if((pixels_temp[i]>=31)&&(pixels_temp[i]<33))
4         {
1             color[i]=0xfd00;
4         }
2     else
4         {
3             color[i]=RED;
4         }
4     }
4     /*Use a TFT screen to display.*/
5     for(u32 i=0;i<PIXEL_NUM;i++)
4     {
6
4Tft.fillScreen(TFT_PIXELS_NUM*(i%8),TFT_PIXELS_NUM*(i%8+1),TFT_PIXELS_NUM*(8
7-i/8),TFT_PIXELS_NUM*(7-i/8),color[i]);
4     }
8}
4
9
5
0
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1
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5
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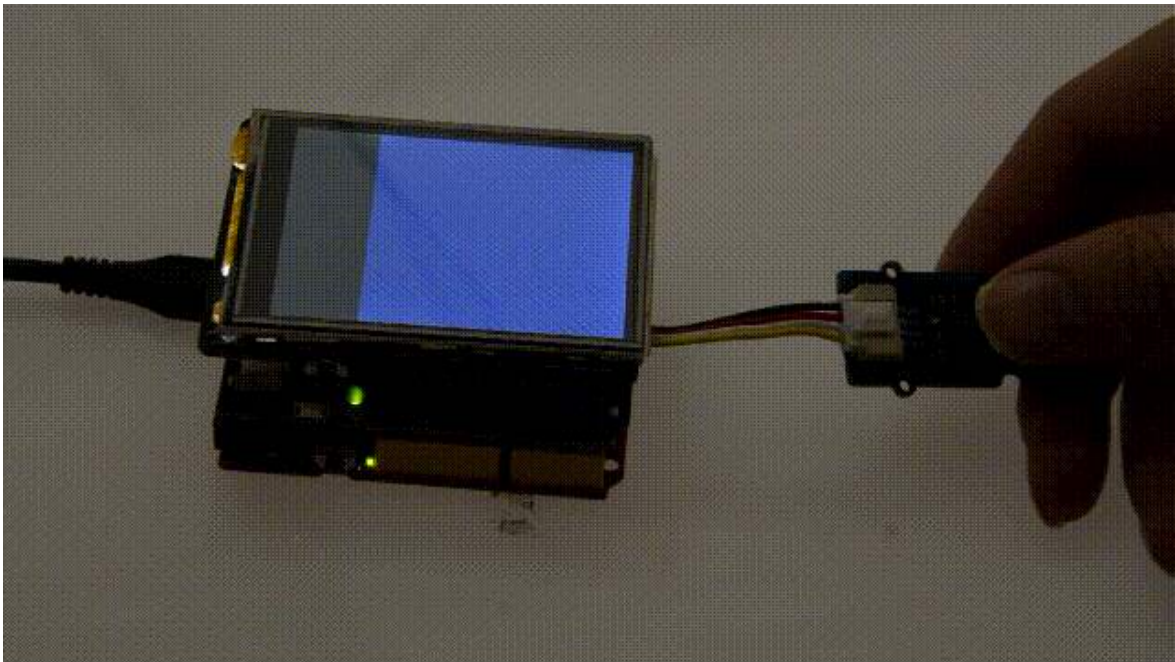
**Attention**

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](#).

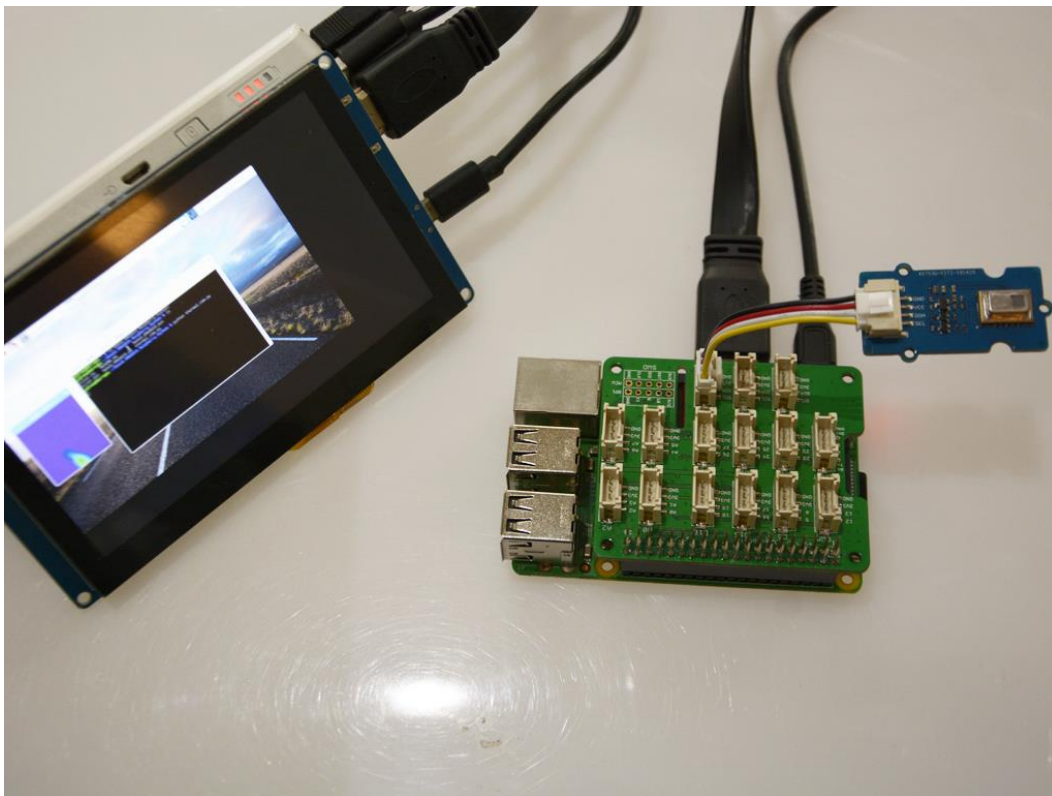
*Hardware***Materials required**

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.

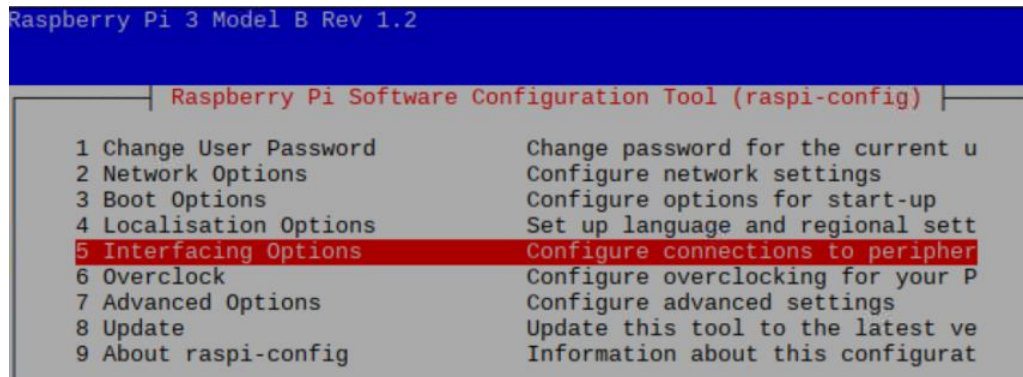
- **Step 1.** Connect the Grove - Infrared Temperature Sensor Array (AMG8833) to port I<sup>2</sup>C of Grove Base Hat for Raspberry Pi.
- **Step 2.** Plug Grove Base Hat for Raspberry Pi into Raspberry Pi.
- **Step 3.** Connect the 5 inch 800x480 Capacitive TouchScreen with the Raspberry Pi via the 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

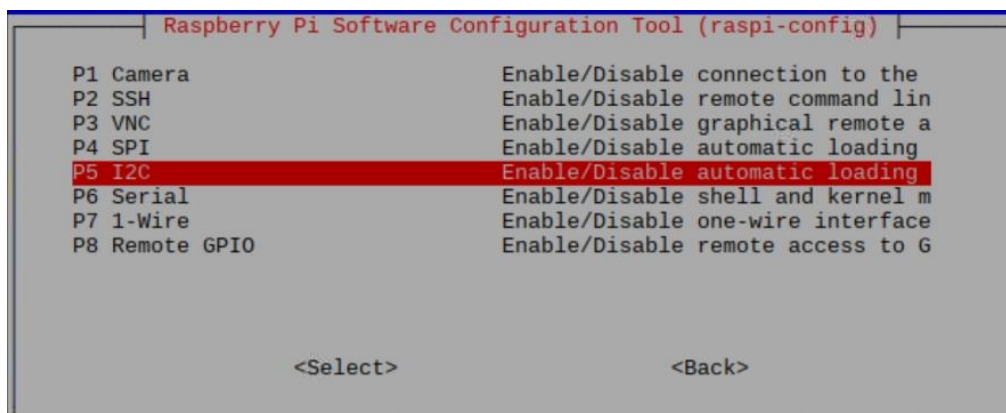
- **Step 1.** Open the I<sup>2</sup>C interface for your raspberry pi. You can open a terminal and tap the following command.

```
1sudo raspi-config
```



```
Raspberry Pi 3 Model B Rev 1.2
Raspberry Pi Software Configuration Tool (raspi-config)
1 Change User Password      Change password for the current u
2 Network Options           Configure network settings
3 Boot Options              Configure options for start-up
4 Localisation Options      Set up language and regional sett
5 Interfacing Options       Configure connections to peripher
6 Overclock                 Configure overclocking for your P
7 Advanced Options         Configure advanced settings
8 Update                   Update this tool to the latest ve
9 About raspi-config        Information about this configurat
```

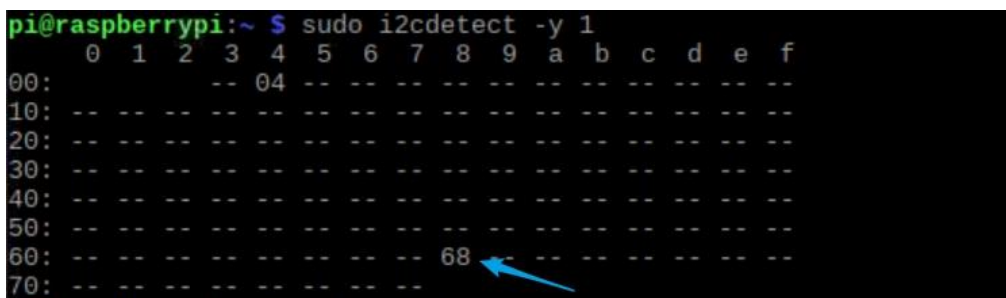
- **Step 2.** When you see the picture above, choose **Interfacing Options**, then choose **I2C** to enable the I<sup>2</sup>C interface.



```
Raspberry Pi Software Configuration Tool (raspi-config)
P1 Camera                  Enable/Disable connection to the
P2 SSH                     Enable/Disable remote command lin
P3 VNC                     Enable/Disable graphical remote a
P4 SPI                     Enable/Disable automatic loading
P5 I2C                     Enable/Disable automatic loading
P6 Serial                  Enable/Disable shell and kernel m
P7 1-Wire                  Enable/Disable one-wire interface
P8 Remote GPIO             Enable/Disable remote access to G
<Select>                  <Back>
```

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

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



```
pi@raspberrypi:~ $ sudo i2cdetect -y 1
 0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- 04 -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- 68 -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
```

You can see the I<sup>2</sup>C 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.

```
1sudo apt-get update
2sudo apt-get install -y build-essential python-pip python-dev python-smbus
3git
4sudo apt-get install -y python-scipy python-pygame
   sudo pip install colour
```

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

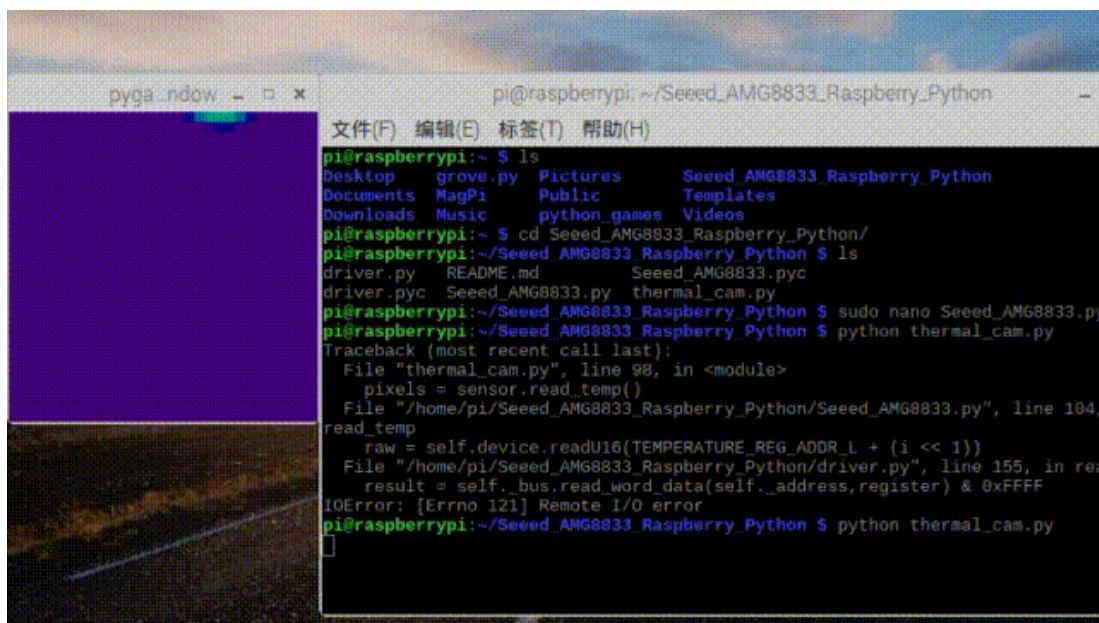
```
1git clone https://github.com/Seeed-Studio/Seeed_AMG8833_Raspberry_Python.git
```

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

```
1pi@raspberrypi:~ $ cd Seeed_AMG8833_Raspberry_Python/
2pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ ls
3driver.py  README.md  Seeed_AMG8833.pyc
4driver.pyc Seeed_AMG8833.py thermal_cam.py
5pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ python thermal_cam.py
```

## Success

If everthing goes well, you will see.



```
pi@raspberrypi:~ $ ls
Desktop  grove.py  Pictures  Seeed_AMG8833_Raspberry_Python
Documents MagPi     Public    Templates
Downloads Music     python_games Videos

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 $ sudo nano Seeed_AMG8833.py
pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ python thermal_cam.py
Traceback (most recent call last):
  File "thermal_cam.py", line 98, in <module>
    pixels = sensor.read_temp()
  File "/home/pi/Seeed_AMG8833_Raspberry_Python/Seeed_AMG8833.py", line 104, in read_temp
    raw = self.device.readU16(TEMPERATURE_REG_ADDR_L + (i << 1))
  File "/home/pi/Seeed_AMG8833_Raspberry_Python/driver.py", line 155, in read_word_data
    result = self._bus.read_word_data(self._address, register) & 0xFFFF
IOError: [Errno 121] Remote I/O error
pi@raspberrypi:~/Seeed_AMG8833_Raspberry_Python $ python thermal_cam.py
]
```



## 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](#)