I2C Jetson NANO

From Nvidia developer forum, the reference is provided here

https://www.instructables.com/Raspberry-Pi-I2C-Python/

Enable i2c:

Step 1. configure i2c

```
sudo usermod -a -G i2c $USER
```

Step 2. check is i2c tool is installed, also use this to install it if not:

$sudo apt-get install i2c-tools

Step 3. Install python smbus:
$sudo apt-get install python-smbus

```
harry@harry-desktop: ~
harry@harry-desktop:~$ sudo apt-get install python-smbus
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

```
harry@harry-desktop: ~
harry@harry-desktop:~$ sudo usermod -a -G i2c $USER
[sudo] password for harry:
harry@harry-desktop:~$
```

```
harry@harry-desktop: ~
70:
harry@harry-desktop:~$ sudo apt-get install i2c-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
i2c-tools is already the newest version (4.0-2).
```

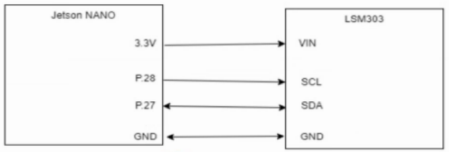
Step 4. Reboot to make installed tools working, thenCheck if any i2c is detected $i2cdetect -y 0

```
harry@harry-desktop: ~
harry@harry-desktop:~$ sudo usermod -a -G i2c $USER
[sudo] password for harry:
harry@harry-desktop:~$ i2cdetect -y 0
Warning: Can't use SMBus Quick Write command, will skip some addresses
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:
10:
20:
30: -- -- -- -- -- -- -- --
40:
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60:
70:
harry@harry-desktop:~$
```

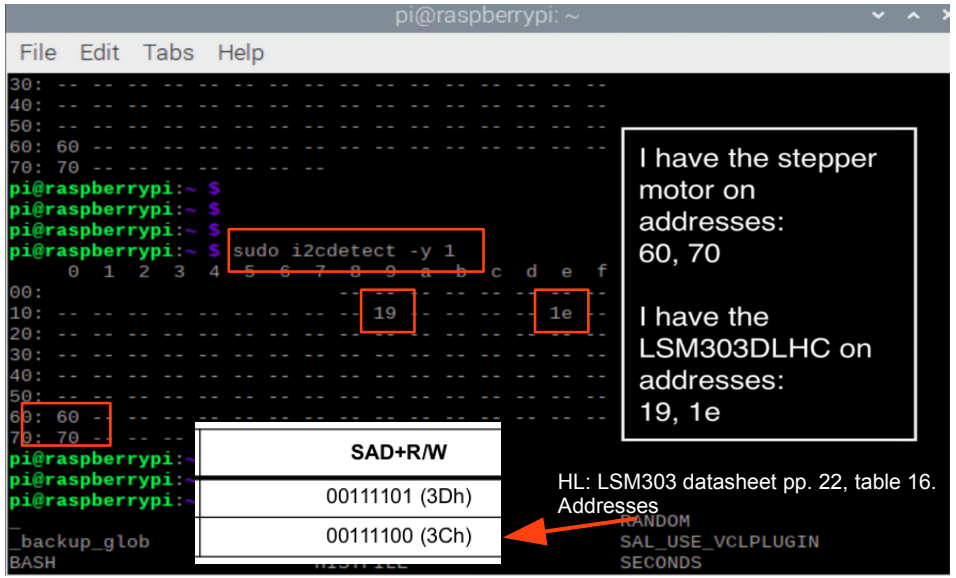
Step 5. Once you are done with step 4, then you are ready to write your i2c code to interface to LSM303

```
import io
io.open ("/dev/i2c-0")
```

Pin 27 (SDA), 28 (SCL) from Billy Lai



Python I2C Interfaces to LSM303



https://learn.adafruit.com/lsm303-accelerometer-slash-compass-breakout/python-circuitpython

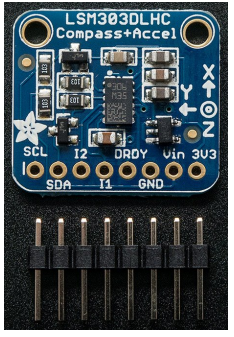
Python & CircuitPython for LSM303 sensor with CircuitPython and the Adafruit CircuitPython LSM303 Accelerometer
https://github.com/adafruit/Adafruit_CircuitPython_LSM303_Accel
Adafruit CircuitPython LIS2MDL or
Adafruit CircuitPython LSM303DLH Magnetometer libraries
https://github.com/adafruit/Adafruit_CircuitPython_LSM303DLH_Mag
These libraries allow you to easily write Python code that reads the accelerometer and magnetometer values from the sensor.

```
import time
import board
import adafruit_lsm303dlh_mag
i2c = board.I2C()  # uses board.SCL and board.SDA
sensor = adafruit_lsm303dlh_mag.LSM303DLH_Mag(i2c)
while True:
    mag_x, mag_y, mag_z = sensor.magnetic
    print('Magnetometer (gauss): ({0:10.3f}, {1:10.3f}, {2:10.3f})'.format(mag_x, mag_y, mag_z))
    print('')
    time.sleep(1.0)
```

Python I2C Interfaces to LSM303

https://learn.adafruit.com/lsm303-accelerometer-slash-compass-breakout/python-circuitpython

Python & CircuitPython for LSM303 sensor with CircuitPython and the Adafruit CircuitPython LSM303 Accelerometer
https://github.com/adafruit/Adafruit_CircuitPython_LSM303_Accel
Adafruit CircuitPython LIS2MDL or
Adafruit CircuitPython LSM303DLH Magnetometer libraries
https://github.com/adafruit/Adafruit_CircuitPython_LSM303DLH_Mag
These libraries allow you to easily write Python code that reads the accelerometer and magnetometer values from the sensor.



Triple-axis Accelerometer+Magnetometer (Compass) Board - LSM303
Product ID: 1120 $14.95

https://www.adafruit.com/product/1120

```
1 import time
2 import board
3 import digitalio
4 import pwmio
5 import adafruit_lsm303_accel
6 import adafruit_lis2mdl
7 import lsm303

22 ### LSM303 SETUP BEGIN ###
23 i2c = board.I2C()
24 accel_out = adafruit_lsm303_accel.LSM303_Accel(i2c)
25 mag_out = adafruit_lis2mdl.LIS2MDL(i2c)
26 ### LSM303 SETUP END ###

28 ### TEXT DOCS SETUP BEGIN ###
29 file = open("Magnetometer_Output.txt", "w")
30 file.write("")
31 ### TEXT DOCS SETUP END ###

40     print("Angle %0.1f: " %angle, end='')
41     print("X=%0.2f Y=%0.2f Z=%0.2f" %mag_out.magnetic)
42     file = open("Magnetometer_Output.txt", "a")
43     file.write("Angle %0.1f: " %angle)
44     file.write("%0.2f %0.2f %0.2f\n"%mag_out.magnetic)
```

Example: from adafruit

```
import time
import board
import adafruit_lsm303dlh_mag
i2c = board.I2C()  # uses board.SCL and board.SDA
sensor = adafruit_lsm303dlh_mag.LSM303DLH_Mag(i2c)
while True:
    mag_x, mag_y, mag_z = sensor.magnetic
    print('Magnetometer (gauss): ({0:10.3f}, {1:10.3f}, {2:10.3f})'.format(mag_x, mag_y, mag_z))
    print('')
    time.sleep(1.0)
```

Example Python I2C Interfaces to LSM303 (2)

https://learn.adafruit.com/lsm303-accelerometer-slash-compass-breakout/python-circuitpython

```
# GPIO Libraries
#import RPi.GPIO as GPIO
import Jetson.GPIO as GPIO

# Handles time
import time

#import i2c bus and LSM303 libraries
import board
import busio
import digitalio
import adafruit_lsm303_accel
import adafruit_lsm303dlh_mag

#import tangent and degrees function
from math import tan, degrees


# Pin Definition in TEGRA_SOC
DIR_PIN = 'DAP4_FS'   #Pin 35
STEP_PIN = 'GPIO_PE6' #Pin 33
```

```
#Set I2c Chanels for acceleration and magnetics
i2c = busio.I2C(board.SCL, board.SDA)
accel = adafruit_lsm303_accel.LSM303_Accel(i2c)
mag = adafruit_lsm303dlh_mag.LSM303DLH_Mag(i2c)
```

```
    m_x, m_y, m_z = mag.magnetic

    angle_yz_0 = angle_XY(acc_y_0, acc_z_0)
    angle_yz_1 = angle_XY(acc_y_1, acc_z_1)
    angle_yz_2 = angle_XY(acc_y_2, acc_z_2)
    angle_yz_3 = angle_XY(acc_y_3, acc_z_3)
    angle_yz_4 = angle_XY(acc_y_4, acc_z_4)

    angle_yz = [angle_yz_0, angle_yz_1, angle_yz_2, angle_yz_3, angle_yz_3]
```

NANO Command Line I2C Interface to LSM303

Use I2C command line can be utilized for read/write testing purpose

1. $i2cdetect #for detection of existing i2c devices

```
harry@harry-desktop:~$ i2cdetect -r -y 0
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
```

```
g-car/embedded/c/examples$ i2cdetect -r -y 0
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- 19 -- -- -- -- 1e --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
```

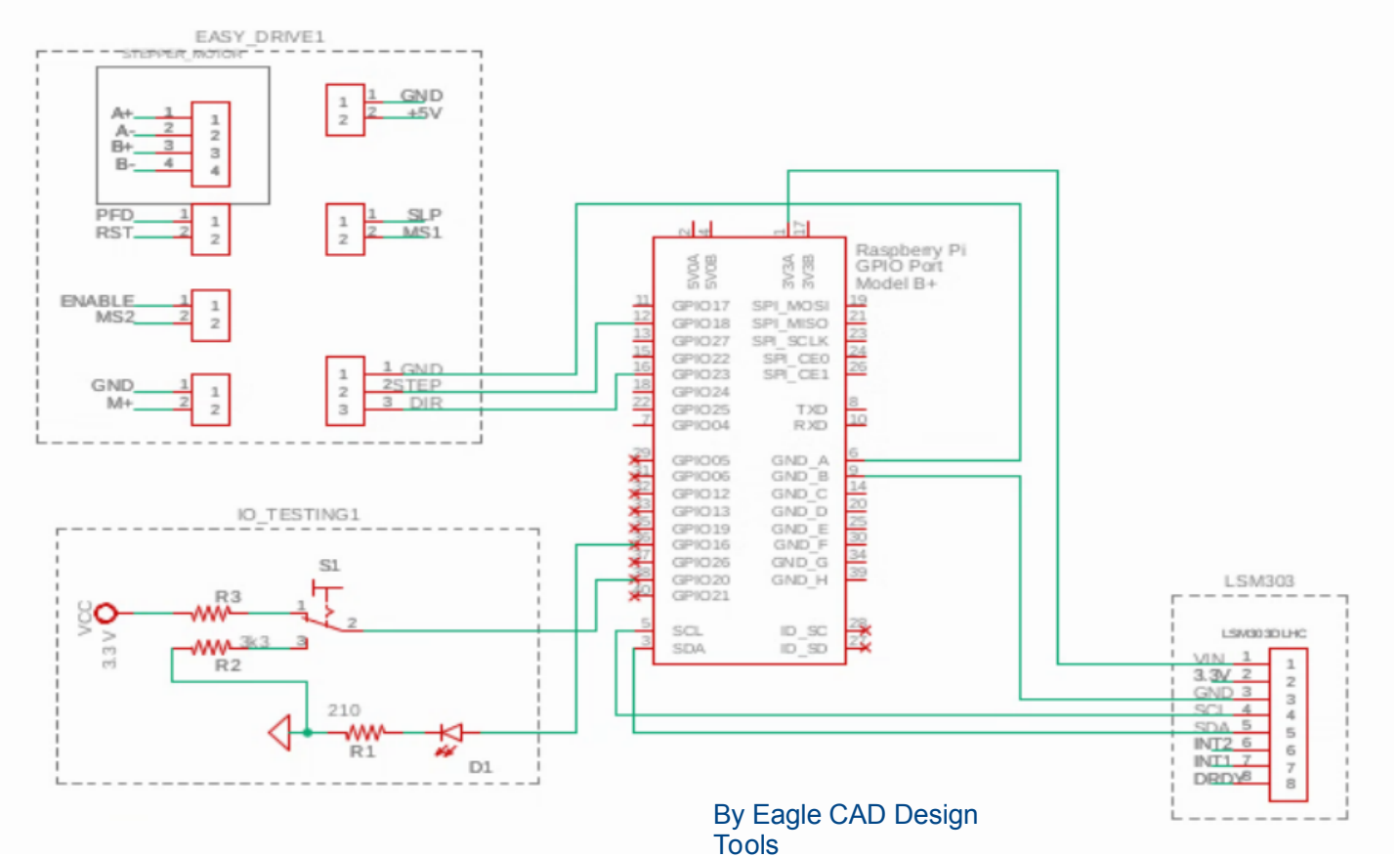
2. $i2cget #for reading/writing testing

```
harry@harry-desktop: ~
harry@harry-desktop:~$ i2cget
Usage: i2cget [-f] [-y] I2CBUS CHIP-ADDRESS [DATA-ADDRESS [MODE]]
  I2CBUS is an integer or an I2C bus name
  ADDRESS is an integer (0x03 - 0x77)
  MODE is one of:
    b (read byte data, default)
    w (read word data)
    c (write byte/read byte)
    Append p for SMBus PEC
harry@harry-desktop:~$
```

```
nvidia@nvidia-desktop:/sys/class/i2c-dev$ i2cset 0 0x19 0x20 0x7f
WARNING! This program can confuse your I2C bus, cause data loss and worse!
I will write to device file /dev/i2c-0, chip address 0x19, data address
0x20, data 0x7f, mode byte.
Continue? [Y/n] y
nvidia@nvidia-desktop:/sys/class/i2c-dev$ i2cget -y 0 0x19 0x29
0xd7
nvidia@nvidia-desktop:/sys/class/i2c-dev$ i2cget -y 0 0x19 0x28
```

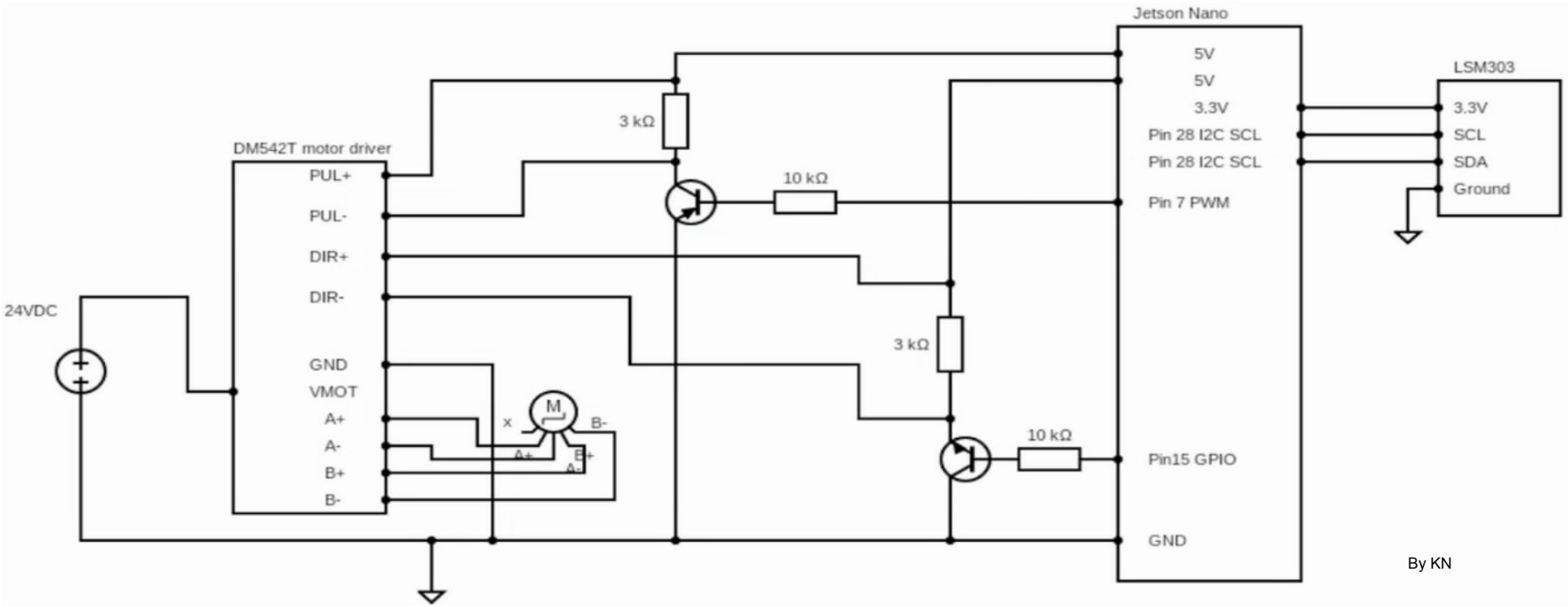
Harry Li, Ph.D. April 2022

NANO/Pie I2C Interface to LSM303



By Eagle CAD Design Tools

NANO I2C Interface to LSM303



Harry Li, Ph.D. April 2022