
Adafruit LSM9DS0 Library Documentation

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CircuitPython module for the LSM9DS0 accelerometer, magnetometer, gyroscope.

CHAPTER 1

Dependencies

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

Installing from PyPI

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

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

Contributing

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

CHAPTER 5

Building locally

To build this library locally you'll need to install the `circuitpython-build-tools` package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-lsm9ds0 --
↳library_location .
```

5.1 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the `index.html` in your browser to view them. It will also (due to `-W`) error out on any warning like Travis will. This is a good way to locally verify it will pass.

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

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```

28     gyro_x, gyro_y, gyro_z = sensor.gyro
29     temp = sensor.temperature
30     # Print values.
31     print('Acceleration (m/s^2): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(accel_x, accel_
↪y, accel_z))
32     print('Magnetometer (gauss): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(mag_x, mag_y,
↪mag_z))
33     print('Gyroscope (degrees/sec): ({0:0.3f},{1:0.3f},{2:0.3f})'.format(gyro_x, gyro_
↪y, gyro_z))
34     print('Temperature: {0:0.3f}C'.format(temp))
35     # Delay for a second.
36     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

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

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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

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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