

# Setting up Sensirion SCD-30 Sensor

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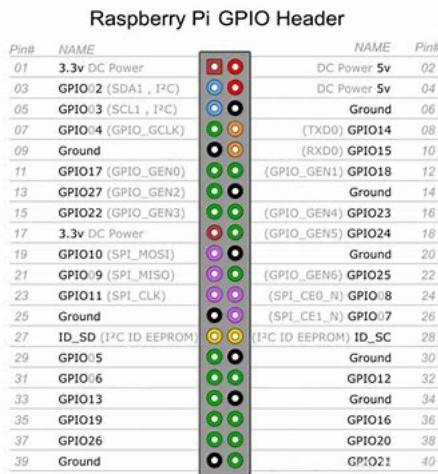
National University of Ireland Maynooth

CS353FZ — Team Project (2021-22: Semester 1) **Team 25**

This document shows the steps to read out Sensirion SCD-30 Sensor values over I2C on Raspberry Pi 4B.

## Step 1 Wiring SCD-30 to Raspberry Pi 4B

The Raspberry Pi 4B 40-pin GPIO Layout is as following:



(Source: <https://www.mioshu.com/316.html>)

The Sensirion SCD-30 Sensor Pin-out is as following:

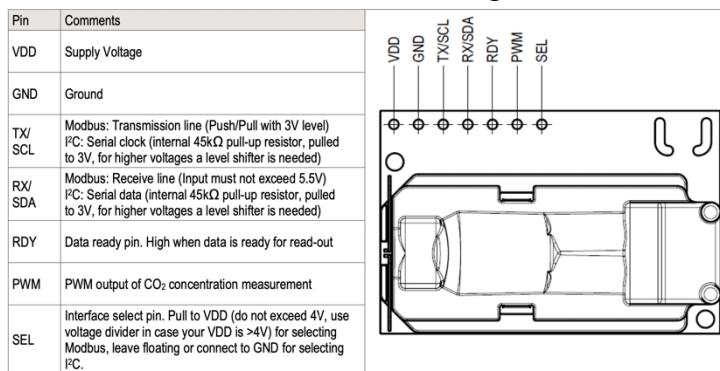


Figure 2: Pin-out of the SCD30.

(Source: <https://www.sensirion.com/>)

Wiring:

SCD-30: VDD/VIN -> Raspberry Pi 4B: 3.3V (Pin#01)

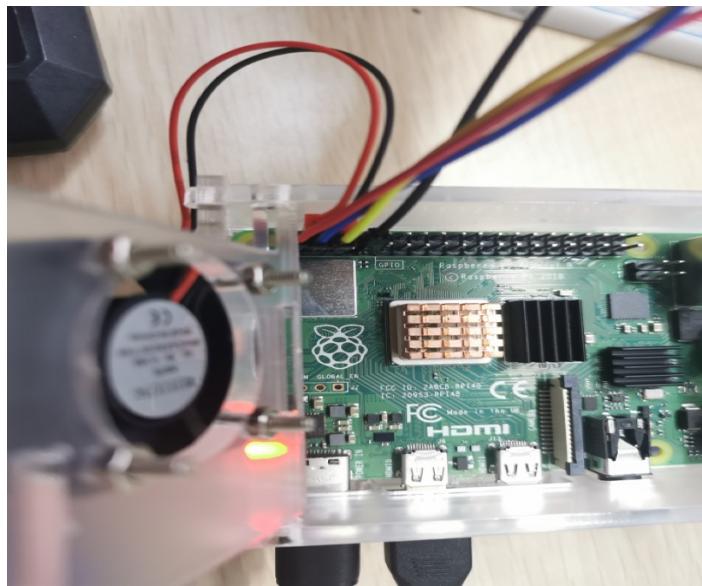
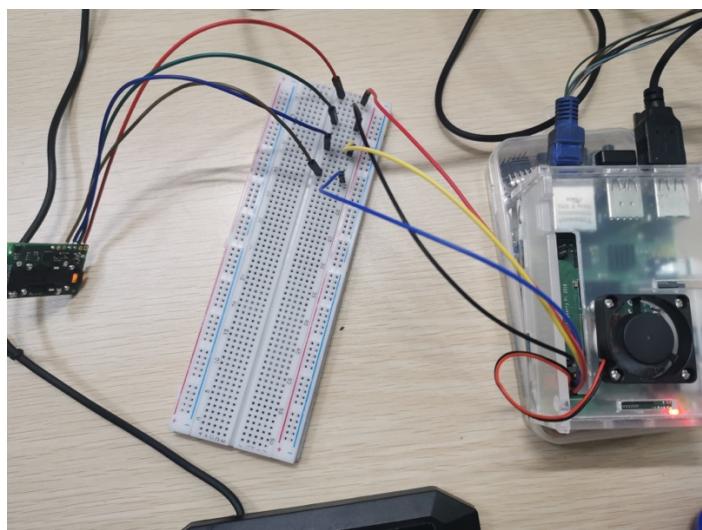
SCD-30: GND -> Raspberry Pi 4B: GND (Pin#09)

SCD-30: TX/SCL -> Raspberry Pi 4B: GPIO03(Pin#05)

SCD-30: RX/SDA -> Raspberry Pi 4B: GPIO02 (Pin#03)

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If you do not understand it clearly, please look at the physical equipment:



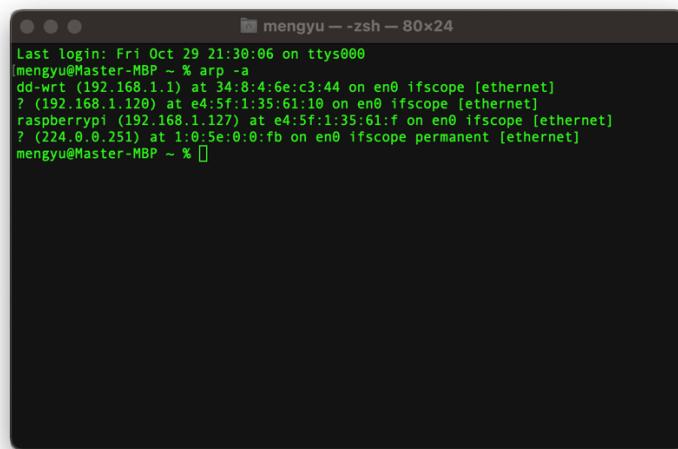
## Step 2 Enabling I2C Interface on Raspberry Pi 4B

There are some methods for you to enable I2C interface, I will introduce one of them.

### Using SSH to enable I2C Interface

You should first connect your computer and your Raspberry Pi 4B in the same Wi-Fi.

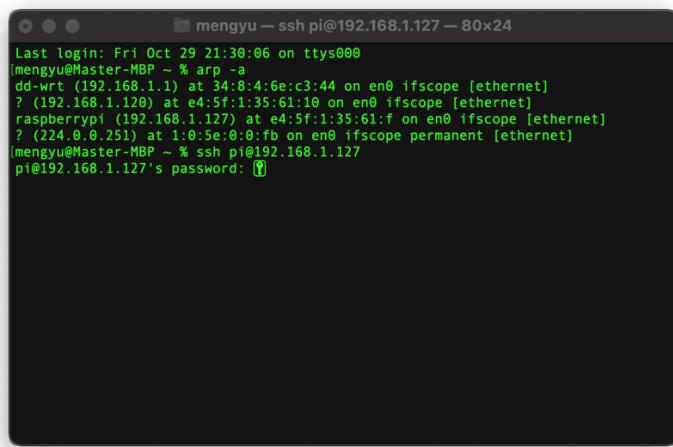
In your terminal, use `arp -a` command to find your Raspberry Pi 4B IP address:



```
mengyu -- zsh -- 80x24
Last login: Fri Oct 29 21:30:06 on ttys000
[mengyu@Master-MBP ~ % arp -a
dd-wrt (192.168.1.1) at 34:8:4:6e:c3:44 on en0 ifscope [ethernet]
? (192.168.1.120) at e4:5f:1:35:61:10 on en0 ifscope [ethernet]
raspberrypi (192.168.1.127) at e4:5f:1:35:61:f on en0 ifscope [ethernet]
? (224.0.0.251) at 1:0:5e:0:0:fb on en0 ifscope permanent [ethernet]
mengyu@Master-MBP ~ % ]
```

In my Local Area Network, you can know that the IP address for Raspberry Pi 4B is **192.168.1.127**.

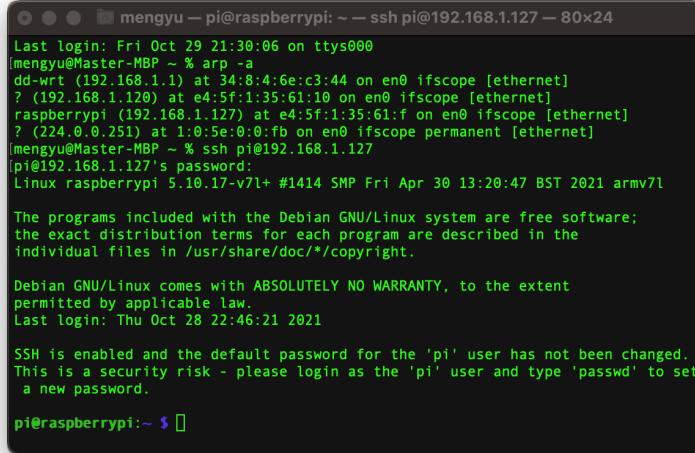
I use SSH command to connect the Raspberry Pi 4B wirelessly.



```
mengyu -- ssh pi@192.168.1.127 -- 80x24
Last login: Fri Oct 29 21:30:06 on ttys000
[mengyu@Master-MBP ~ % arp -a
dd-wrt (192.168.1.1) at 34:8:4:6e:c3:44 on en0 ifscope [ethernet]
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? (224.0.0.251) at 1:0:5e:0:0:fb on en0 ifscope permanent [ethernet]
[mengyu@Master-MBP ~ % ssh pi@192.168.1.127
pi@192.168.1.127's password: ]
```

Hint: 1. The original password for Raspberry Pi 4B is *raspberry*.  
2. You should reset password after you login it.

If you enter password correctly, you can see it:



```
mengyu - pi@raspberrypi: ~ - ssh pi@192.168.1.127 - 80x24
Last login: Fri Oct 29 21:30:06 on ttys000
[mengyu@Master-MBP ~ % arp -a
dd-wrt (192.168.1.1) at 34:8:4:6:e:c3:44 on en0 ifscope [ethernet]
? (192.168.1.120) at e4:5f:1:35:61:10 on en0 ifscope [ethernet]
raspberrypi (192.168.1.127) at e4:5f:1:35:61:f on en0 ifscope [ethernet]
? (224.0.0.251) at 1:0:5e:0:fb on en0 ifscope permanent [ethernet]
[mengyu@Master-MBP ~ % ssh pi@192.168.1.127
pi@192.168.1.127's password:
Linux raspberrypi 5.10.17-v7l+ #1414 SMP Fri Apr 30 13:20:47 BST 2021 armv7l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Oct 28 22:46:21 2021

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.

pi@raspberrypi:~ $ ]
```

This means you login in Raspberry Pi 4B successfully by using SSH connection.

Then you can open I2C by running the following command in the terminal:

```
sudo raspi - config
```



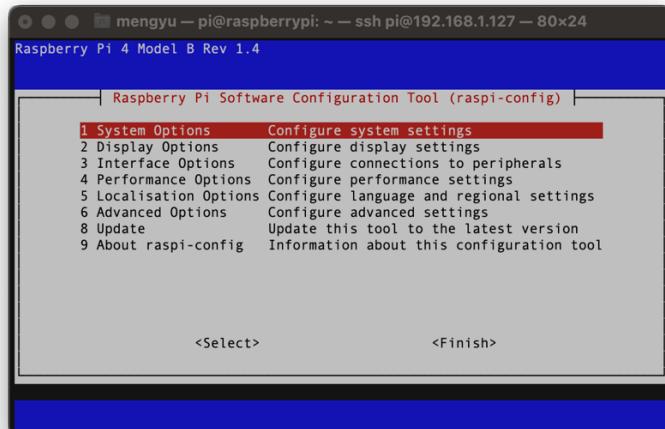
```
mengyu - pi@raspberrypi: ~ - ssh pi@192.168.1.127 - 80x24
Last login: Fri Oct 29 21:30:06 on ttys000
[mengyu@Master-MBP ~ % arp -a
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raspberrypi (192.168.1.127) at e4:5f:1:35:61:f on en0 ifscope [ethernet]
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[mengyu@Master-MBP ~ % ssh pi@192.168.1.127
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Linux raspberrypi 5.10.17-v7l+ #1414 SMP Fri Apr 30 13:20:47 BST 2021 armv7l
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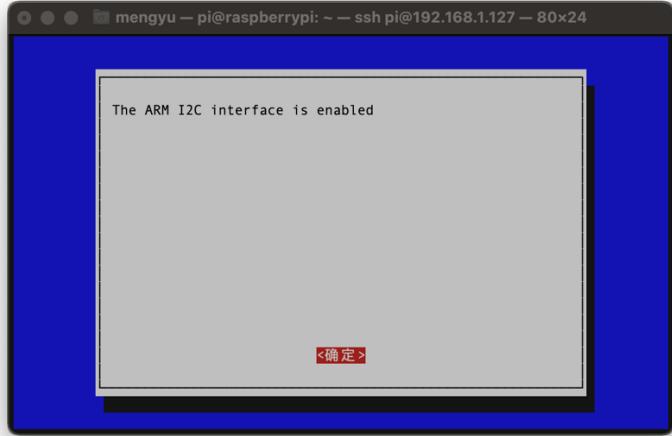
SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.

pi@raspberrypi:~ $ sudo raspi-config[ ]
```

You will see the following window:



Use Direction Key in the keyboard to choose **3 Interface Options**, then choose **P5 I2C**, then click **ENTER** to choose **Yes** button. Finally, you will see the following window:



From now on, the I2C Interface in Raspberry Pi 4B is enabled.

Hint: Do not forget to reboot Raspberry Pi 4B after you do the command.

*sudo reboot*

```
mengyu — pi@raspberrypi: ~ — ssh pi@192.168.1.127 — 80x24
Last login: Fri Oct 29 21:30:06 on ttys000
[mengyueMaster-MBP ~ % arp -a
dd-wrt (192.168.1.1) at 34:8:4:6:e:c3:44 on en0 ifscope [ethernet]
? (192.168.1.120) at e4:5f:1:35:61:10 on en0 ifscope [ethernet]
raspberrypi (192.168.1.127) at e4:5f:1:35:61:f on en0 ifscope [ethernet]
? (224.0.0.251) at 1:0:5e:0:0:fb on en0 ifscope permanent [ethernet]
[mengyueMaster-MBP ~ % ssh pi@192.168.1.127
pi@192.168.1.127's password:
Linux raspberrypi 5.10.17-v7l+ #1414 SMP Fri Apr 30 13:20:47 BST 2021 armv7l

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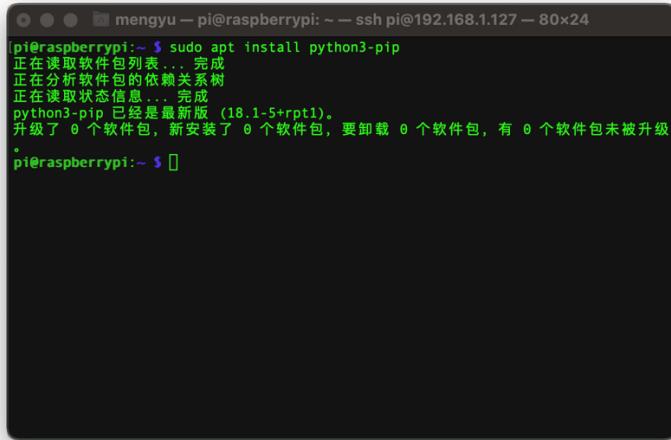
SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
a new password.

[pi@raspberrypi:~ $ sudo raspi-config
pi@raspberrypi:~ $ sudo reboot[]
```

## Step 3 Installing related Python Libraries on Raspberry Pi 4B

You should first install pip3 in your Raspberry Pi 4B which is a package-management system written in Python used to install and manage software packages.

```
sudo apt install python3-pip
```



```
mengyu — pi@raspberrypi: ~ — ssh pi@192.168.1.127 — 80x24
[pi@raspberrypi:~ $ sudo apt install python3-pip
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
python3-pip 已经是最新版 (18.1-5+rpt1)。
升级了 0 个软件包，新安装了 0 个软件包，要卸载 0 个软件包，有 0 个软件包未被升级。
.
pi@raspberrypi:~ $ ]
```

Hint: If you find it is slow for you to download the packages, you should replace the source for download (You can search it in the Internet, but I advise you not to replace it because there may be some unknown problems). If you replace it, you should upgrade all the packages in your Raspberry Pi 4B.

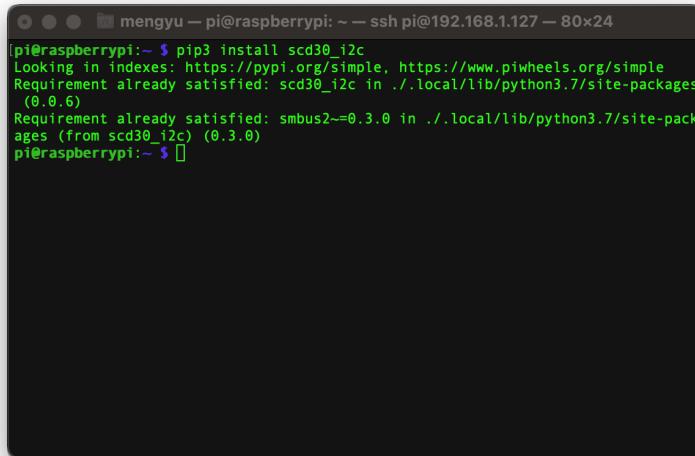
You can use some Python Libraries read out Sensirion SCD-30 Sensor values over I2C on Raspberry Pi 4B. I will introduce two of them.

### The scd30\_i2c Library

You can use **scd30\_i2c Library** to read out Sensirion SCD-30 Sensor values.

First, you should install the library.

```
pip3 install scd30_i2c
```



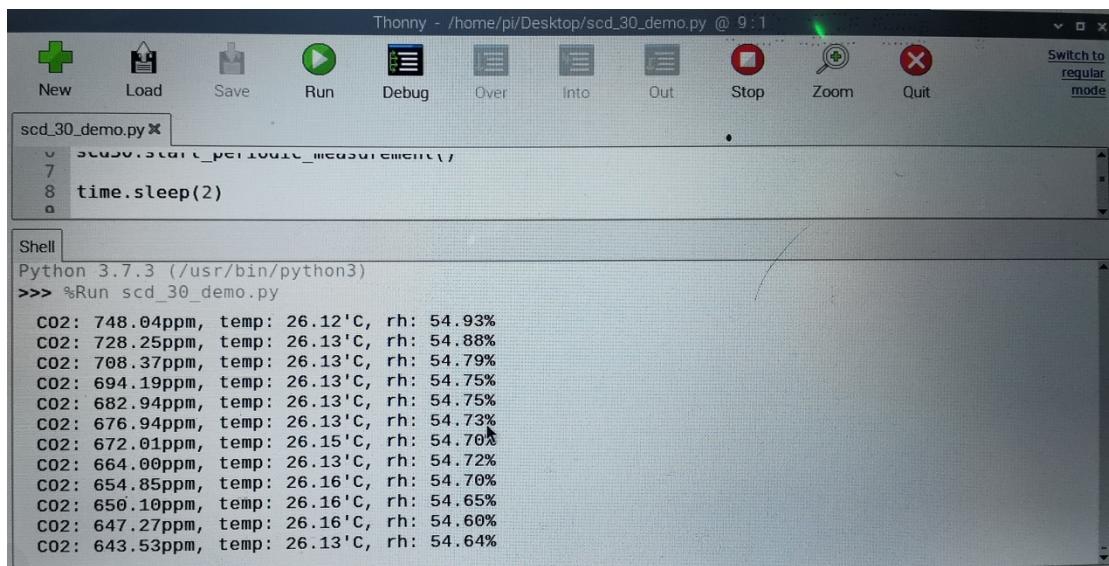
```
mengyu — pi@raspberrypi: ~ — ssh pi@192.168.1.127 — 80x24
[pi@raspberrypi:~ $ pip3 install scd30_i2c
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Requirement already satisfied: scd30_i2c in ./local/lib/python3.7/site-packages
(0.0.6)
Requirement already satisfied: smbus2~=0.3.0 in ./local/lib/python3.7/site-packages
(from scd30_i2c) (0.3.0)
pi@raspberrypi:~ $ ]
```

Then, you can run the following Python code in the Raspberry Pi 4B.

```
1  from scd30_i2c import SCD30
2  import time
3  scd30 = SCD30()
4
5  scd30.set_measurement_interval(2)
6  scd30.start_periodic_measurement()
7
8  time.sleep(2)
9
10 while True:
11     if scd30.get_data_ready():
12         m = scd30.read_measurement()
13         if m is not None:
14             print(f"CO2: {m[0]:.2f}ppm, temp: {m[1]:.2f}'C, rh: {m[2]:.2f}%")
15         time.sleep(2)
16     else:
17         time.sleep(0.2)
```

(Source:[https://github.com/Skyer19/scd-30-sensor/blob/main/scd\\_30\\_i2c\\_demo.py](https://github.com/Skyer19/scd-30-sensor/blob/main/scd_30_i2c_demo.py))

Hint: You can use Thonny Python IDE in the Raspberry Pi 4B or use terminal.



### The adafruit\_scd30 Library

You can also use the library which is special for adafruit. The package install operation is like install **scd30\_i2c Library**. You can try it by yourself. :)

The related operations and code are as following:

Source: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_SCD30](https://github.com/adafruit/Adafruit_CircuitPython_SCD30)

Source: <https://learn.adafruit.com/adafruit-scd30/python-circuitpython>