lec6-LSM303-2018-10-08.ppt

CTI One Corporation

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Outline

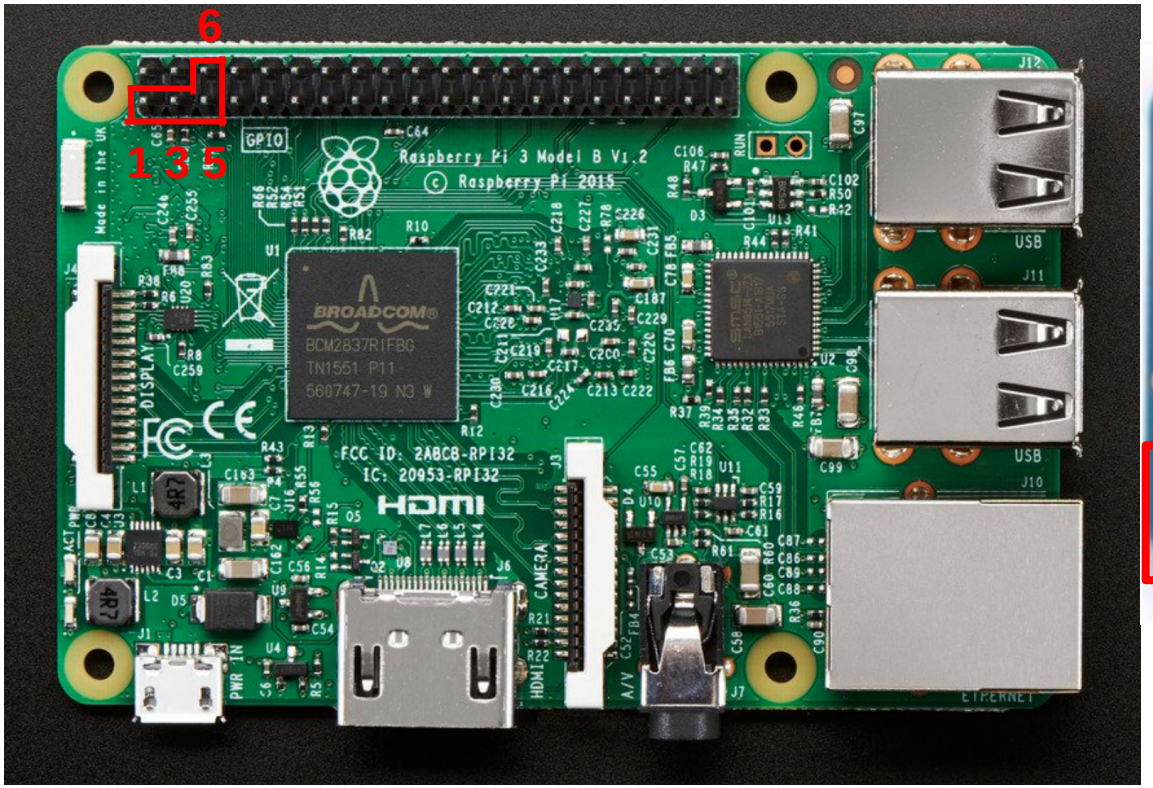
- LSM303 introduction and specification
- Hardware connection with Raspberry Pi
- Software setup and sample code in Python 3

LSM303 Main Properties

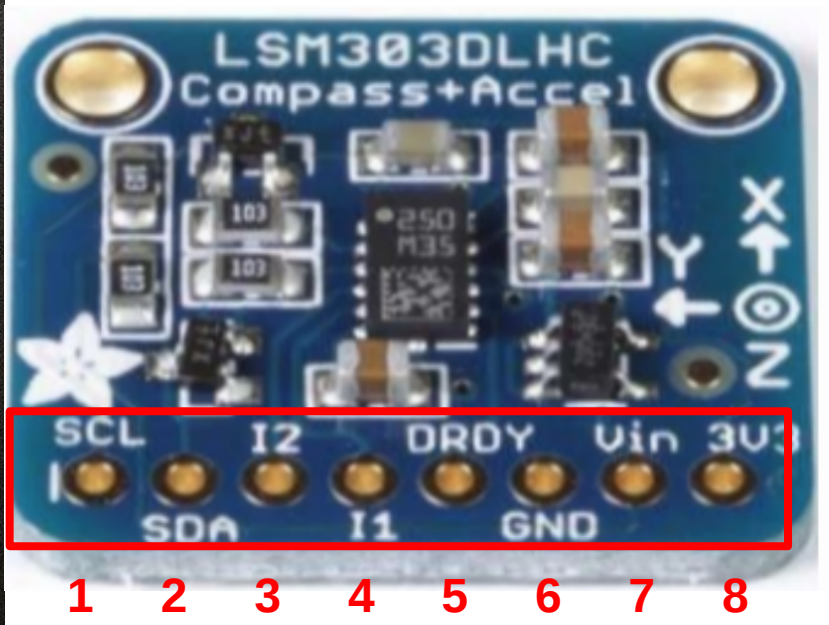
- Power 3.3V or 5V
- I2C serial interface
- 3-Axis acceleration sensor
- 3-Axis magnetic field sensor
- 12-bit data output

Hardware Connection

Raspberry Pi 3 - Model B



LSM303



Raspberry Pi Module		LSM303	
Pin	**Definition**	**Pin**	**Definition**
1	3.3 VDC Power	7	VIN
3	SDA1 (I2C)	2	SDA
5	SCL1 (I2C)	1	SCL
6	Ground	6	GND

Software Setup and Test

- Library:
  - Adafruit Python LSM303 [Download]
  - Adafruit Python GPIO [Download]
  - Adafruit Python PureIO [Download]
- Test code: simple test code from Github [Download]
- Test result:

```
[pi@raspberrypi:~/Adafruit_Python_LSM303 $ python3 test.py
Printing accelerometer & magnetometer X, Y, Z axis values, press Ctrl-C to quit...
Accel X=33, Accel Y=-4, Accel Z=1005, Mag X=270, Mag Y=-156, Mag Z=-345
Accel X=35, Accel Y=-3, Accel Z=1004, Mag X=267, Mag Y=-157, Mag Z=-343
Accel X=32, Accel Y=-2, Accel Z=1009, Mag X=271, Mag Y=-155, Mag Z=-341
Accel X=33, Accel Y=0, Accel Z=1008, Mag X=271, Mag Y=-156, Mag Z=-343
Accel X=37, Accel Y=-1, Accel Z=1005, Mag X=270, Mag Y=-161, Mag Z=-343
Accel X=35, Accel Y=-3, Accel Z=1003, Mag X=271, Mag Y=-156, Mag Z=-344
Accel X=36, Accel Y=-3, Accel Z=1003, Mag X=271, Mag Y=-156, Mag Z=-345
Accel X=39, Accel Y=-3, Accel Z=1003, Mag X=271, Mag Y=-160, Mag Z=-341
Accel X=36, Accel Y=-2, Accel Z=1004, Mag X=273, Mag Y=-156, Mag Z=-345
Accel X=39, Accel Y=-1, Accel Z=1009, Mag X=271, Mag Y=-161, Mag Z=-344
```

Compute a Compass Heading

- To convert the magnetometer readings into a 0-360 degree compass heading, we can use the atan2() function to compute the angle of the vector defined by the Y and X axis readings. The result will be in radians, so we multiply by 180 degrees and divide by Pi to convert that to degrees.

- Result

```
heading = (math.atan2(mag_y, mag_x) * 180) / pi
if heading < 0:
    heading = 360 + heading
```

```
pi@raspberrypi:~/Adafruit_Python_LSM303 $ python3 simpletest.py
Printing accelerometer & magnetometer X, Y, Z axis values, press Ctrl-C to quit...
Accel X=-41, Accel Y=-6, Accel Z=1005, Mag X=304, Mag Y=-195, Mag Z=-429
heading: 327.3205743491062 °
Accel X=-42, Accel Y=-3, Accel Z=1009, Mag X=299, Mag Y=-190, Mag Z=-430
heading: 327.5646409044544 °
Accel X=-43, Accel Y=-7, Accel Z=1012, Mag X=301, Mag Y=-191, Mag Z=-431
heading: 327.60139117529366 °
Accel X=-35, Accel Y=-4, Accel Z=1009, Mag X=303, Mag Y=-191, Mag Z=-430
heading: 327.77281323016484 °
Accel X=-44, Accel Y=-6, Accel Z=1005, Mag X=301, Mag Y=-188, Mag Z=-429
heading: 328.01036928300516 °
```

END