WiFi and MQTT Connection Guide SLAMaleykoum

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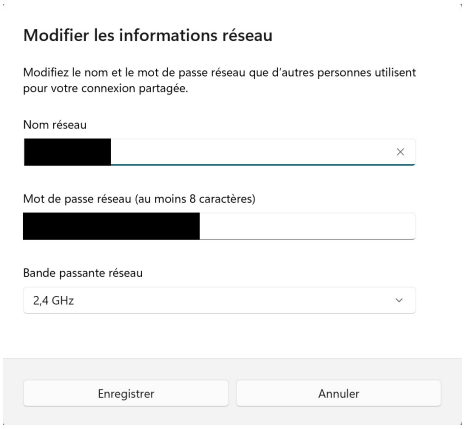
1 WiFi Connection

- Go on the parameters of your laptop HotSpot and make sure your network bandwidth is set to 2.4 Hz (ESP32 doesn't support 5 Hz). On Windows and MacOs, it is by default set on 5 Hz, so you must change it.



- Enable the Wifi HotSpot of your Laptop. Make sure you have a stable Wifi connection before.

- In "wifi_connection.h", change the variables "ssid" and "pass" into respectively your HotSpot name and HotSpot password.

```
const char* ssid = "PCSlam";
const char* pass = "SlamAleykoum";
```

- Define the correct pin for the test "test_connection" in "test_main" of one of the ESP.
  Connect your laptop to the corresponding ESP and run the command *pio run -e esp2_test -t upload && pio device monitor* in a PlatformIo terminal.
  You should now have a success in your terminal when you run the "test_connection.cpp" file on the ESP 2 which means you should obtain something like this :

```
Connecting to PC-Alex
-
Connected to PC-Alex
Attempting MQTT connection...connected!
Published: I am connected!!!!
Published: I am connected!!!!
Published: I am connected!!!!
Published: I am connected!!!!
```

2 MQTT Connection

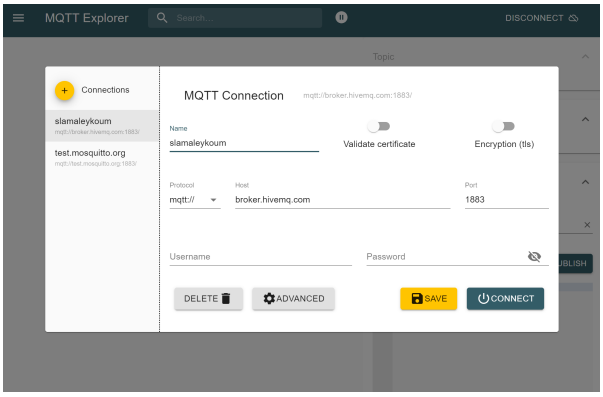
The ESP32 should establish the MQTT connection automatically with the parameters given. This means that it connects to the broker "broker.hivemq.com" with the port 1883.

Now, to get the data send by the ESP32 to the broker, you need to connect to the broker on your laptop.

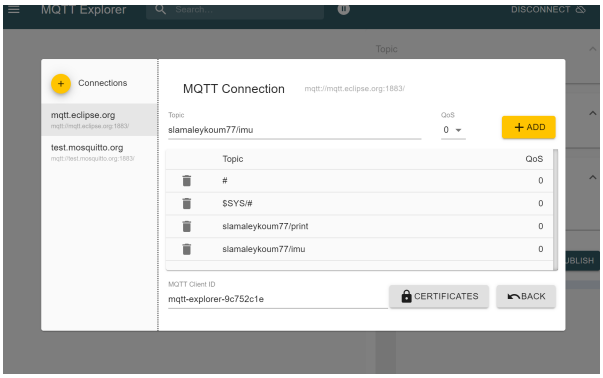
2.1 MQTT Explorer

In order to get simple data like print or few values like distance to a sensor for every loop, you can simply use MQTT Explorer.

- Download the version you need here : MQTT Explorer
- Then, open MQTT Explorer and add a new connection. Setup the MQTT Connection like this :

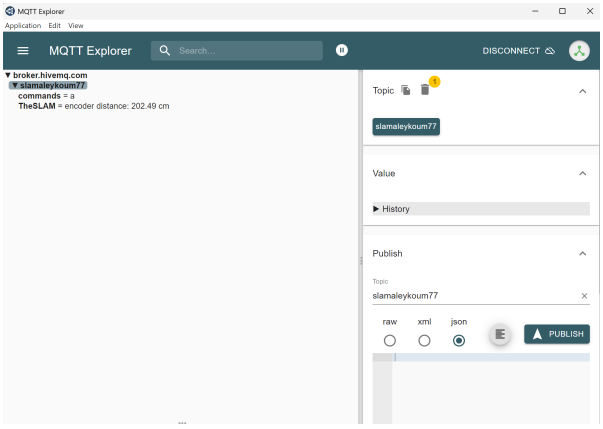


- In order to get the messages and to be able to send commands, you need to create the topics.
  Go to the section "Advanced" and add the topics you want to see. They all begin by "slamaleykoum77/" and end with the name of the topics known: "print" (for simple debug messages), "imu", "ultrasonic", "encoder", "servo", "lidar".



- Then, click on "connect" and you should start to receive the messages of the SLAM car.
  PS : you must have uploaded the code on the ESP32 and connected the battery to the SLAM car (be careful to not be connected with a cable to the ESP32 with your computer and still have your HotSpot activated !). Also, follow the last point and make sure you upload your messages to the correct topics in your test code.

- If you want to get the previous values of a topic, you can simply click on it and go to the tab "History" on the right panel. You will get all the values you got with the time when you received them.



- In order to send data of the code, you must have this in your code:
  - In the setup function, make sure to have this line:
    connection.setupWifi();.
  - In the loop function, you must have this line:
    connection.check_connection();.
  - To send a message, you must create a message (char*) and then publish it to the broker with the command:
    connection.publish(mqtt_topic, msg);.
    Make sure to upload them on the topic you want.

    Here is an example for the connection test:

```
const char* mqtt_topic_connection = "slamaleykoum77/print";

void setup_test_connection() {
    Serial.begin(115200);
    delay(2000);

    connection.setupWifi();
}

void loop_test_connection() {
    connection.check_connection();

    char msg[60];
    snprintf(msg, sizeof(msg), "{\"type\": \"print\", \"message\": \"I am connected!!!!\"}");
    // Publish data to MQTT
    connection.publish(mqtt_topic_connection, msg);

    delay(1000);
}
```

2.2 The file *mqtt_client.py*

To get more data or if you prefer simple prints in a terminal, you can directly use a Python file that connects to the broker and prints what you want.
In the directory "2025fa-SLAMaleykoum", the file "mqtt_client.py" is doing this.

- Make sure you have Python installed and then install the paho-mqtt library with the command:
  pip install paho-mqtt matplotlib
- Just like before, when you have uploaded your code to one of the ESPs, you just have to run this Python file in a terminal (not PlatformIO) with the command:
  python mqtt_client.py
  It will connect to the broker and catch all the messages sent by the ESPs.
- The file should print all the values received in any of the topics known and print it in the terminal. You can improve it in order to get the data printed as you want or in a different manner (use "plt" if you want to plot a curve with some distances received for example).