CME 466
Design of an Advanced Digital System

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Connect sensors to RPI

1. Raspberry Pi 4 pinout:

Make sure you have placed the RPI in a correct direction, then use the following schematic to select the desired pins.

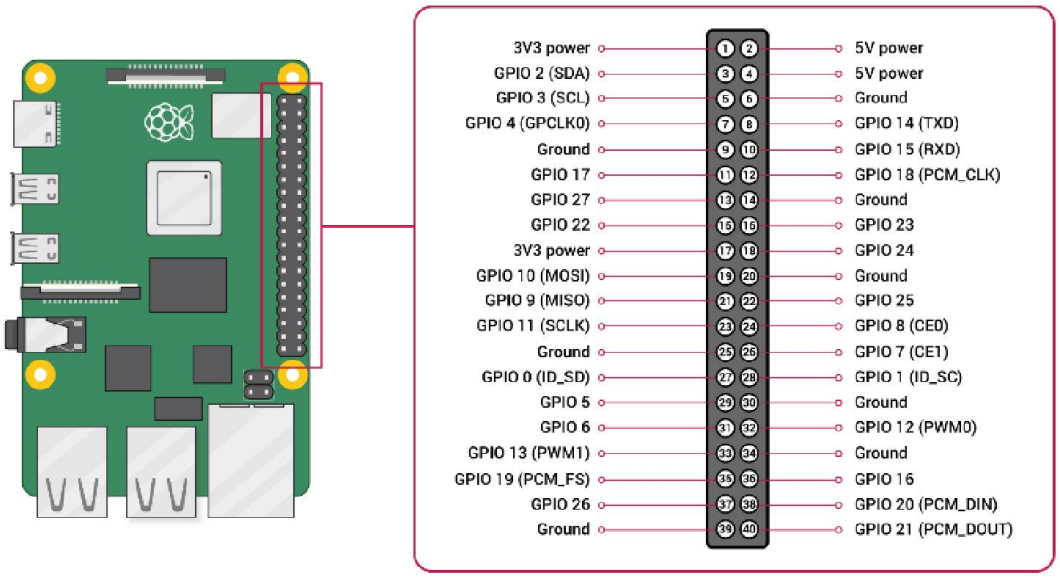

Fig.1 RPI 4 pinouts

2. Select a sensor:

In this example BMP180 is selected, but students are free to choose any sensor modules available in the lab (must interface using I2C, UART or SPI).

2.1. Sensor specifications:

Vin: 3 to 5VDC
Pressure sensing range: 300-1100 hPa (9000m to -500m above sea level)
-40 to +85°C operational range, +-2°C temperature accuracy
I2C address: 0x77

Connect the 3Vo, GND, SCL and SDA pins of the sensor module to pins 1, 6 (or 39), 5 and 3 of the RPi respectively. Make sure to enable I2C peripheral of RPi from the config menu (see Tutorial 1). Make sure you have the RPI GPIO python package already installed (see Tutorial 1).

Lessons from SunFounder: https://docs.sunfounder.com/projects/sensorkit-v2-pi/en/latest/lesson_1.html

Fig.2 BMP180, Barometric Pressure, Temperature and Altitude

2.2. Find a suitable python package:

Search "BMP180 python package", then follow the instruction available on the internet. An example is given below:

```
sudo apt-get update
sudo apt-get install git build-essential python-dev python-smbus
git clone https://github.com/adafruit/Adafruit_Python_BMP.git
cd Adafruit_Python_BMP
sudo python setup.py install
```

Github is a website in which programmers shares their codes.
"git" is a tool used for source code management.

More information about the package can be found here: https://github.com/adafruit/Adafruit_Python_BMP

2.3. Write your code:

```
import Adafruit_BMP.BMP085 as BMP085

sensor = BMP085.BMP085()

print(f'temp = {sensor.read_temperature()} C')
print(f'pressure = {sensor.read_pressure()} Pa')
print(f'alt = {sensor.read_altitude()} m')
```

Create an object of BMP085 class.

Using print function, you can print a string in terminal.
ex. print("HELLO WORLD")

In order to attached variables in string you have to:
1. Add f before the "". ex print(f'')
2. Place your variable inside {}. ex. print(f'this is {my_var}')

Note: You can either use '' or "" for strings.

2.3. Add decision making to your code:

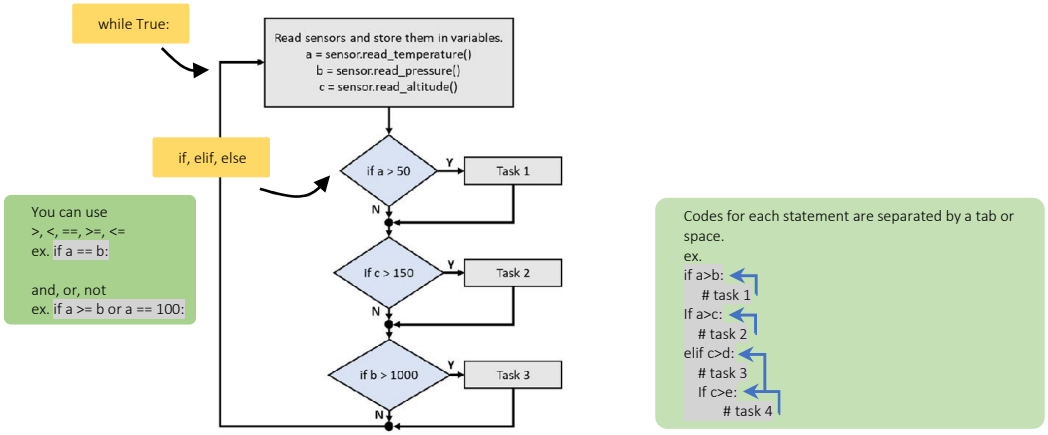

Fig.3 if else statement

2.4. Periodic events: