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# **Adafruit LSM9DS0 Library Documentation**

***Release 1.0***

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CircuitPython module for the LSM9DS0 accelerometer, magnetometer, gyroscope.



# CHAPTER 1

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## Dependencies

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This driver depends on:

- [Adafruit CircuitPython](#)
- [Bus Device](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).





## CHAPTER 2

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### Installing from PyPI

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On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-lsm9ds0
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-lsm9ds0
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-lsm9ds0
```



## CHAPTER 3

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### Usage Example

---

```
import time
import board
import busio
import adafruit_lsm9ds0

i2c = busio.I2C(board.SCL, board.SDA)
sensor = adafruit_lsm9ds0.LSM9DS0_I2C(i2c)

while True:
    accel_x, accel_y, accel_z = sensor.acceleration
    mag_x, mag_y, mag_z = sensor.magnetic
    gyro_x, gyro_y, gyro_z = sensor.gyro
    temp = sensor.temperature
    print('Acceleration (m/s^2): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(accel_x, accel_
↵y, accel_z))
    print('Magnetometer (gauss): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(mag_x, mag_y,
↵mag_z))
    print('Gyroscope (degrees/sec): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(gyro_x, gyro_
↵y, gyro_z))
    print('Temperature: {0:0.3f}C'.format(temp))
    time.sleep(1.0)
```



## CHAPTER 4

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### Contributing

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Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.



## CHAPTER 5

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### Documentation

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For information on building library documentation, please check out [this guide](#).





## 6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/lsm9ds0\_simpletest.py

```
1  # Simple demo of the LSM9DS0 accelerometer, magnetometer, gyroscope.
2  # Will print the acceleration, magnetometer, and gyroscope values every second.
3  import time
4
5  import board
6  import busio
7
8  # import digitalio # Used with SPI
9
10 import adafruit_lsm9ds0
11
12 # I2C connection:
13 i2c = busio.I2C(board.SCL, board.SDA)
14 sensor = adafruit_lsm9ds0.LSM9DS0_I2C(i2c)
15
16 # SPI connection:
17 # from digitalio import DigitalInOut, Direction
18 # spi = busio.SPI(board.SCK, board.MOSI, board.MISO)
19 # gcs = DigitalInOut(board.D5)
20 # xmcs = DigitalInOut(board.D6)
21 # sensor = adafruit_lsm9ds0.LSM9DS0_SPI(spi, xmcs, gcs)
22
23 # Main loop will read the acceleration, magnetometer, gyroscope, Temperature
24 # values every second and print them out.
25 while True:
26     # Read acceleration, magnetometer, gyroscope, temperature.
27     accel_x, accel_y, accel_z = sensor.acceleration
```

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```

28 mag_x, mag_y, mag_z = sensor.magnetic
29 gyro_x, gyro_y, gyro_z = sensor.gyro
30 temp = sensor.temperature
31 # Print values.
32 print(
33     "Acceleration (m/s^2): ({0:0.3f},{1:0.3f},{2:0.3f})".format(
34         accel_x, accel_y, accel_z
35     )
36 )
37 print(
38     "Magnetometer (gauss): ({0:0.3f},{1:0.3f},{2:0.3f})".format(mag_x, mag_y, mag_
↪ z)
39 )
40 print(
41     "Gyroscope (degrees/sec): ({0:0.3f},{1:0.3f},{2:0.3f})".format(
42         gyro_x, gyro_y, gyro_z
43     )
44 )
45 print("Temperature: {0:0.3f}C".format(temp))
46 # Delay for a second.
47 time.sleep(1.0)

```

## 6.2 adafruit\_lsm9ds0

CircuitPython module for the LSM9DS0 accelerometer, magnetometer, gyroscope. Based on the driver from: [https://github.com/adafruit/Adafruit\\_LSM9DS0](https://github.com/adafruit/Adafruit_LSM9DS0)

See examples/simpletest.py for a demo of the usage.

- Author(s): Tony DiCola

### 6.2.1 Implementation Notes

#### Hardware:

- Adafruit 9-DOF Accel/Mag/Gyro+Temp Breakout Board - LSM9DS0 (Product ID: 2021)
- FLORA 9-DOF Accelerometer/Gyroscope/Magnetometer - LSM9DS0 (Product ID: 2020)

#### Software and Dependencies:

- Adafruit CircuitPython firmware for the ESP8622 and M0-based boards: <https://github.com/adafruit/circuitpython/releases>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**class** adafruit\_lsm9ds0.LSM9DS0

Driver for the LSM9DS0 accelerometer, magnetometer, gyroscope.

#### accel\_range

The accelerometer range. Must be a value of: - ACCELRange\_2G - ACCELRange\_4G - ACCELRange\_6G - ACCELRange\_8G - ACCELRange\_16G

#### acceleration

The accelerometer X, Y, Z axis values as a 3-tuple of m/s^2 values.

**gyro**

The gyroscope X, Y, Z axis values as a 3-tuple of degrees/second values.

**gyro\_scale**

The gyroscope scale. Must be a value of: - GYROSCALE\_245DPS - GYROSCALE\_500DPS - GYROSCALE\_2000DPS

**mag\_gain**

The magnetometer gain. Must be a value of: - MAGGAIN\_2GAUSS - MAGGAIN\_4GAUSS - MAGGAIN\_8GAUSS - MAGGAIN\_12GAUSS

**magnetic**

The magnetometer X, Y, Z axis values as a 3-tuple of gauss values.

**read\_accel\_raw()**

Read the raw accelerometer sensor values and return it as a 3-tuple of X, Y, Z axis values that are 16-bit unsigned values. If you want the acceleration in nice units you probably want to use the accelerometer property!

**read\_gyro\_raw()**

Read the raw gyroscope sensor values and return it as a 3-tuple of X, Y, Z axis values that are 16-bit unsigned values. If you want the gyroscope in nice units you probably want to use the gyroscope property!

**read\_mag\_raw()**

Read the raw magnetometer sensor values and return it as a 3-tuple of X, Y, Z axis values that are 16-bit unsigned values. If you want the magnetometer in nice units you probably want to use the magnetometer property!

**read\_temp\_raw()**

Read the raw temperature sensor value and return it as a 16-bit unsigned value. If you want the temperature in nice units you probably want to use the temperature property!

**temperature**

The temperature of the sensor in degrees Celsius.

**class** adafruit\_lsm9ds0.**LSM9DS0\_I2C**(*i2c*)

Driver for the LSM9DS0 connected over I2C.

**class** adafruit\_lsm9ds0.**LSM9DS0\_SPI**(*spi, xmcs, gcs*)

Driver for the LSM9DS0 connected over SPI.



## CHAPTER 7

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### Indices and tables

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