ECE 180DA
Lab 3
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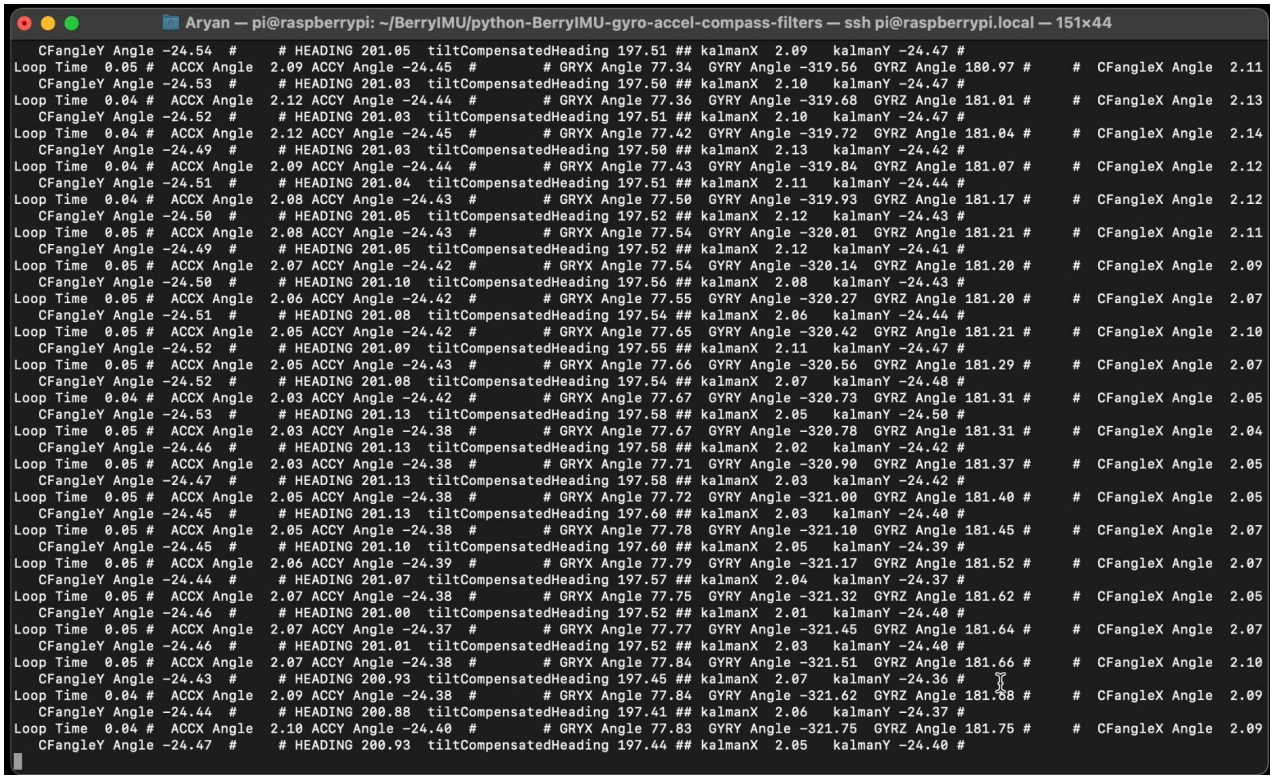
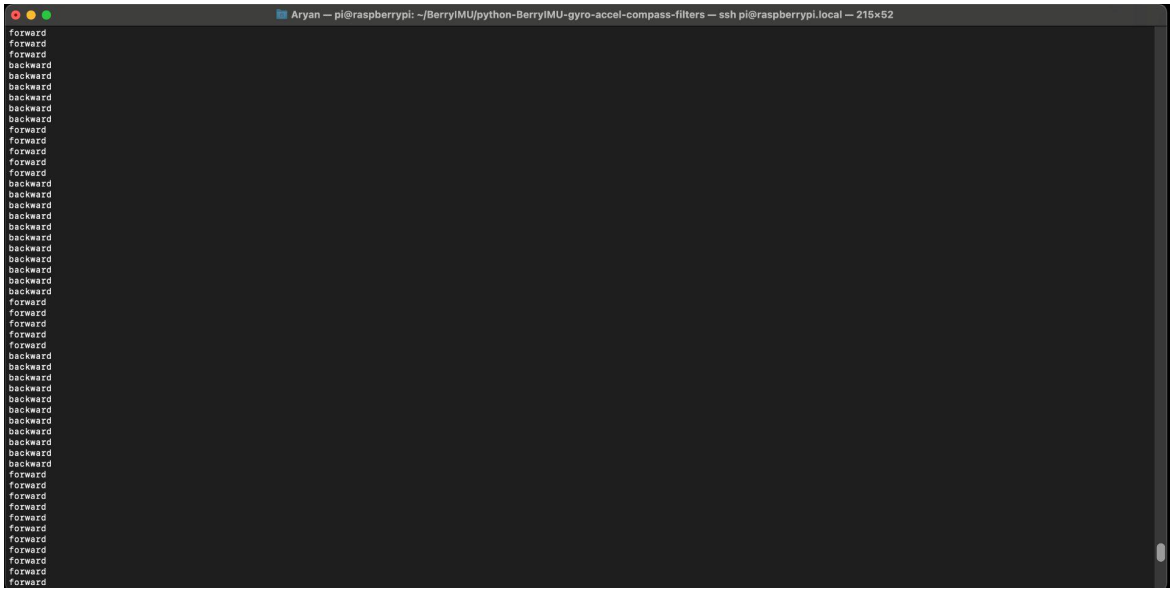
IMU and Speech Recognition

The first thing that I worked on was setting up the WiFi connection again because I had set up my Pi at home. After I connected to eduroam, I checked whether everything was connecting and checked the same using “ping google.com”.

After this, I went on to set up the IMU. I downloaded all the libraries and stuff but the conda was not working and the solving environment kept getting killed. So, I used pip to install whatever was left and ran it using python3.9 instead and it worked. This is what I got once I got the IMU running.



I played around with this for a while to figure out what changed when I move the IMU around. We had to develop a system so it detected whether it is going forward or backward. I used the ACCx and ACCy for this. Very similarly, I developed the same system for left and right turns as well. Following is the screenshot from when I made it detect forward push and backward push.


Aryan — pi@raspberrypi: ~/BerryIMU/python-BerryIMU-gyro-accel-compass-filters — ssh pi@raspberrypi.local — 215×52
forward
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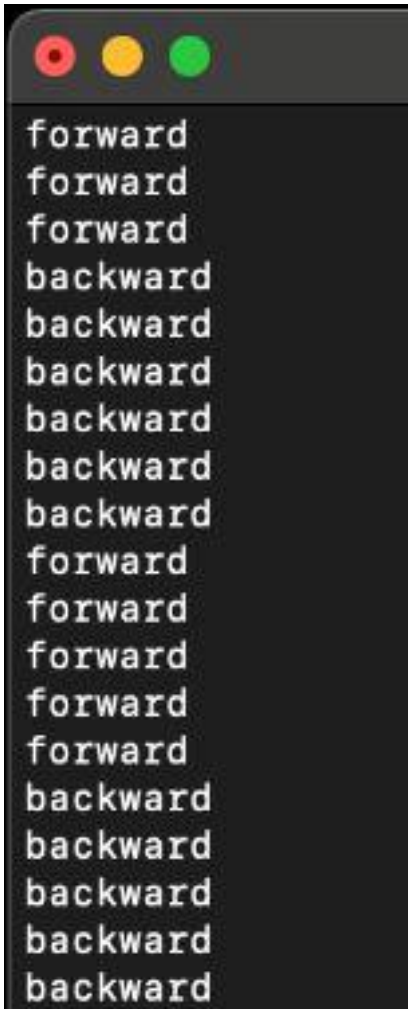
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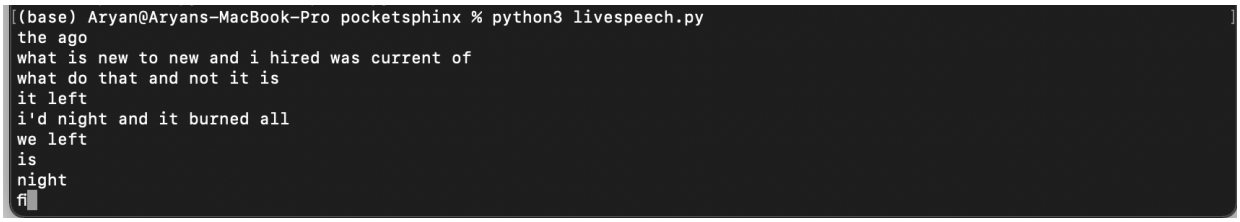
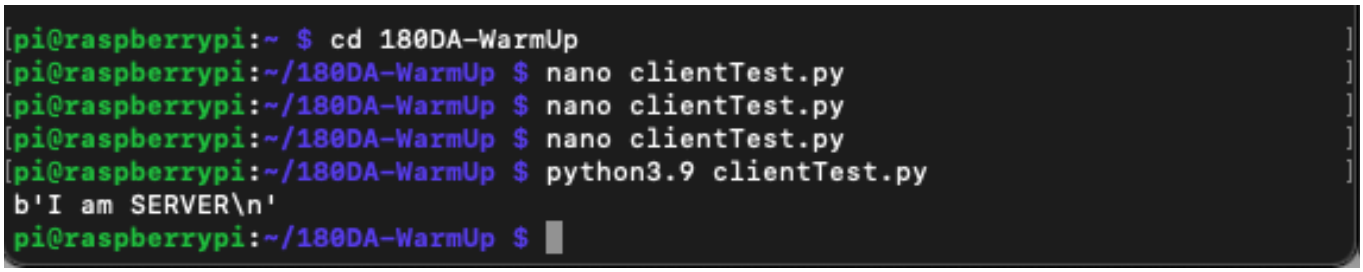
After I got this set up, we started on section 3 which was related to speech detection. I used *pocketsphinx* which is not very accurate. There was a lot of background noise but it recognized some of the words I was saying. I mainly said “left” and “right”. This is the result I got from it.

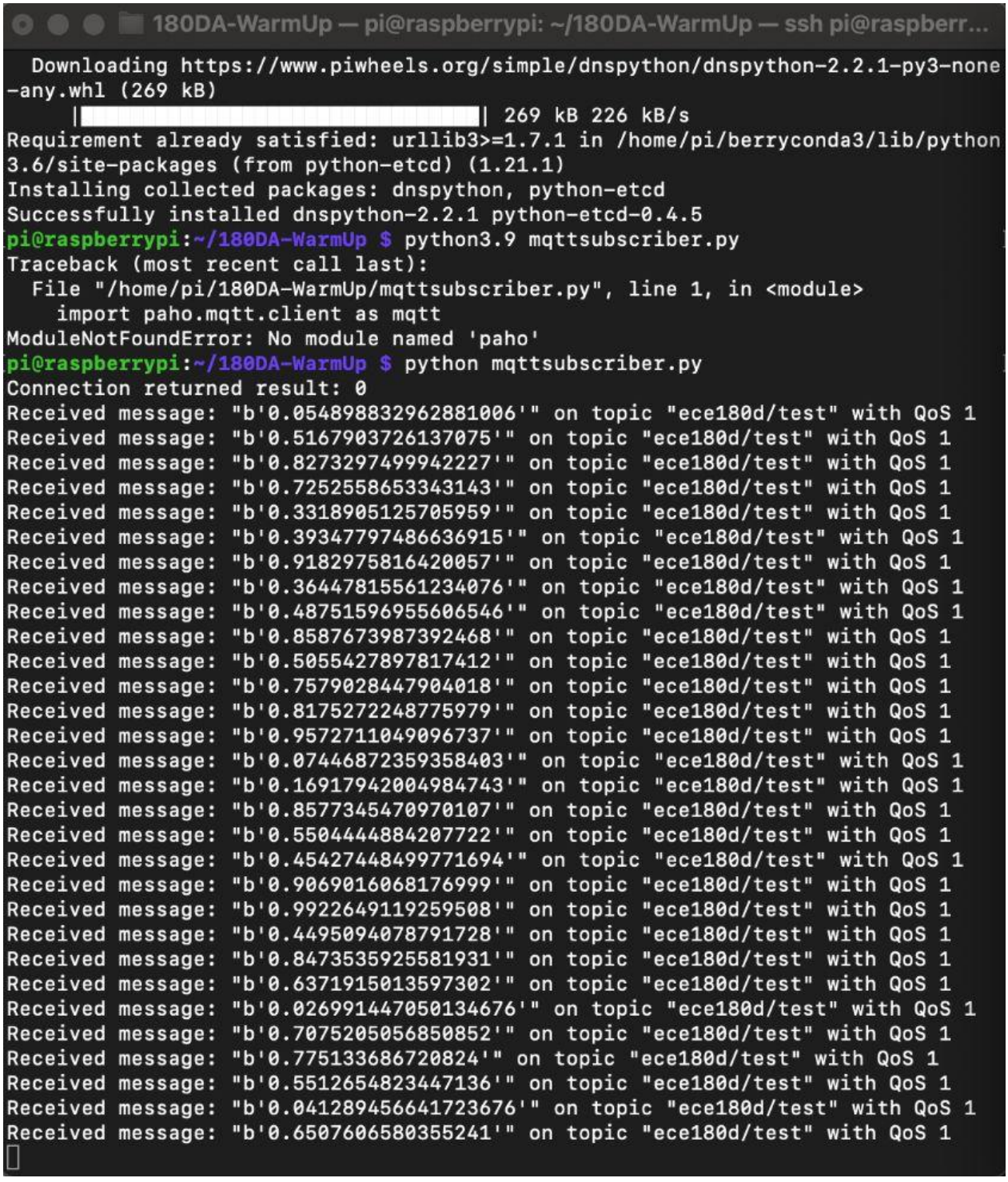


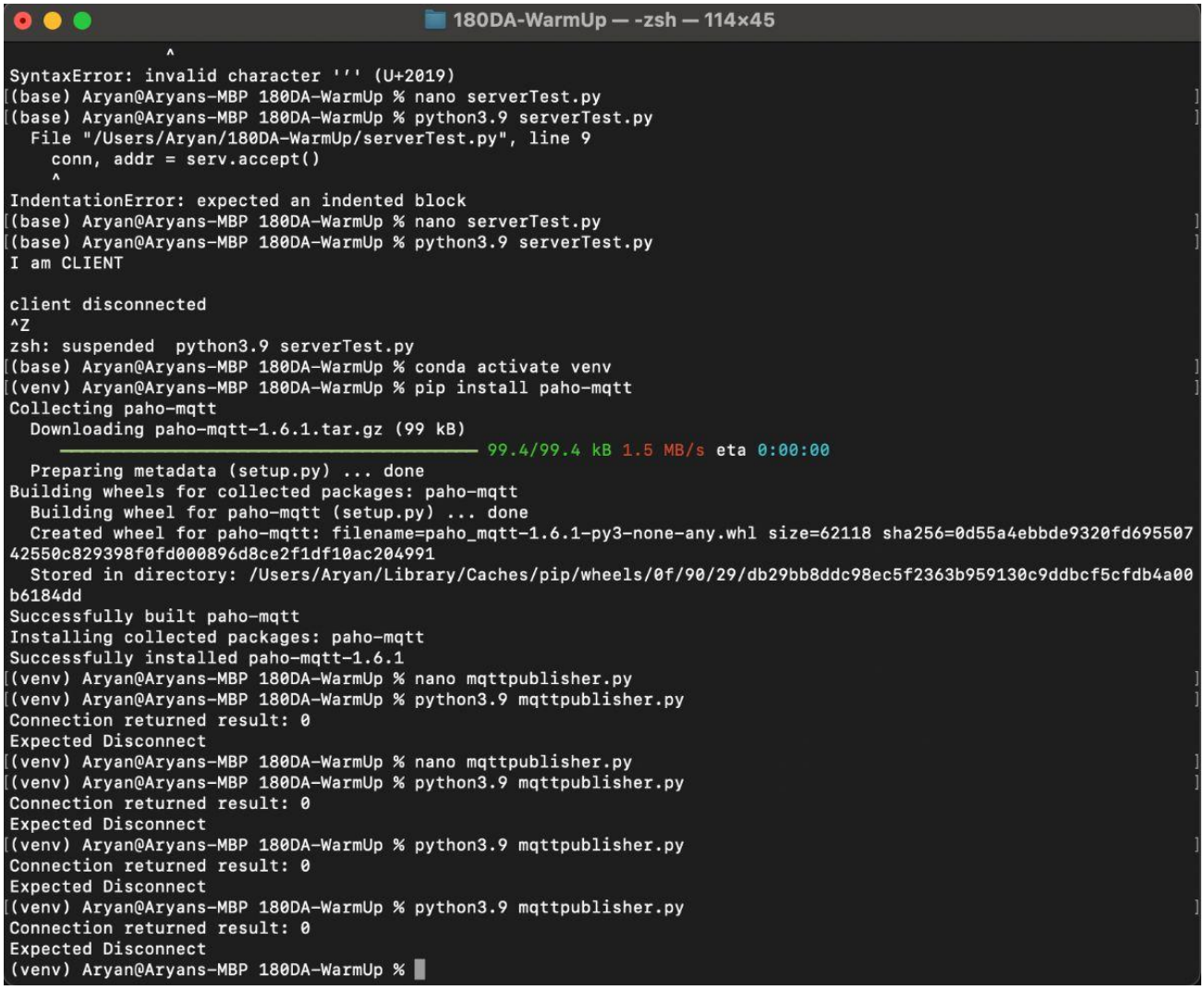
Communication

For this, we first learned about TCP/IP (server-client) and MQTT (publisher-subscriber). I used the RasPi as the client and my computer as the server and sent a message between the two. This was the result.



I then set up the MQTT communication between my RasPi and my computer. I did this using my RasPi as a subscriber and my computer as the publisher. The result was as follows.


180DA-WarmUp — pi@raspberrypi: ~/180DA-WarmUp — ssh pi@raspberr...
Downloading https://www.piwheels.org/simple/dnspython/dnspython-2.2.1-py3-none-any.whl (269 kB)
| 269 kB 226 kB/s
Requirement already satisfied: urllib3>=1.7.1 in /home/pi/berryconda3/lib/python3.6/site-packages (from python-etcd) (1.21.1)
Installing collected packages: dnspython, python-etcd
Successfully installed dnspython-2.2.1 python-etcd-0.4.5
pi@raspberrypi:~/180DA-WarmUp $ python3.9 mqttsubscriber.py
Traceback (most recent call last):
File "/home/pi/180DA-WarmUp/mqttsubscriber.py", line 1, in <module>
import paho.mqtt.client as mqtt
ModuleNotFoundError: No module named 'paho'
pi@raspberrypi:~/180DA-WarmUp $ python mqttsubscriber.py
Connection returned result: 0
Received message: "b'0.054898832962881006'" on topic "ece180d/test" with QoS 1
Received message: "b'0.5167903726137075'" on topic "ece180d/test" with QoS 1
Received message: "b'0.8273297499942227'" on topic "ece180d/test" with QoS 1
Received message: "b'0.7252558653343143'" on topic "ece180d/test" with QoS 1
Received message: "b'0.3318905125705959'" on topic "ece180d/test" with QoS 1
Received message: "b'0.39347797486636915'" on topic "ece180d/test" with QoS 1
Received message: "b'0.9182975816420057'" on topic "ece180d/test" with QoS 1
Received message: "b'0.36447815561234076'" on topic "ece180d/test" with QoS 1
Received message: "b'0.48751596955606546'" on topic "ece180d/test" with QoS 1
Received message: "b'0.8587673987392468'" on topic "ece180d/test" with QoS 1
Received message: "b'0.5055427897817412'" on topic "ece180d/test" with QoS 1
Received message: "b'0.7579028447904018'" on topic "ece180d/test" with QoS 1
Received message: "b'0.8175272248775979'" on topic "ece180d/test" with QoS 1
Received message: "b'0.9572711049096737'" on topic "ece180d/test" with QoS 1
Received message: "b'0.07446872359358403'" on topic "ece180d/test" with QoS 1
Received message: "b'0.16917942004984743'" on topic "ece180d/test" with QoS 1
Received message: "b'0.8577345470970107'" on topic "ece180d/test" with QoS 1
Received message: "b'0.5504444884207722'" on topic "ece180d/test" with QoS 1
Received message: "b'0.45427448499771694'" on topic "ece180d/test" with QoS 1
Received message: "b'0.9069016068176999'" on topic "ece180d/test" with QoS 1
Received message: "b'0.9922649119259508'" on topic "ece180d/test" with QoS 1
Received message: "b'0.4495094078791728'" on topic "ece180d/test" with QoS 1
Received message: "b'0.8473535925581931'" on topic "ece180d/test" with QoS 1
Received message: "b'0.6371915013597302'" on topic "ece180d/test" with QoS 1
Received message: "b'0.026991447050134676'" on topic "ece180d/test" with QoS 1
Received message: "b'0.7075205056850852'" on topic "ece180d/test" with QoS 1
Received message: "b'0.775133686720824'" on topic "ece180d/test" with QoS 1
Received message: "b'0.5512654823447136'" on topic "ece180d/test" with QoS 1
Received message: "b'0.041289456641723676'" on topic "ece180d/test" with QoS 1
Received message: "b'0.6507606580355241'" on topic "ece180d/test" with QoS 1


180DA-WarmUp — -zsh — 114×45
^
SyntaxError: invalid character ''' (U+2019)
(base) Aryan@Aryans-MBP 180DA-WarmUp % nano serverTest.py
(base) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 serverTest.py
File "/Users/Aryan/180DA-WarmUp/serverTest.py", line 9
conn, addr = serv.accept()
^
IndentationError: expected an indented block
(base) Aryan@Aryans-MBP 180DA-WarmUp % nano serverTest.py
(base) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 serverTest.py
I am CLIENT
client disconnected
^Z
zsh: suspended python3.9 serverTest.py
(base) Aryan@Aryans-MBP 180DA-WarmUp % conda activate venv
(venv) Aryan@Aryans-MBP 180DA-WarmUp % pip install paho-mqtt
Collecting paho-mqtt
Downloading paho-mqtt-1.6.1.tar.gz (99 kB)
99.4/99.4 kB 1.5 MB/s eta 0:00:00
Preparing metadata (setup.py) ... done
Building wheels for collected packages: paho-mqtt
Building wheel for paho-mqtt (setup.py) ... done
Created wheel for paho-mqtt: filename=paho_mqtt-1.6.1-py3-none-any.whl size=62118 sha256=0d55a4ebbde9320fd695507
42550c829398f0fd000896d8ce2f1df10ac204991
Stored in directory: /Users/Aryan/Library/Caches/pip/wheels/0f/90/29/db29bb8ddc98ec5f2363b959130c9ddbcf5cfdb4a00
b6184dd
Successfully built paho-mqtt
Installing collected packages: paho-mqtt
Successfully installed paho-mqtt-1.6.1
(venv) Aryan@Aryans-MBP 180DA-WarmUp % nano mqttpublisher.py
(venv) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 mqttpublisher.py
Connection returned result: 0
Expected Disconnect
(venv) Aryan@Aryans-MBP 180DA-WarmUp % nano mqttpublisher.py
(venv) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 mqttpublisher.py
Connection returned result: 0
Expected Disconnect
(venv) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 mqttpublisher.py
Connection returned result: 0
Expected Disconnect
(venv) Aryan@Aryans-MBP 180DA-WarmUp % python3.9 mqttpublisher.py
Connection returned result: 0
Expected Disconnect
(venv) Aryan@Aryans-MBP 180DA-WarmUp %