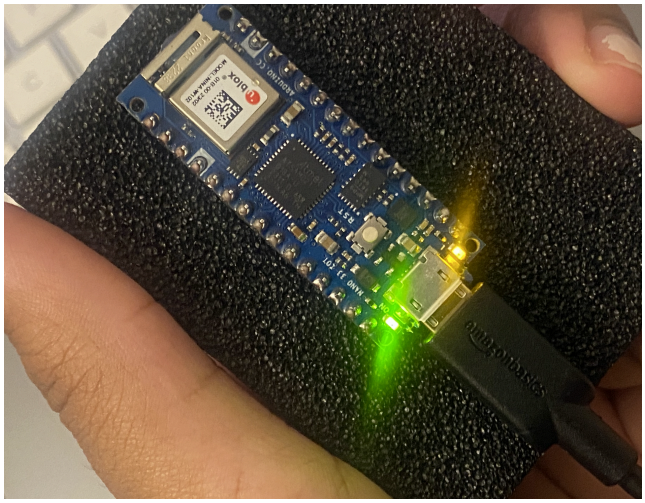
Task 1



```
  Serial.println("X\tY\tZ");
}

void loop() {
  float x, y, z;

  if (IMU.accelerationAvailable()) {
    IMU.readAcceleration(x, y, z);

    Serial.print(x);
    Serial.print('\t');
    Serial.print(y);
    Serial.print('\t');
    Serial.println(z);
  }
}
```

Output Serial Monitor ×

Not connected. Select a board and a port to connect automatically.

```
0.47    0.12    0.80
0.59    0.12    0.81
0.69    0.21    0.82
0.59    0.24    0.81
0.61    0.21    0.79
0.60    0.21    0.79
0.59    0.23    0.79
0.60    0.24    0.80
0.61    0.21    0.82
0.60    0.16    0.82
0.58    0.14    0.80
0.58    0.14    0.79
```

Task 2

```
Connecting to UCLA_WIFI

WiFi connected
IP address:
172.30.77.177
```

Task 3


```
  "GYR_Z": -0.122070313
}
{
  "ACC_X": -3.761290789,
  "ACC_Y": -2.477998734,
  "ACC_Z": 8.743624687,
  "GYR_X": -3.845214844,
  "GYR_Y": -1.586914063,
  "GYR_Z": 0.061035156
}
```


The lag is not too bad, without adjusting the code, the IMU is recording data every 0.5 seconds. We can adjust the IMU's sampling rate to reduce the lag or implement filtering algorithms to send messages less frequently. In addition, we can also optimize the network infrastructure for low-latency communication, ensuring reliable connections, sufficient bandwidth, and minimal congestion. A button would be helpful in processing the IMU so just one message is sent.

Task 4

```
------------------------------
Direction:   X       Y       Z
ACC Data: -0.002394, -0.065841, 9.816227
------------------------------
GYR Data: 0.427246, 0.183105, 0.122070
------------------------------
```

- When the IMU is idle, there is little to no motion detected by the sensors. Accelerometers would read close to zero acceleration in all axes, indicating that there is no significant movement.
- I could determine the x,y, and x directions and confirm that with the data my IMU was recording as seen above. For example, the gravity acceleration is 9.81 which is accurate to real gravity acceleration when the IMU is lying flat in the z-direction.
- The IMU is quite accurate for determining the different movements. The values don't drift that much when idle, however, with larger position differences the values do. Integrating data from multiple sensors would help with classifying, idle vs. non-idle.