
Adafruit LSM9DS1 Library Documentation

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CircuitPython module for the LSM9DS1 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-lsm9ds1
```

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

```
sudo pip3 install adafruit-circuitpython-lsm9ds1
```

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-lsm9ds1
```


CHAPTER 3

Usage Example

See `examples/lsm9ds1_simpletest.py` for a demo of the usage.

CHAPTER 4

Contributing

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

CHAPTER 5

Documentation

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/lsm9ds1_simpletest.py

```
1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  # Simple demo of the LSM9DS1 accelerometer, magnetometer, gyroscope.
5  # Will print the acceleration, magnetometer, and gyroscope values every second.
6  import time
7  import board
8  import adafruit_lsm9ds1
9
10 # Create sensor object, communicating over the board's default I2C bus
11 i2c = board.I2C() # uses board.SCL and board.SDA
12 sensor = adafruit_lsm9ds1.LSM9DS1_I2C(i2c)
13
14 # SPI connection:
15 # from digitalio import DigitalInOut, Direction
16 # spi = board.SPI()
17 # csag = DigitalInOut(board.D5)
18 # csag.direction = Direction.OUTPUT
19 # csag.value = True
20 # csm = DigitalInOut(board.D6)
21 # csm.direction = Direction.OUTPUT
22 # csm.value = True
23 # sensor = adafruit_lsm9ds1.LSM9DS1_SPI(spi, csag, csm)
24
25 # Main loop will read the acceleration, magnetometer, gyroscope, Temperature
26 # values every second and print them out.
27 while True:
```

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```

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

```

6.2 adafruit_lsm9ds1

CircuitPython module for the LSM9DS1 accelerometer, magnetometer, gyroscope. Based on the driver from: https://github.com/adafruit/Adafruit_LSM9DS1

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 - LSM9DS1 (Product ID: 3387)

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://circuitpython.org/downloads>
- Adafruit's Bus Device library: https://github.com/adafruit/Adafruit_CircuitPython_BusDevice

class `adafruit_lsm9ds1.LSM9DS1`

Driver for the LSM9DS1 accelerometer, magnetometer, gyroscope.

accel_range

The accelerometer range. Must be a value of:

- `ACCEL_RANGE_2G`
- `ACCEL_RANGE_4G`
- `ACCEL_RANGE_8G`
- `ACCEL_RANGE_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 rad/s 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_4GAUSS
- MAGGAIN_8GAUSS
- MAGGAIN_12GAUSS
- MAGGAIN_16GAUSS

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 12-bit signed 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_lsm9ds1.LSM9DS1_I2C(*i2c*, *mag_address*=30, *xg_address*=107)

Driver for the LSM9DS1 connect over I2C.

Parameters

- **i2c** (*I2C*) – The I2C bus the device is connected to
- **mag_address** (*int*) – A 8-bit integer that represents the i2c address of the LSM9DS1's magnetometer. Options are limited to 0x1C or 0x1E Defaults to 0x1E.
- **xg_address** (*int*) – A 8-bit integer that represents the i2c address of the LSM9DS1's accelerometer and gyroscope. Options are limited to 0x6A or 0x6B. Defaults to 0x6B.

Quickstart: Importing and using the device

Here is an example of using the *LSM9DS1* class. First you will need to import the libraries to use the sensor

```
import board
import adafruit_lsm9ds1
```

Once this is done you can define your `board.I2C` object and define your sensor object

```
i2c = board.I2C() # uses board.SCL and board.SDA
sensor = adafruit_lsm9ds1.LSM9DS1_I2C(i2c)
```

Now you have access to the acceleration, magnetic gyro and temperature attributes

```
acc_x, acc_y, acc_z = sensor.acceleration
mag_x, mag_y, mag_z = sensor.magnetic
gyro_x, gyro_y, gyro_z = sensor.gyro
temp = sensor.temperature
```

class `adafruit_lsm9ds1.LSM9DS1_SPI` (*spi, xgcs, mcs*)
Driver for the LSM9DS1 connect over SPI.

Parameters

- **spi** (*SPI*) – The SPI bus the device is connected to
- **mcs** (*DigitalInOut*) – The digital output pin connected to the LSM9DS1’s CSM (Chip Select Magnetometer) pin.
- **xgcs** (*DigitalInOut*) – The digital output pin connected to the LSM9DS1’s CSAG (Chip Select Accelerometer/Gyroscope) pin.

Quickstart: Importing and using the device

Here is an example of using the *LSM9DS1* class. First you will need to import the libraries to use the sensor

```
import board
import adafruit_lsm9ds1
```

Once this is done you can define your `board.SPI` object and define your sensor object

```
spi = board.SPI()
sensor = adafruit_lsm9ds1.LSM9DS1_SPI(spi)
```

Now you have access to the acceleration, magnetic gyro and temperature attributes

```
acc_x, acc_y, acc_z = sensor.acceleration
mag_x, mag_y, mag_z = sensor.magnetic
gyro_x, gyro_y, gyro_z = sensor.gyro
temp = sensor.temperature
```

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