

## Final Project part2

Step 0, go to the director, start MQTT server

```
cd /usr/local/etc/mosquitto  
brew services restart mosquitto
```

Step 1. create a MQTT-client subscriber the topic

```
'Suhuan_FinalProject'
```

```
mosquitto_sub -h "192.168.1.11" -v -t 'Suhuan_FinalProject' -d
```

Step 2, create a MQTT-client publisher with the same topic to take user input

```
mosquitto_pub -h "192.168.1.11" -t 'Suhuan_FinalProject' -m  
'Initial greetings.'
```

Step 3, Arduino script source code:

```
// part(1)  
#include <WiFi.h>  
#include <PubSubClient.h>  
// part (2)  
#include <ESP32Servo.h>  
#include <UltrasonicSensor.h>  
  
#define LED 2  
  
// part(1): global constant variables for local WiFi  
const char *ssid = "Be Cool Honey Bunny"; // WiFi name  
const char *password = "7608144989"; // WiFi password  
  
// part(1): global constant variables for MQTT Broker(server)
```

```

const char *mqtt_broker = "192.168.1.11"; // WiFi local IP
address
const char *topic = "Suhuan_FinalProject";
const char *mqtt_username = "emqx";
const char *mqtt_password = "public";
const int mqtt_port = 1883;

// part (2)
int posVal = 0; // variable to store the servo position
int servoPin = 15; // Servo motor pin

// part(1)
WiFiClient espClient;
PubSubClient client(espClient);

// part(2)
UltrasonicSensor ultrasonic(13, 14);

// part(1)
void connectingToWiFi() {

    // keep trying every half second
    while (WiFi.status() != WL_CONNECTED) {
        delay(500);
        // Serial.println("Connecting to WiFi..");
    }

    Serial.println("Connected to the WiFi network.");
}

// part(1)
void connectingToBroker() {
    while (!client.connected()) {

        String client_id = "[esp32-client]";

        // esp connects to MQTT broker succeed
        if (client.connect(client_id.c_str(), mqtt_username,
mqtt_password)) {
            Serial.println("Public emqx mqtt broker connected.");
        }

        // failed
        else {
            Serial.print("failed with state ");

```

```

        Serial.print(client.state());
        delay(2000);
    }
}

void setup() {

    // 1. Set software serial baud to 115200;
    Serial.begin(115200);

    // part(2) initialization
    int temperature = 22;
    ultrasonic.setTemperature(temperature);

    // initialize output
    pinMode(LED, OUTPUT);

    // 2. esp is connecting to local WiFi network
    WiFi.begin(ssid, password);
    connectingToWiFi();

    // 3a. esp32 is connecting to a mqtt broker(server)
    client.setServer(mqtt_broker, mqtt_port);

    // 3b. message send back to esp32 (output in serial monitor
    under same baud)
    client.setCallback(callback);

    // 4. make esp32 to send / receive message via MQTT broker
    connectingToBroker();

    // 5. publish message and subscribe the same topic to receive
    message from MQTT server
    client.publish(topic, "Greetings from ESP32 board.");
    client.subscribe(topic);

    // part (2)
    myservo.setPeriodHertz(50); // standard 50 hz servo
    myservo.attach(servoPin, 500, 2500);

}

```

```

// 4 what you will see in serial monitor
void callback(char *topic, byte *payload, unsigned int length) {

    Serial.print("Message arrived in topic: ");
    Serial.println(topic);

    String s = "";
    for (int i = 0; i < length; i++) {
        // Serial.print((char) payload[i]);
        s += (char) payload[i];
    }

    if (s == "1") {
digitalWrite(LED, HIGH); // high volt means lights on
        delay(2000);
        Serial.println("Press 1 to turn on LED.");
    }

    else if (s == "2") {
        digitalWrite(LED, LOW); // low volt means lights off
        delay(2000);
        Serial.println("Press 2 to turn off LED.");
    }

    else if (s == "3") {
        int distance = ultrasonic.distanceInCentimeters();
        Serial.printf("Press 3 to measure distance = %dcm.\n",
distance);
        delay(2000);

        Serial.println("Adjust servo position with the same
value.");
        myservo.write(distance);
delay(15); // wait for 15 ms to reach the position

myservo.detach();
    }

    else {
        delay(2000);
    }
}

```

```
    Serial.println();  
    Serial.println("-----");  
}
```

```
// 7. run the loop  
void loop() {  
    client.loop();  
}
```

Step 4, press three to measure distance

```
mosquitto_pub -h "192.168.1.11" -t 'Suhuan_FinalProject' -m '1'
```

```
mosquitto_pub -h "192.168.1.11" -t 'Suhuan_FinalProject' -m '2'
```

```
mosquitto_pub -h "192.168.1.11" -t 'Suhuan_FinalProject' -m '1'
```

Checking output on MQTT-client publisher  
Checking MQTT-client subscriber terminal:

Meanwhile, Checking Arduino Serial Monitor

open the serial monitor  
put hands close to ultrasonic to measure distance

```
rst:0x1 (POWERON_RESET),boot:0x33 (SConnected to the WiFi network.  
Public emqx mqtt broker connected.  
Message arrived in topic: UltrasonicSensor  
Distance: 5cm.
```

```
-----  
Message arrived in topic: UltrasonicSensor  
Distance: 5cm.
```

```
-----  
Message arrived in topic: UltrasonicSensor  
Distance: 28cm.  
-----
```

Finally, stop service on publisher terminal

```
brew services stop mosquitto
```