ECEGR 4640: Internet of Things **Date: 09/30/2025**

Laboratory 1: Uploading data from the Raspberry Pi to ThingSpeak

Goal: To connect and upload data from a Raspberry Pi to ThingSpeak for IoT applications. Using an environmental sensing board called Enviro pHAT, upload temperature and other measurements onto ThingSpeak.

This is an exploratory lab activity. So, rather than providing step-by-step instructions, an overview of the methodology will be provided.

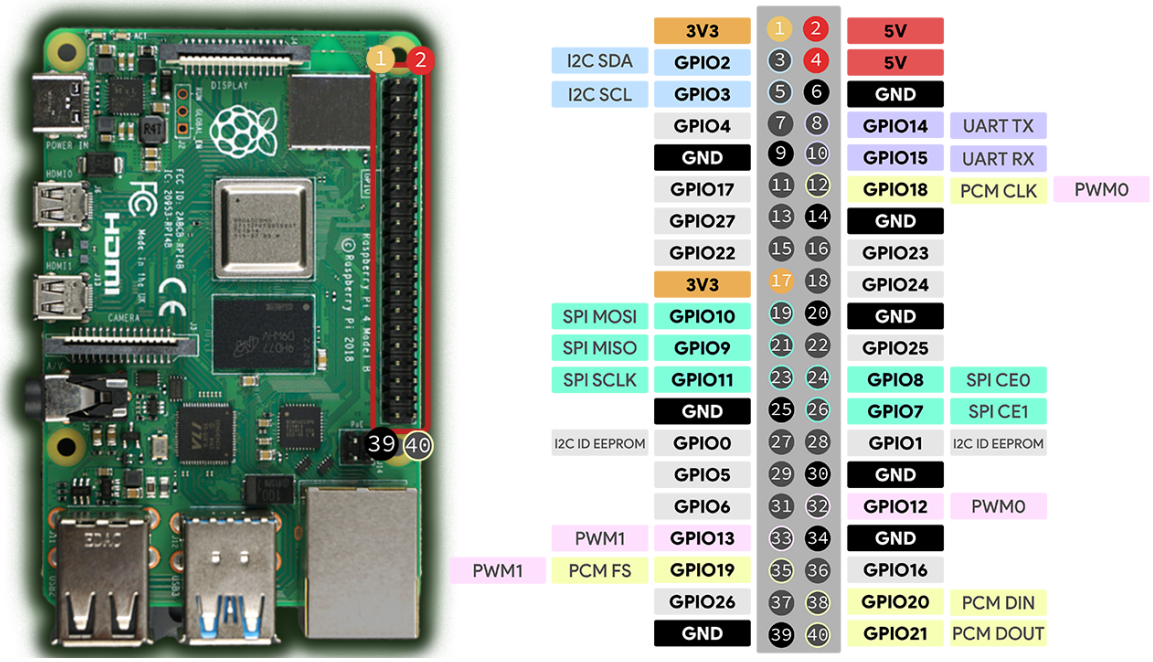
- Follow instructions to sign in to ThingSpeak using your existing Mathworks account, or create a new one. Create a channel for temperature measurements.

  https://www.mathworks.com/help/thingspeak/collect-data-in-a-new-channel.html

- Install the Enviro pHAT software on your Raspberry Pi.

```
sudo apt update
sudo apt remove python3-rpi.gpio
sudo apt install python3-rpi-lgpio
sudo apt install python3-envirophat
```

- Mount the Enviro pHAT onto the Pi



- Run Python scripts corresponding to the three examples found here:
  https://github.com/pimoroni/enviro-phat

- **Use the sample python script (modified temperature.py) below to connect and upload data from the Pi to ThingSpeak.**

```
from time import time, sleep
from urllib.request import urlopen
import sys
from envirophat import weather, leds

WRITE_API = "____________" # Replace your ThingSpeak API key here
BASE_URL =
"https://api.thingspeak.com/update?api_key={}".format(WRITE_API)


SensorPrevSec = 0
SensorInterval = 2 # 2 seconds
ThingSpeakPrevSec = 0
ThingSpeakInterval = 20 # 20 seconds

try:
    while True:

        if time() - SensorPrevSec > SensorInterval:
            SensorPrevSec = time()

            temperature = weather.temperature()
            print("{} degrees Celcius".format(temperature))

        if time() - ThingSpeakPrevSec > ThingSpeakInterval:
            ThingSpeakPrevSec = time()

            thingspeakHttp = BASE_URL +
"&field1={:.2f}".format(temperature)
            print(thingspeakHttp)
```

```
            conn = urlopen(thingspeakHttp)
            print("Response: {}".format(conn.read()))
            conn.close()

            sleep(1)

except KeyboardInterrupt:
    conn.close()
```

- Repeat this exercise for *all.py* and *motion_detect.py*
- Use various capabilities of ThingSpeak to make the activity more interesting! For example, enable notifications on ThingSpeak.

https://learn.pimoroni.com/tutorial/sandyj/getting-started-with-enviro-phat