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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

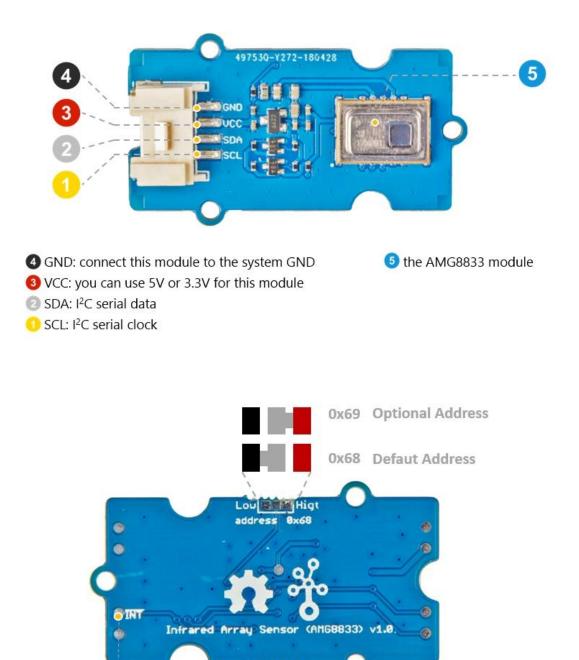
Specification

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	2C
I²C 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

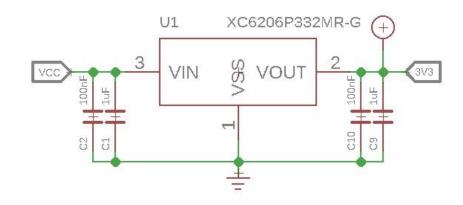


INT Pin

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

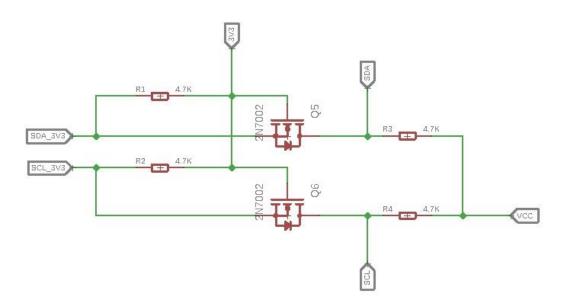
Schemaitc

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	Linklt ONE
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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		Infrared Temperature Sensor Array	2.8 TFT Touch Shield V2.0
Constant of the second	THE		THURSDAY

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 \rightarrow Examples \rightarrow Grove IR Matrix Temperature sensor AMG8833 \rightarrow TFT_screen_demo.

New Ctrl+N Open Ctrl+O Open Recent Sketchbook	Robot Control Robot Motor SD	> >	
Examples			
Close Ctrl+W	Servo SpacebrewYun	5	
Save Ctrl+S	Stepper	>	
Save As Ctrl+Shift+S	Temboo	>	
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Preferences Ctrl+Comma	EEPROM	>	
Quit Ctrl+Q	SoftwareSerial	>	
	SPI	>	
	Grove IR Matrix Temperature sensor AMG8833	3	basic_demo
	Grove Multiple Switch library	3	TFT_screen_demo
	Grove Temper Humidity TH02	2	thermal_cam_interpolat

b. Open it in your computer by click the TFT_screen_demo.ino which you can find in the folder XXXXArduino\libraries\Seeed_AMG8833master\examples\TFT_screen_demo, XXXX is the location you installed the Arduino

IDE.

ተ 🚺 ›	This PC → Core (C:)) > Users > seeed :	Documents > Arduino > libr	raries > Seeed_A	AMG8833-master > ex	amples > TFT_screen_demo
	Name	^	Date modified	Туре	Size	
cess n	TFT_screen	n_demo.ino	10/11/2018 4:11 PM	INO File	4 KB	

c. Or, you can just click the icon \square 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++)</pre>
8
     {
          if(status[i])
9
          {
              for(u32 j=0;j<8;j++)</pre>
1
0
               {
                   if(status[i]&((1<<j)))</pre>
1
1
                   {
1
                       Serial.print("pixel ");
2
                       Serial.print(8*i+j+1);
1
                       Serial.println("interrupt is generated!!!");
3
                   }
1
              }
4
         }
1
     }
5}
1
6void print status (u8* status)
1 {
7
     for(u32 i=0;i<8;i++)</pre>
1
     {
8
          Serial.print(status[i],HEX);
1
          Serial.print(" ");
9
2
     }
0
     Serial.println(" ");
2}
1
2
2
2
3void setup()
2 {
4
     Serial.begin(115200);
2
     sensor.init();
5
     TFT BL ON;
2
     /*2.8 TFT screen. url:https://www.seeedstudio.com/2.8-TFT-Touch-Shield-
6V2.0-p-1286.html*/
2
     Tft.TFTinit();
7}
2
8
2
9void loop()
3 {
0
     u8 val=0;
3
     float pixels temp[PIXEL NUM] = { 0 };
1
     ul6 color[PIXEL NUM] = { 0 };
3
     /*Read temperature*/
2
     sensor.read_pixel_temperature(pixels_temp);
3
     /*Different temperature correspond to different color.*/
3
     for(u32 i=0;i<PIXEL NUM;i++)</pre>
3
     {
4
          if(pixels temp[i]<29)</pre>
3
          {
5
              color[i]=BLUE;
3
```

```
6
          else if((pixels_temp[i]>=29)&&(pixels_temp[i]<30))</pre>
3
          {
7
               color[i]=GREEN;
3
          }
8
          else if((pixels temp[i]>=30)&&(pixels temp[i]<31))</pre>
3
          {
9
              color[i]=YELLOW;
4
          }
0
          else if((pixels temp[i]>=31)&&(pixels temp[i]<33))</pre>
4
          {
             color[i]=0xfd00;
1
          }
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++)</pre>
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
5
1
5
2
5
3
5
4
5
5
5
6
5
7
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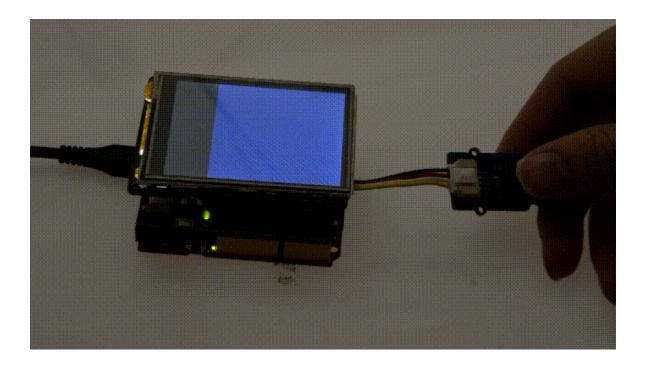
Attention

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

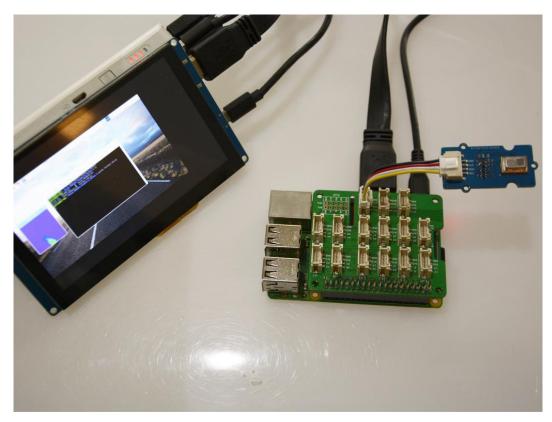
3

	5 inch 800x480 Capacitive TouchScreen

Тір

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	
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
2 Deat Ontions	
3 Boot Options	Configure options for start-up
4 Localisation Options	Configure options for start-up Set up language and regional sett
4 Localisation Options	Set up language and regional sett
4 Localisation Options 5 Interfacing Options	Set up language and regional sett Configure connections to peripher
4 Localisation Options 5 Interfacing Options 6 Overclock	Set up language and regional sett Configure connections to peripher Configure overclocking for your P

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

P1 Camera	Enable/Disable connection to the
2 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
96 Serial	Enable/Disable shell and kernel m
07 1-Wire	Enable/Disable one-wire interface
28 Remote GPIO	Enable/Disable remote access to G
<select></select>	<back></back>

• Step 3. When you finish, you can use the following command to check. 1sudo i2cdetect -y 1

) T (9												ect					
		Θ	1	2	3		4	5	6	7		8	9	a	b	С	d	1
ÐØ	:					Θ	4											
10																		
20																		
30	:																	
40																		
50																		
60											6	8	*					
70																		

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.

```
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.

pyga.ndow 🗕 ד 🗙	pi@raspberrypi: ~/Seeed_AMG8833_Raspberry_Python
A CONTRACTOR OF	文件(F) 编辑(E) 标签(T) 帮助(H)
	<pre>pi@raspberrypi:~ \$ 1s Desktop grove.py Pictures Second AMG8833_Raspberry_Python Documents MagPi Public Templates Documents MagPi Public Templates Documents MagPi Public Second AMG8833_Raspberry_Python/ pi@raspberrypi:~ \$ cd Second AMG8833_Raspberry_Python/ pi@raspberrypi:~ \$ econd AMG8833_Raspberry_Python \$ 1s driver.py README.md Second AMG8833_Raspberry_Python \$ sudo nano Second_AMG88 pi@raspberrypi:~/Second AMG8833_Raspberry_Python \$ sudo nano Second_AMG88 pi@raspberrypi:~/Second AMG8833_Raspberry_Python \$ sudo nano Second_AMG88 pi@raspberrypi:~/Second_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/Second_AMG8833_Raspberry_Python/Second_AMG8833.py", line read_temp raw = self.device.readU16(TEMPERATURE_REG_ADDR_L + (i << 1)) File "/home/pi/Second_AMG8833_Raspberry_Python/driver.py", line 155, j result = self.bevice.readU16(TEMPERATURE_REG_ADDR_L + (i << 1)) File "/home/pi/Second_AMG8833_Raspberry_Python/driver.py", line 155, j result = self.bevice.readU16(TEMPERATURE_REG_ADDR_L + (i << 1)) File "/home/pi/Second_AMG8833_Raspberry_Python/driver.py", line 155, j result = self.bevice.readU16(TEMPERATURE_REG_ADDR_L + (i << 1)) File "/home/pi/Second_AMG8833_Raspberry_Python/driver.py", line 155, j result = self.bevice.readU16(TEMPERATURE_REG_ADDR_L + (i << 1)) File "/home/pi/Second_AMG8833_Raspberry_Python/driver.py", line 155, j result = self.bevice.readU16(Temperature_read_selfaddress.register) & 0xFFFF IOError: [Errno 121] Remote I/O error pi@raspberrypi:~/Second_AMG8833_Raspberry_Python \$ python thermal_cam.py]</module></pre>

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