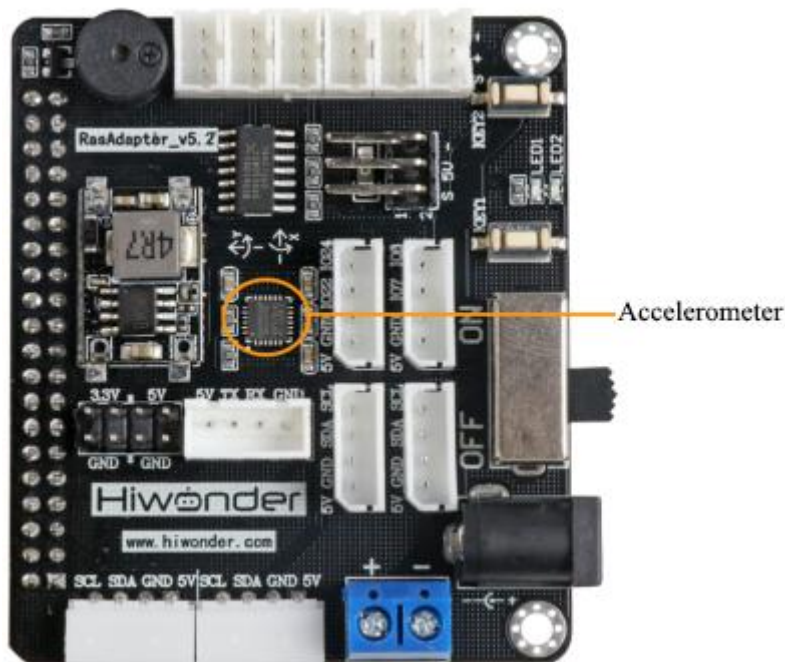


Lesson 5 Use of Accelerometer

1. Preparation

There is a accelerometer on the Raspberry Pi expansion board, as shown in the figure below:



Note: 4PIN wire adopts anti-back insert design. Please pay attention to the plug direction.

2. Working Principle

Accelerometer composed of mass blocks, dampers, elastic elements, sensitive elements, and debugging circuits is a tool that measures acceleration. During the acceleration process of the sensor, the acceleration value can be obtained according to Newton's second law by measuring the inertial force on the mass block.

The source code of program is located in

/home/pi/TonyPi/HiwonderSDK/Mpu6050.py

```
248 if __name__ == "__main__":
249     mpu = mpu6050(0x68)
250     mpu.set_gyro_range(mpu.GYRO_RANGE_2000DEG)
251     mpu.set_accel_range(mpu.ACCEL_RANGE_2G)
252     while True:
253         try:
254             accel_date = mpu.get_accel_data(g=True)
255
256             ax = accel_date['x']
257             ay = accel_date['y']
258             az = accel_date['z']
259
260             angle_x = math.degrees(math.atan2(ax, az))
261             angle_y = math.degrees(math.atan2(ay, az))
262             print(angle_x, angle_y)
263             time.sleep(0.1)
264         except KeyboardInterrupt:
265             break
266         except BaseException as e:
267             print('error: ', e)
```

“ax”, “ay”, “az” are the values of X, Y, Z axes respectively.

Before obtaining the data of accelerometer, the atan2() function in the math library can be used to obtain the inverse tangent of the given coordinate value, and use the degrees() function to convert it to an angle value.

3. Operation Steps

- 1) Click the icon shown below to enter the LX terminal command line.



- 2) Enter the command “cd TonyPi/HiwonderSDK/hiwonder/” in the interface and press “Enter” to switch to the directory where the routine is located.

```
pi@raspberrypi:~ $ cd TonyPi/HiwonderSDK/hiwonder/
pi@raspberrypi:~/TonyPi/HiwonderSDK/hiwonder $
```

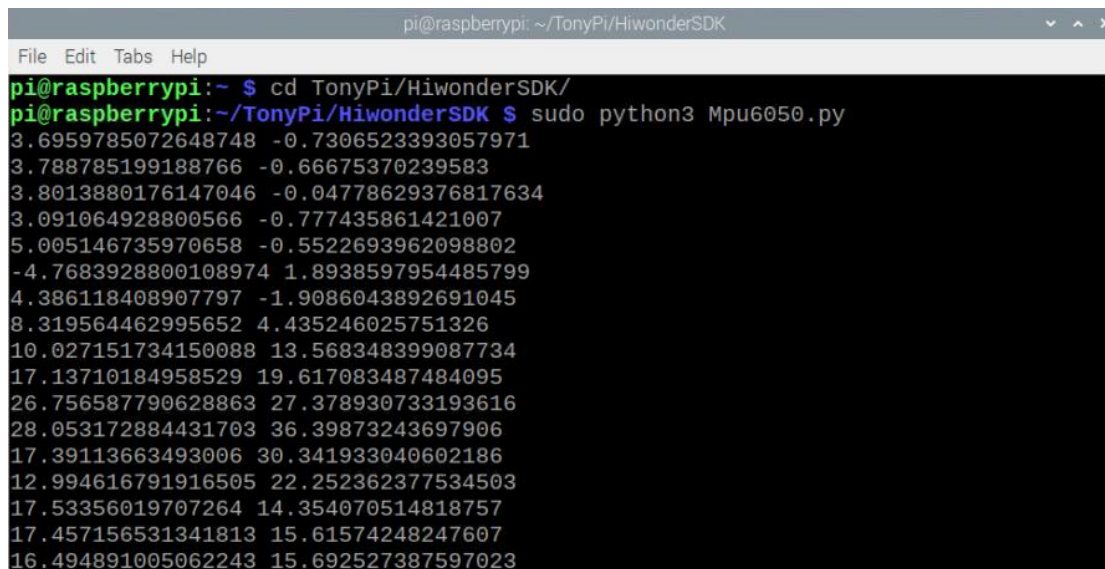
- 3) Input the command “**sudo python3 mpu6050.py**” to start the accelerometer program, and press “Enter”.

```
pi@raspberrypi:~ $ cd TonyPi/HiwonderSDK/hiwonder/  
pi@raspberrypi:~/TonyPi/HiwonderSDK/hiwonder $ sudo python3 Mpu6050.py
```

- 4) Press “**Ctrl+C**” to close the program.

4. Project outcome

Starting the program, the tilt angle will be displayed on the interface.



```
pi@raspberrypi: ~/TonyPi/HiwonderSDK  
File Edit Tabs Help  
pi@raspberrypi:~ $ cd TonyPi/HiwonderSDK/  
pi@raspberrypi:~/TonyPi/HiwonderSDK $ sudo python3 Mpu6050.py  
3.6959785072648748 -0.7306523393057971  
3.788785199188766 -0.66675370239583  
3.8013880176147046 -0.04778629376817634  
3.091064928800566 -0.777435861421007  
5.005146735970658 -0.5522693962098802  
-4.7683928800108974 1.8938597954485799  
4.386118408907797 -1.9086043892691045  
8.319564462995652 4.435246025751326  
10.027151734150088 13.568348399087734  
17.13710184958529 19.617083487484095  
26.756587790628863 27.378930733193616  
28.053172884431703 36.39873243697906  
17.39113663493006 30.341933040602186  
12.994616791916505 22.252362377534503  
17.53356019707264 14.354070514818757  
17.457156531341813 15.61574248247607  
16.494891005062243 15.692527387597023
```