

**Smart Farmer-IOT Enabled Smart Farming Application**

## **SOFTWARE**

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## Connect to the MQTT broker

This article will use [the free public MQTT broker](#) provided by EMQX. This service is based on [MQTT cloud service - EMQX Cloud](#) to create.

The accessing information of the broker is as follows:

- Broker: **broker.emqx.io**
- TCP Port: **1883**
- Websocket Port: **8083**

## Import the Paho MQTT client

```
from paho.mqtt import client as mqtt_client
```

## Set the parameter of the MQTT Broker connection

Set the address, port and topic of the MQTT Broker connection. At the same time, we call the Python function `random.randint` to randomly generate the MQTT client id.

```
broker = 'broker.emqx.io' port = 1883 topic  
= "python/mqtt" client_id = f'python-mqtt-  
{random.randint(0,  
1000)}'  
# username = 'emqx'  
  
# password = 'public'
```

## Write the MQTT connect function

Write the connect callback function `on_connect`.

This function will be called after connecting the client, and we can determine whether the client is connected successfully according to `rc` in this function. Usually, we will create an MQTT client at the same time and this client will connect to `broker.emqx.io`.

```
def connect_mqtt():    def  
  
on_connect(client, userdata, flags, rc):
```

```
if rc == 0:
```

```
    print("Connected to MQTT Broker!")
```

```
else:
```

```
    print("Failed to connect, return code %d\n",
```

```
rc)
```

```
    # Set Connecting Client ID    client =  
    mqttclient.Client(client_id)  
    client.username_pw_set(username, password)  
    client.on_connect = on_connect  
    client.connect(broker, port)
```

```
return client
```

## Publish messages

First, we define a while loop. In this loop, and we will set the MQTT client `publish` function to send messages to the topic `python/mqtt` every second.

```
def publish(client):
```

```
    msg_count = 0    while
```

```
    True:
```

```
        time.sleep(1)    msg =  
    f"messages: {msg_count}"
```

```
result = client.publish(topic, msg)

# result: [0, 1]

status = result[0]

if status == 0:

    print(f"Send `{msg}` to topic `{topic}`")

else:

    print(f"Failed to send message to topic
{topic}")

msg_count += 1
```

**Subscribe**

Write the message callback function `on message`. This function will be called after the client receives messages from the MQTT Broker. In this function, we will print out the name of subscribed topics and the received messages.

```
def subscribe(client: mqtt client):    def
on_ message(client, user data, msg):

    print (f "Received ,{msg .payload .decode()}`
from `{msg. topic}` topic")

client.subscribe(topic)

client.on message = on message
```

**The full code**



## The code of publishing messages

```
# python 3.6
```

```
import random
```

```
import time
```

```
from paho.mqtt import client as mqtt_client
```

```
broker =
```

```
'broker.emqx.io' port =
```

```
1883 topic =
```

```
"python/mqtt"
```

```
# generate client ID with pub prefix randomly
```

```
client_id = f'python-mqtt-{random.randint(0,
```

```
1000)}'
```

```
# username = 'emqx'
```

```
# password = 'public'
```



```
def connect_mqtt():    def
on_connect(client, userdata, flags, rc):

if rc == 0:

    print("Connected to MQTT Broker!")

else:

    print("Failed to connect, return code %d\n",
rc)

client = mqtt_client.Client(client_id)
client.username_pw_set(username, password)
```



```
client.on_connect = on_connect
```

```
client.connect(broker, port)
```

```
return client
```

```
def publish(client):
```

```
    msg_count = 0    while
```

```
    True:
```

```
        time.sleep(1)    msg =  
    f"messages: {msg_count}"
```



```
result = client.publish(topic, msg)
```

```
# result: [0, 1]
```

```
status = result[0]
```

```
if status == 0:
```

```
    print(f"Send `{msg}` to topic `{topic}`")
```

```
else:
```

```
    print(f"Failed to send message to topic  
{topic}")
```

```
msg_count += 1
```





```
def run():

    client = connect_mqtt()

    client.loop_start()

    publish(client)


if __name__ == '__main__':

    run()
```

## The code of subscribing



# python3.6

```
import random
```

```
from paho.mqtt import client as mqtt_client
```

```
broker = 'broker.emqx.io'
```

```
port = 1883 topic =
```

```
"python/mqtt"
```

```
# generate client ID with pub prefix randomly
```

```
client_id = f'python-mqtt-{random.randint(0, 100)}'
```

```
# username = 'emqx'
```

```
# password = 'public'
```

```
def connect_mqtt() -> mqtt_client:    def
```

```
on_connect(client, userdata, flags, rc):
```

```
if rc == 0:
```

```
    print("Connected to MQTT Broker!")
```





```
else:
```

```
    print("Failed to connect, return code %d\n",  
rc)
```

```
    client = mqtt_client.Client(client_id)
```

```
    client.username_pw_set(username, password)
```

```
    client.on_connect = on_connect
```

```
    client.connect(broker, port)    return client
```





```
def subscribe(client: mqtt_client):  
  
    def on_message(client, userdata, msg):  
  
        print(f"Received `{msg.payload.decode()}`  
from `{msg.topic}` topic")  
  
    client.subscribe(topic)  
  
client.on_message = on_message
```

```
def run():

    client = connect_mqtt()

    subscribe(client)

    client.loop_forever()


if __name__ == '__main__':

    run()
```