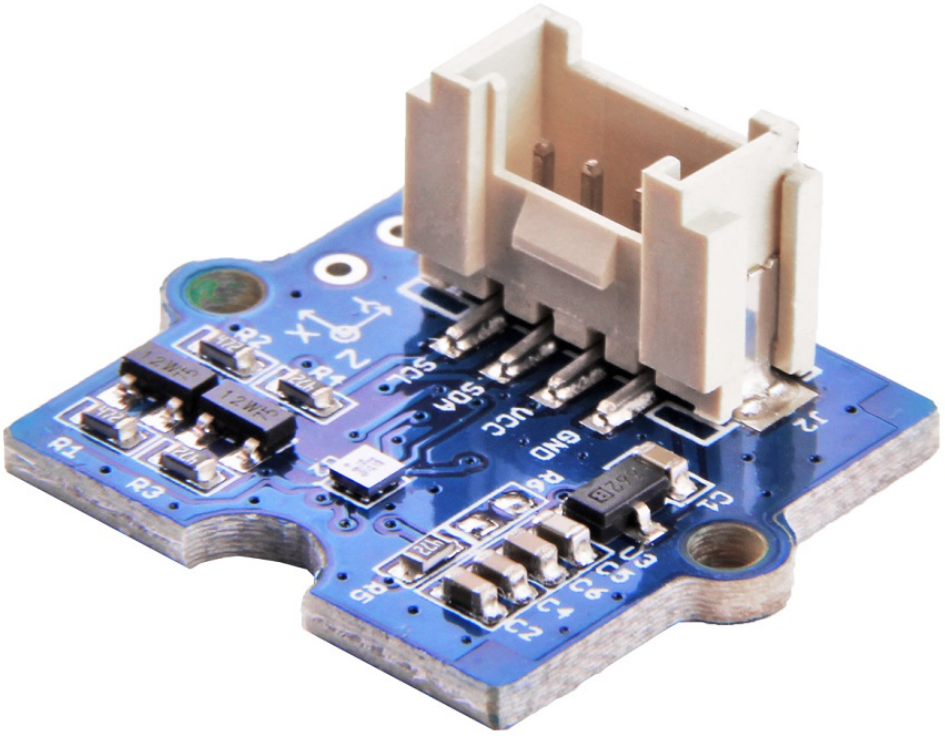
Grove - 3-Axis Digitial Compass v2.0



The Grove - 3-Axis Digital Compass is a digital compass sensor based on Bosch BMM150. It allows measurement of the magnatic field in three perpendicular axes and the output can be read out over I2C and SPI interface, perfectly suitable for 3-Axis mobile applications.

This is the second generation of Grove - 3-Axis Digital Compass, comparing to the first version, this version can perfectly match the demanding requirements of all 3-Axis applications while the price is almost half of the first version, very cost effective.

Get One Now

[https://www.seeedstudio.com/Grove-3-Axis-Digital-Compass-V2-p-3034.html]

Features

- High resolution
- High heading accuracy
- Easy to use

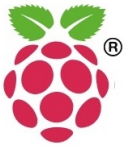
Specifications

Item	Valnue
Working Voltage	3.3V / 5V
Magnetic field range typical	±1300μT(x, y-axis), ±2500μT(z-axis)
Magnetic field resolution	0.3μT
Output Degree	0° ~ 360°
Interface	I2C
Working Temperature	-40℃ to +85 ℃
Dimensions	20mm x 20mm x 15mm
I2C Address	0x13

Note
If you want to use multiplue I2C devices, please refer to Software I2C [https://wiki.seeedstudio.com/Arduino_Software_I2C_user_guide/].

Tip
More details about Grove modules please refer to Grove System [https://wiki.seeedstudio.com/Grove_System/]

Platforms Supported

Arduino	Raspberry Pi		
			

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

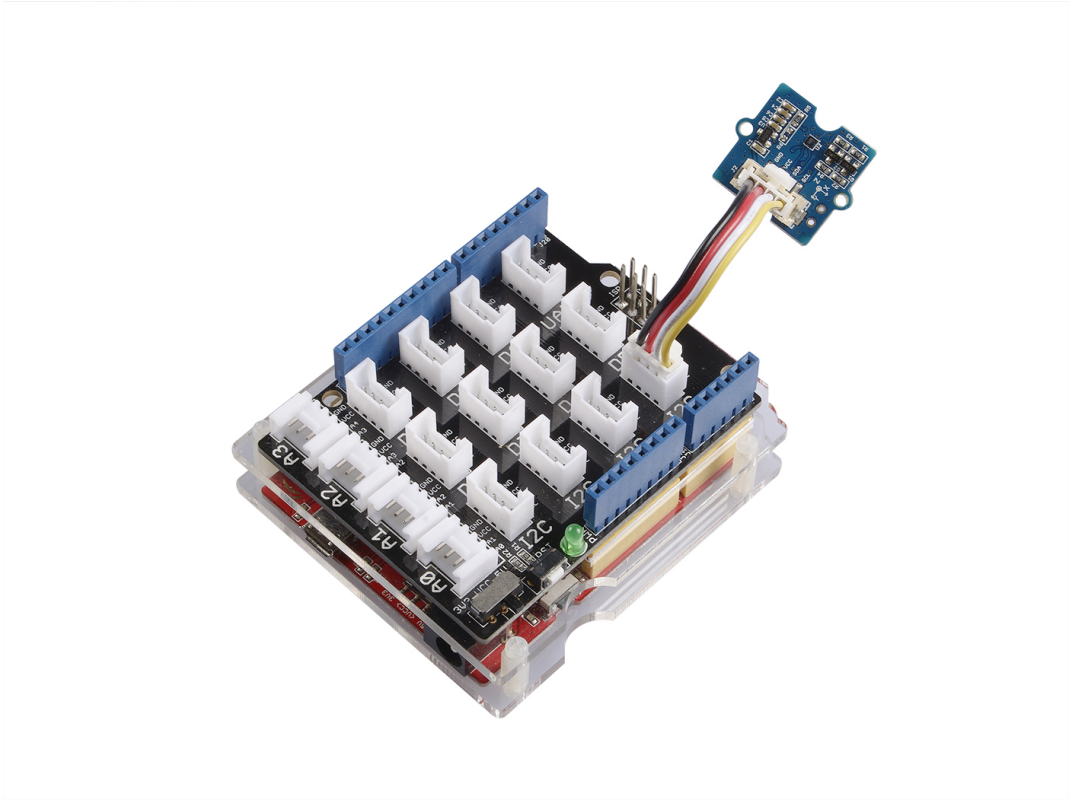
Play with Arduino

Hardware

- **Step 1.** Prepare the below stuffs:

Seeeduino V4.2	Base Shield
	
Get One Now [https://www.seeedstudio.com/Seeeduino-V4.2-p-2517.html]	Get One Now [https://www.seeedstudio.com/Base Shield-V2-p-1378.html]

- **Step 2.** Connect Grove-3-Axis_Digitial_Compass_v2.0 to port **I2C** of Grove-Base Shield.
- **Step 3.** Plug Grove - Base Shield into Seeeduino.
- **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_v4	Grove-3-Axis_Digitial_Compass_v2.0
5V	VCC
GND	GND
SDA	SDA
SCL	SCL

Caution

> Please plug the USB cable gently, otherwise you may damage the interface.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** [https://www.seeedstudio.com/Micro-USB-Cable-48cm-p-1475.html] to buy

Software

Step 1. Download the library [https://github.com/Seeed-Studio/Grove_3_Axis_Compass_V2.0_BMM150] from Github.

Step 2. Refer How to install library [https://wiki.seeedstudio.com/How_to_install_Arduino_Library] to install library for Arduino.

Step 3. Create a new Arduino sketch and paste the codes below to it or open the code directly by the path: **File->Examples->Grove_3_Axis_Compass_V2.0_BMM150-master->compass**

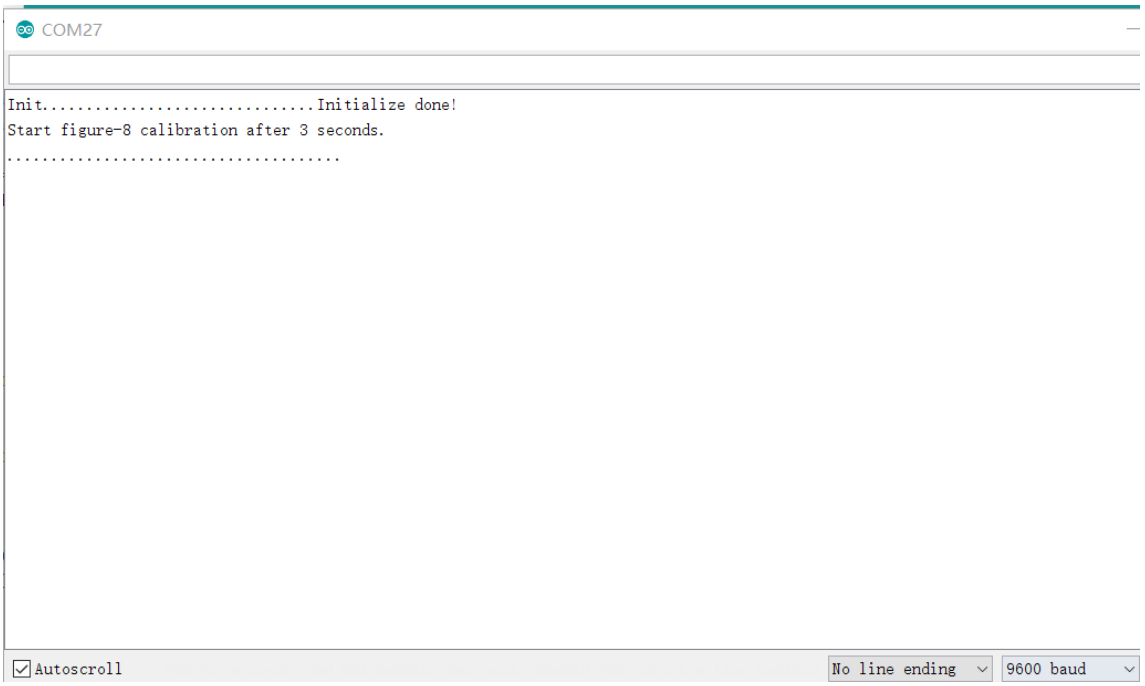
Here is the code

```
/**
 * This example
*/

#include <Arduino.h>
#include <Wire.h>
// libraries
#include "bmm150.h"
#include "bmm150_defs.h"

BMM150 bmm = BMM150();

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

```

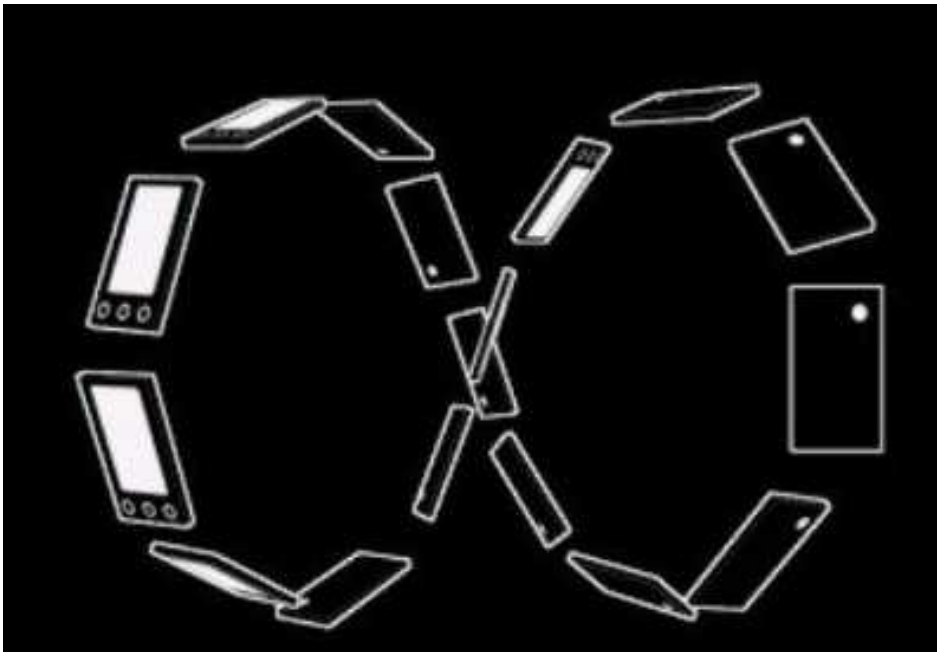
```
  if(bmm.initialize() == BMM150_E_ID_NOT_CONFORM) {
    Serial.println("Chip ID can not read!");
    while(1);
  } else {
    Serial.println("Initialize done!");
  }

}

void loop()
{
  bmm150_mag_data value;
  bmm.read_mag_data();

  value.x = bmm.raw_mag_data.raw_datax;
  value.y = bmm.raw_mag_data.raw_datay;
  value.z = bmm.raw_mag_data.raw_dataz;

  float xyHeading = atan2(value.x, value.y);
  float zxHeading = atan2(value.z, value.x);
  float heading = xyHeading;

  if(heading < 0)
    heading += 2*PI;
  if(heading > 2*PI)
    heading -= 2*PI;
  float headingDegrees = heading * 180/M_PI;
  float xyHeadingDegrees = xyHeading * 180 / M_PI;
  float zxHeadingDegrees = zxHeading * 180 / M_PI;

  Serial.print("Heading: ");
  Serial.println(headingDegrees);

  delay(100);
}
```

Step 4. Upload the code. If you do not know how to upload the code, please check how to upload code [https://wiki.seeedstudio.com/Upload_Code/].

Step 5. Open the serial monitor to receive the sensor's data



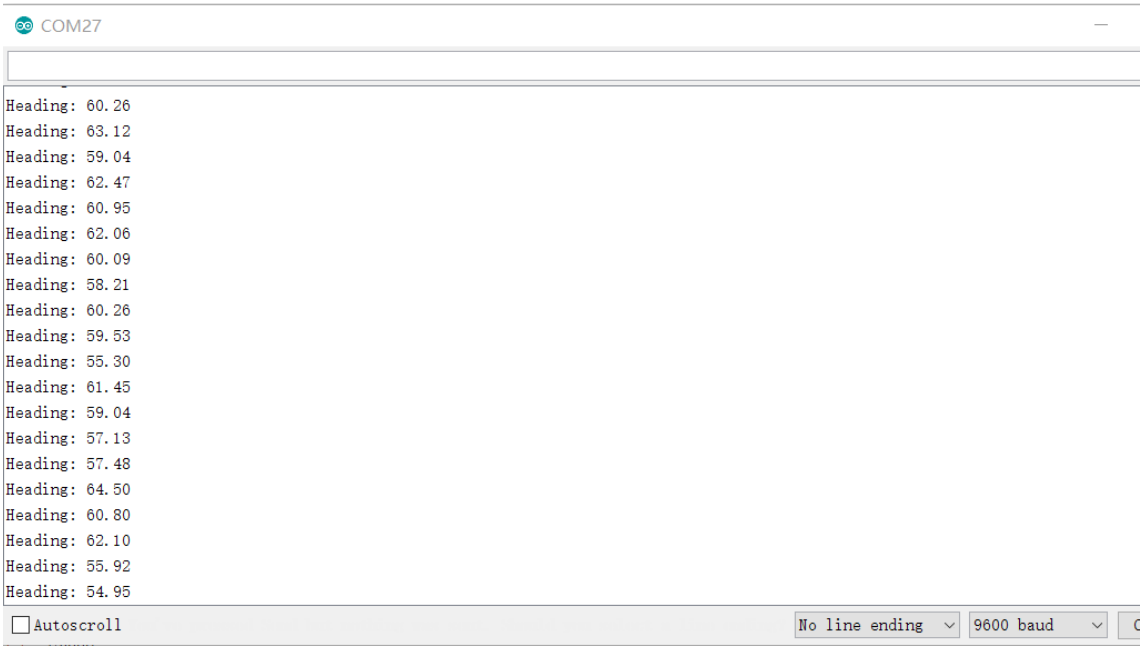
Step 6. Within these 3 seconds， please tilt and rotate the compass back and forth on every axis, as shown in the picture below.



The calibration period time can be changed through the parameter timeout in the fuction **calibrate(uint16_t timeout)**.

> **Note**
> The compass needs to be calibrated, otherwise you will get the inaccurate data! Please make sure you have done the Step 5.

Step 7. Finally, you will see the something like the following picture.



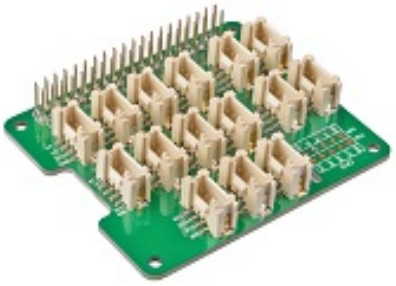
> **Tip**
> Heading value is in range of 0° ~ 360°, this value is for Y axis, 0° means Y axis points at North, 90° means Y axis points at West, 180° means Y axis points at South, 270° means Y points at East.

Enjoy your compass!

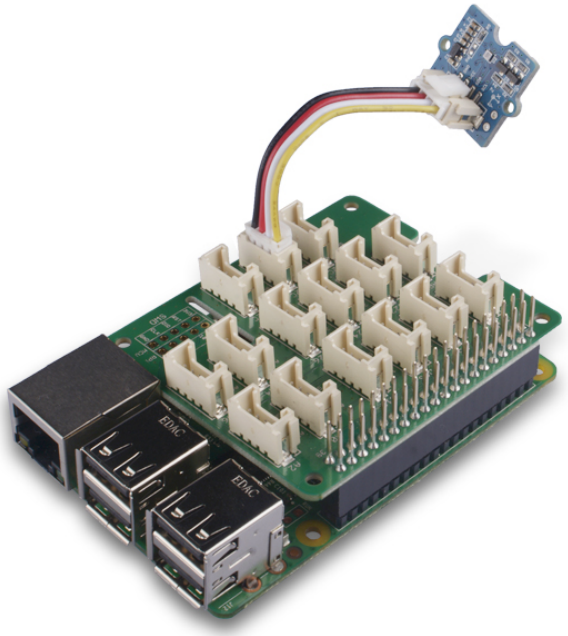
Play With Raspberry Pi (With Grove Base Hat for Raspberry Pi)

Hardware

- **Step 1**. Things used in this project:

Raspberry pi	Grove Base Hat for RasPi
	
Get ONE Now [https://www.seeedstudio.com/Raspberry-Pi-3-Model-B-p-2625.html]	Get ONE Now [https://www.seeedstudio.com/Grove Base-Hat-for-Raspberry-Pi-p-3186.html]

- **Step 2**. Plug the Grove Base Hat into Raspberry.
- **Step 3**. Connect the 3-axis compass to I2C port of the Base Hat.
- **Step 4**. Connect the Raspberry Pi to PC through USB cable.



Software

- **Step 1**. Follow Setting Software [https://wiki.seeedstudio.com/Grove_Base_Hat_for_Raspberry_Pi/#installation] to configure the development environment.
- **Step 2**. Download the source file by cloning the grove.py library.

Attention
If you are using **Raspberry Pi with Raspberrypi OS >= Bullseye**, you have to use this command line **only with Python3**.

Note
You are required to install python-mraa and python-upm, see the instruction here https://github.com/Seeed-Studio/pi_repo#mraa--upm-package-repository-for-raspberry-pi [https://github.com/Seeed-Studio/pi_repo#mraa--upm-package-repository-for-raspberry-pi] for more information.

```
cd ~
git clone https://github.com/Seeed-Studio/grove.py
```

- **Step 3**. Excute below commands to run the code.

```
cd grove.py/grove
python3 grove_3_axis_compass_bmm150.py
```

Following is the grove_3_axis_compass_bmm150.py code.

```
from __future__ import print_function
import time, sys, signal, atexit, math
try:
    from upm import pyupm_bmm150 as sensorObj
except ImportError:
    print('Error: Please install python-mraa python-upm
          'See instruction here https://github.com/Seeed


def main():
    # Instantiate a BMP250E instance using default i2c b
    sensor = sensorObj.BMM150(0, 0x13)

    # For SPI, bus 0, you would pass -1 as the address,
    # BMM150(0, -1, 10);

    ## Exit handlers ##
    # This function stops python from printing a stacktr
    def SIGINTHandler(signum, frame):
        raise SystemExit

    # This function lets you run code on exit
    def exitHandler():
        print("Exiting")
        sys.exit(0)
```

```
26
27      # Register exit handlers
28      atexit.register(exitHandler)
29      signal.signal(signal.SIGINT, SIGINTHandler)
30
31      # now output data every 250 milliseconds
32      while (1):
33          sensor.update()
34
35          data = sensor.getMagnetometer()
36          print("Magnetometer x: {0:.2f}".format(data[0]),
37          print(" y: {0:.2f}".format(data[1]), end=' ')
38          print(" z: {0:.2f}".format(data[2]), end=' ')
39          print(" uT")
40
41          xyHeading = math.atan2(data[0], data[1])
42          zxHeading = math.atan2(data[2], data[0])
43          heading = xyHeading
44
45          if heading < 0:
46              heading += 2*math.pi
47          if heading > 2*math.pi:
48              heading -= 2*math.pi
49
50          headingDegrees = heading * 180/(math.pi);
51          xyHeadingDegrees = xyHeading * 180 / (math.pi)
52          zxHeadingDegrees = zxHeading * 180 / (math.pi)
53
54          print('heading(axis_Y point to): {0:.2f} degree'
55          time.sleep(.250)
56
57  if __name__ == '__main__':
58      main()
```

Success

If everything goes well, you will be able to see the following result

```
1  pi@raspberrypi:~/grove.py/grove $ python3 grove_3_axis_c
```

```
Magnetometer x: -34.12  y: 36.71  z: -21.25  uT
heading(axis_Y point to): 317.10 degree
Magnetometer x: -34.49  y: 38.20  z: -16.32  uT
heading(axis_Y point to): 317.92 degree
Magnetometer x: -34.12  y: 38.20  z: -9.87  uT
heading(axis_Y point to): 318.23 degree
Magnetometer x: -32.64  y: 38.94  z: -5.69  uT
heading(axis_Y point to): 320.03 degree
Magnetometer x: -31.52  y: 38.20  z: -2.28  uT
heading(axis_Y point to): 320.47 degree
Magnetometer x: -29.67  y: 38.20  z: 0.38  uT
heading(axis_Y point to): 322.16 degree
Magnetometer x: -26.33  y: 38.20  z: 4.55  uT
heading(axis_Y point to): 325.42 degree
^CExiting
```

You can quit this program by simply press `Ctrl` + `C`.

Schematic Online Viewer

Resources

- **[Library]** Grove-3_Axis_Compass_V2.0 lib [https://github.com/Seeed-Studio/Grove_3_Axis_Compass_V2.0_BMM150]
- **[PDF]** BST-BMM150-Datasheet [https://files.seeedstudio.com/wiki/Grove-3-Axis_Digitial_Compass_v2.0/res/Datasheet.pdf]

- **[Zip]** Grove-3-Axis Digital Compass v2_Eagle File [https://files.seeedstudio.com/wiki/Grove-3-Axis_Digitial_Compass_v2.0/res/Eagle File.zip]

Tech Support

Please submit any technical issue into our forum [https://forum.seeedstudio.com/].