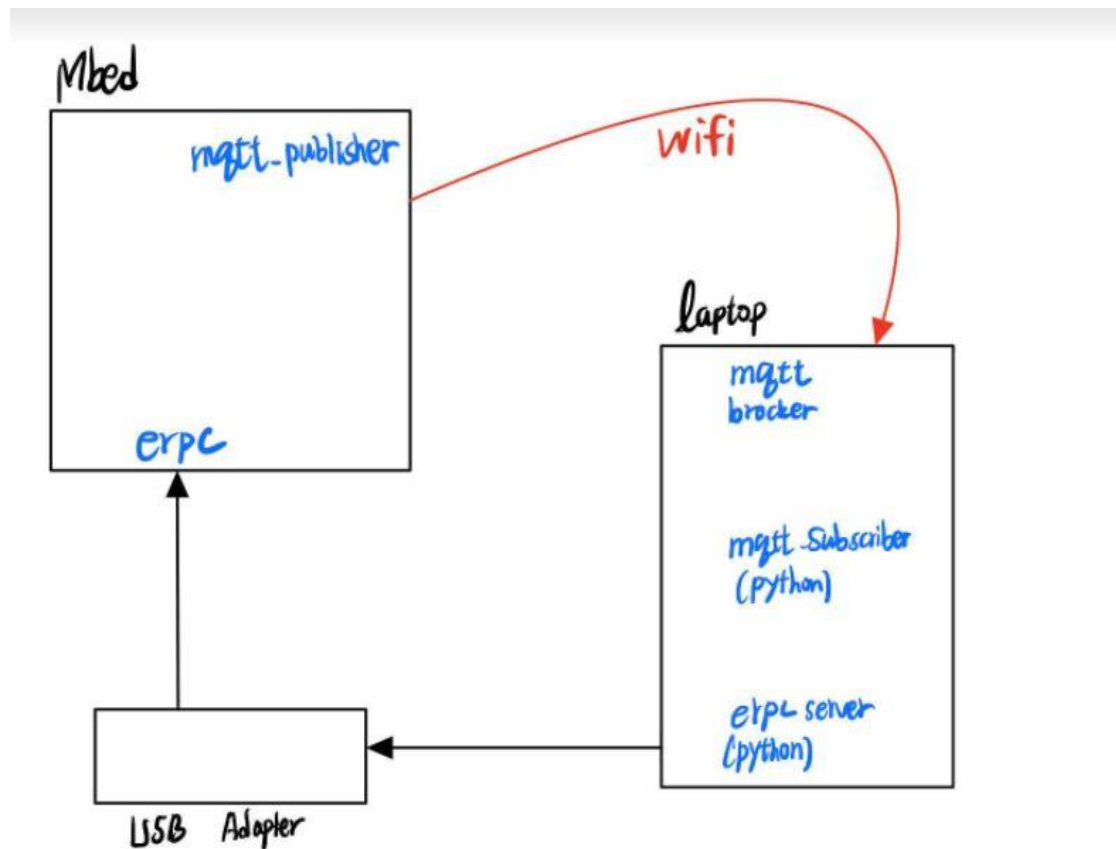


In homework 3 we implement erpc service and MQTT service.

### (1) Implementation and Algorithm

At first, we have the block diagram of how the data flow in the system.



We first turn on/off of MQTT\_Publisher on mbed through erpc\_server(Python) in laptop. Then MQTT\_Publisher will start to publish data to MQTT\_broker in laptop through WIFI. Then MQTT\_Subscriber will catch data and plot the diagram if enough data were received.

So to decide whether mbed needs to publish data to MQTT\_broker, we use a global variable called "state". If (state == 1), which means publisher is on, otherwise it was closed.

So I used a ticker to try to published data every 0.1 second. If (state == 1) send data, otherwise don't send.

With erpc\_service, we can control "state" through USB Adapter from laptop.

On laptop side, we loop MQTT\_subscriber forever until we get 100 data, then plot the diagram on screen.

## (2) Validation and Result

---

To turn on/off MQTT\_publisher we use erpc\_service on laptop.

```
PS D:\embedded system\HW3> py HW3.py COM10
Please input console, 1 for on, 0 for off
1
Please input console, 1 for on, 0 for off
0
Please input console, 1 for on, 0 for off
1
Please input console, 1 for on, 0 for off

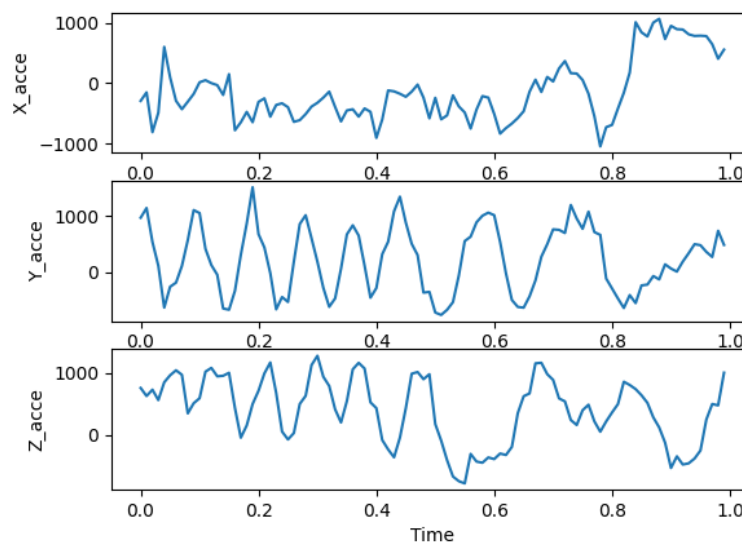
```

And mbed will start to publish data, through MQTT\_broker we can get data from MQTT\_subscriber.

```
PS D:\embedded system\HW3> py mqtt_client.py
Connecting to 192.168.126.216/Mbed
Connected rc: 0
Subscribed OK
x:719, y:-326, z:914
x:810, y:-53, z:622
x:693, y:154, z:740
x:541, y:368, z:793
x:428, y:447, z:917
x:-88, y:666, z:929
x:-129, y:589, z:750
x:-339, y:637, z:999
x:-269, y:454, z:983
x:-188, y:-122, z:677
x:89, y:-114, z:830
x:534, y:-246, z:1051
x:461, y:-121, z:942
x:434, y:87, z:1109

```

Then we can plot data on screen.



### **(3) *Encounter issue***

---

#### **(a) MQTT\_service return rc == -1**

I meet this problem in lab10 before, and I guess that it may come from the result of data is not deal with properly in short time and were blocked.

I test it for some cases, if I send data every 1 second, the service will died out in 1 minute. But if data was send every 2 second, the service will stay on for a long time. (I went to take a shower and the service state is still onsite.)

So I guess that mbed need to deal with the feedback of data (echo), and it can't afford too much data in a short period.

To solve this problem, I closed the subscriber function on mbed, which we quite don't need it in HW3, and it worked perfectly when publish data to broker every 0.1 second.

#### **(b) Function that loops forever and some object is out of scope**

I found that some function that will loop forever and which is hard to implement other function when the function is on. For example, erpc\_server on mbed and MQTT\_subscriber (code in lab9) will loop forever and won't jump out.

Originally I think I can turn ticker on or off through erpc\_service, but I found out that the object, for example: MQTT\_seriver, client, which is called in main() function, is quite hard to use them outside of the scope, since they are not called in global.

So I change another method, the ticker is still on and will put event into queue every 0.1 second, but the global variable "state" can decide whether to send data or not and it can be changed through erpc\_service, also mbed will loop forever when erpc\_service is called, quite tricky.

### **(4) *Discussion***

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The step in this homework look simple only with 4 steps. But with wireless system it is quite hard to find out where the bug is. Also the first issue I confronted is also tricky, I took some time to test my guest after demo of lab 10 and temporarily (?) solve the problem. Also second issues is quite tricky too. I have to use another method to solve it. Learned a lot of new concept (erpc, TCP/IP, MQTT... ) from lab 9 ,10 and this homework.