แนวทางการใช้งานอินเทอร์เน็ตของสรรพสิ่งในระบบการผลิต

IoT Approaches to Manufacturing System

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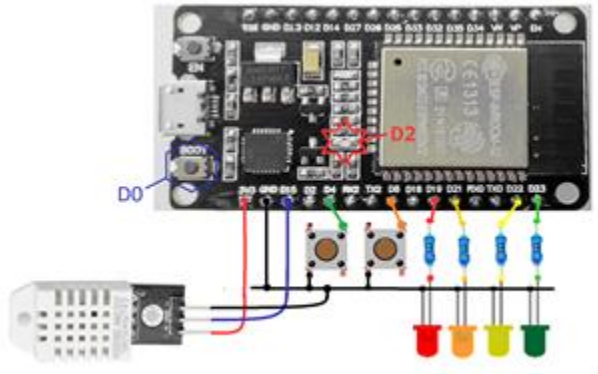
5/5. คำถามท้ายบทเพื่อทดสอบความเข้าใจ

Quiz_401 – Ubidots: Monitor DHT22, Monitor Digital Switch and Control 4 LED



< Test Code >

```
#include <WiFi.h>
#include <PubSubClient.h>
#include "DHTesp.h"

const char *My_SSID = "V2036";
const char *My_Pass = "fnafchica";
const char *MQTT_Server = "things.ubidots.com";
const char *MQTT_User = "BBFF-gvcR0u8y0BegX9muo6Vfs4mKvsItpI";
const char *MQTT_Pass = "BBFF-gvcR0u8y0BegX9muo6Vfs4mKvsItpI";

const char *PTopic1 = "/v2.0/devices/bearish";
const char *STopic1 = "/v2.0/devices/bearish/humid";
const char *STopic2 = "/v2.0/devices/bearish/tempp";
const char *STopic3 = "/v2.0/devices/bearish/led1";
const char *STopic4 = "/v2.0/devices/bearish/led2";
const char *STopic5 = "/v2.0/devices/bearish/led3";
const char *STopic6 = "/v2.0/devices/bearish/led4";
const char *STopic7 = "/v2.0/devices/bearish/sw1";
```

```
const char *STopic8 = "/v2.0/devices/bearish/sw2";

#define MQTT_Port 1883
#define Test_LED1 18
#define Test_LED2 19
#define Test_LED3 22
#define Test_LED4 23
#define Test_SW1 4
#define Test_SW2 21
#define Pin_DHT22 15

DHTesp dht;
WiFiClient espClient;
PubSubClient client(espClient);
long lastMsg = 0;
char msg[50];
int value = 0;

void Setup_Wifi() {
  delay(10);
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(My_SSID);
  WiFi.begin(My_SSID, My_Pass);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500); Serial.print(".");
  }
  randomSeed(micros());
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
void reconnect()
{ while (!client.connected()) // Loop until we're reconnected
  { Serial.print("Attempting MQTT connection...");
    String clientId = "ESP32 Client-";
```

```
    clientId += String(random(0xffff), HEX); // Create a random client ID
    if (client.connect(clientId.c_str(), MQTT_User, MQTT_Pass)) // Attempt to connect
    { Serial.println("connected"); // Once connected, publish an announcement...
      client.subscribe(STopic1);
      client.subscribe(STopic2);
      client.subscribe(STopic3);
      client.subscribe(STopic4);
      client.subscribe(STopic5);
      client.subscribe(STopic6);
      client.subscribe(STopic7);
      client.subscribe(STopic8);
    } else
    { Serial.print("failed, rc=");
      Serial.print(client.state());
      Serial.println(" try again in 5 seconds");
      delay(5000);
    }
  }
}
void callback(char *topic, byte *payload, unsigned int length)
{ Serial.print("Message arrived [");
  Serial.print(topic);
  Serial.print("] ");
  for (int i = 0; i < length; i++)
  { Serial.print((char)payload[i]);
  }
  if (topic[24] == STopic3[24]) {
    Serial.print(" -LED1->> ");
    Serial.print((char)payload[10]);
    if (payload[10] == '1')
      digitalWrite(Test_LED1, HIGH);
    else
      digitalWrite(Test_LED1, LOW);
  }
  if (topic[24] == STopic4[24]) {
    Serial.print(" -LED2->> ");
    Serial.print((char)payload[10]);
```

```
    if (payload[10] == '1')
      digitalWrite(Test_LED2, HIGH);
    else
      digitalWrite(Test_LED2, LOW);
  }
  if (topic[24] == STopic5[24]) {
    Serial.print(" -LED3->> ");
    Serial.print((char)payload[10]);
    if (payload[10] == '1')
      digitalWrite(Test_LED3, HIGH);
    else
      digitalWrite(Test_LED3, LOW);
  }
  if (topic[24] == STopic6[24]) {
    Serial.print(" -LED4->> ");
    Serial.print((char)payload[10]);
    if (payload[10] == '1')
      digitalWrite(Test_LED4, HIGH);
    else
      digitalWrite(Test_LED4, LOW);
  }
  Serial.println();
}
void setup()
{ pinMode(Test_LED1, OUTPUT);
  pinMode(Test_LED2, OUTPUT);
  pinMode(Test_LED3, OUTPUT);
  pinMode(Test_LED4, OUTPUT);
  pinMode(Test_SW1, INPUT_PULLDOWN);
  pinMode(Test_SW2, INPUT_PULLDOWN);
  dht.setup(Pin_DHT22, DHTesp::DHT22);
  Serial.begin(115200);
  Setup_Wifi();
  client.setServer(MQTT_Server, MQTT_Port);
  client.setCallback(callback);
}
void loop()
```

```
{ if (!client.connected()) reconnect();
  client.loop();
  long now = millis();
  if (now - lastMsg > 5000)
  { lastMsg = now;
    float humidity = dht.getHumidity();
    float temperature = dht.getTemperature();
    int sw1 = 0;
    int sw2 = 0;
    if (digitalRead(Test_SW1) == HIGH) sw1 = 1;
    else sw1 = 0;
    if (digitalRead(Test_SW2) == LOW) sw2 = 1;
    else sw2 = 0;
    snprintf (msg, 75, "{ \"humid\" : %.2f, \"tempp\": %.2f, \"sw1\": %d, \"sw2\": %d }",
            humidity, temperature, sw1, sw2);
    Serial.print("Publish message: ");
    Serial.println(msg);
    client.publish(PTopic1, msg);
  }
}
```

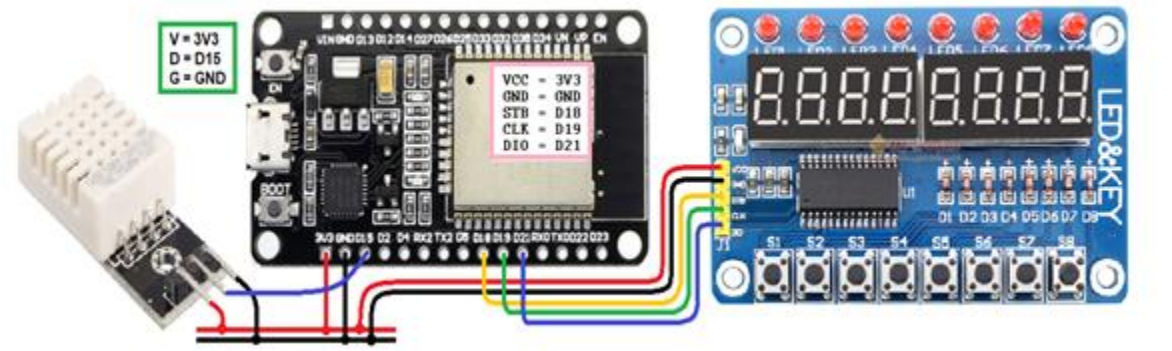
รูปการต่อวงจร – 1

รูปการต่อวงจร – 2

รูปหน้าจอ Ubidot Dashboard

Quiz_402 – Ubidots: Monitor DHT22 with TM1638 Display and LINE Alert

- ส่งข้อมูลอุณหภูมิไปยัง Ubidots
- หากอุณหภูมิที่อ่านได้เกิน 28'C ให้แจ้งเตือนผ่าน LINE และบอกด้วยว่าอุณหภูมิเท่าใด
- แสดงอุณหภูมิที่ 7_Segment Display TM1638 Board



< Test Code >

```
#include <WiFi.h>
#include <PubSubClient.h>
#include <HTTPClient.h>
#include <TM1638plus.h>
#include "DHTesp.h"

const char *My_SSID = "V2036";
const char *My_Pass = "fnafchica";
const char *MQTT_Server = "things.ubidots.com";
const char *MQTT_User = "BBFF-gvcR0u8y0BegX9muo6Vfs4mKvsItpI";
const char *MQTT_Pass = "BBFF-gvcR0u8y0BegX9muo6Vfs4mKvsItpI";

#define WebHooksKey "oXSQX-hS7mc2o1blAA3UlubXBXN2WIrMIIheoCkvYQI"
#define WebHooksEventName "test_GSheet"
#define WebHooksEventName_line "Test_Key"

const char *PTopic1 = "/v2.0/devices/bearish";
const char *STopic1 = "/v2.0/devices/bearish/humid";
const char *STopic2 = "/v2.0/devices/bearish/tempp";

#define Brd_STB 18 // strobe = GPIO connected to strobe line of module
#define Brd_CLK 19 // clock = GPIO connected to clock line of module
```

```
#define Brd_DIO 21 // data = GPIO connected to data line of module
bool high_freq = true; //default false,, If using a high freq CPU > ~100 MHZ set to true.
TM1638plus tm(Brd_STB, Brd_CLK , Brd_DIO, high_freq);
#define MQTT_Port 1883
#define Pin_DHT22 15
#define My_NAME "B6214005 Varasiri Limprasert"
DHTesp dht;
WiFiClient espClient;
PubSubClient client(espClient);
long lastMsg = 0;
char msg[50];
int value = 0;

void Setup_Wifi() {
  delay(10);
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(My_SSID);
  WiFi.begin(My_SSID, My_Pass);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500); Serial.print(".");
  }
  randomSeed(micros());
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
void reconnect()
{ while (!client.connected()) // Loop until we're reconnected
  { Serial.print("Attempting MQTT connection...");
    String clientId = "ESP32 Client-";
    clientId += String(random(0xffff), HEX); // Create a random client ID
    if (client.connect(clientId.c_str(), MQTT_User, MQTT_Pass)) // Attempt to connect
    { Serial.println("connected"); // Once connected, publish an announcement...
      client.subscribe(STopic1);
      client.subscribe(STopic2);
```

```
    } else
    { Serial.print("failed, rc=");
      Serial.print(client.state());
      Serial.println(" try again in 5 seconds");
      delay(5000);
    }
  }
}
void setup()
{
  tm.displayBegin();
  dht.setup(Pin_DHT22, DHTesp::DHT22);
  Serial.begin(115200);
  Setup_Wifi();
  client.setServer(MQTT_Server, MQTT_Port);
}
void loop()
{ if (!client.connected()) reconnect();
  client.loop();
  long now = millis();
  if (now - lastMsg > 5000)
  { lastMsg = now;
    float humidity = dht.getHumidity();
    float temperature = dht.getTemperature();
    snprintf (msg, 75, "{ \"humid\" : %.2f, \"tempp\": %.2f}", humidity, temperature);
    Serial.print("Publish message: ");
    Serial.println(msg);
    client.publish(PTopic1, msg);
    Serial.println();
    Serial.print("\nTemperature('C) = ");
    Serial.print(temperature, 1);
    Serial.print("\tHumidity(%) = ");
    Serial.print(humidity, 1);
    String serverName = "http://maker.ifttt.com/trigger/" +
                        String(WebHooksEventName) + "/with/key/" + String(WebHooksKey);
    String httpRequestData = "value1=" + String(My_NAME) + "&value2=" +
                             String(temperature) + "&value3=" +
```

```
                String(humidity);
  Serial.println();
  Serial.println("Server Name >> " + serverName);
  Serial.println("json httpRequestData >> " + httpRequestData);
  if (WiFi.status() == WL_CONNECTED) {
    HTTPClient http;
    http.begin(serverName);
    http.addHeader("Content-Type", "application/x-www-form-urlencoded");
    int httpResponseCode = http.POST(httpRequestData);
    Serial.print("HTTP Response code: ");
    Serial.println(httpResponseCode);
    http.end();
    if (httpResponseCode == 200)
      Serial.println("[Google sheet] --> Successfully sent");
    else
      Serial.println("[Google sheet] --> Failed!");
  }
  else {
    Serial.println("WiFi Disconnected");
  }
  /// if temp > 28 C send notifications >> line
  if (temperature > 28) {
    String serverName = "http://maker.ifttt.com/trigger/" +
                  String(WebHooksEventName_line) + "/with/key/" + String(WebHooksKey);
    String httpRequestData = "value1=" + String(My_NAME) + "&value2=" +
                  String(temperature) + "&value3=" +
                  String(humidity);
    Serial.println();
    Serial.println("Server Name >> " + serverName);
    Serial.println("json httpRequestData >> " + httpRequestData);
    if (WiFi.status() == WL_CONNECTED) {
      HTTPClient http;
      http.begin(serverName);
      http.addHeader("Content-Type", "application/x-www-form-urlencoded");
      int httpResponseCode = http.POST(httpRequestData);
      Serial.print("HTTP Response code: ");
      Serial.println(httpResponseCode);
```

```
      http.end();
      if (httpResponseCode == 200)
        Serial.println("[Line] --> Successfully sent");
      else
        Serial.println("[Line] --> Failed!");
    }
    else {
      Serial.println("WiFi Disconnected");
    }
  }
  /*Display */
  int t = int(temperature * 100);
  int Tempp2 = (int)temperature / 10; int Tempp1 = (int)temperature % 10; int Tempp0 =
    (int)(temperature * 10) % 10;
  int Humi2 = (int)humidity / 10; int Humi1 = (int)humidity % 10; int Humi0 =
    (int)(humidity * 10) % 10;
  tm.displayHex(0, Tempp2);
  tm.displayASCIIwDot(1, Tempp1 + '0'); // turn on dot
  tm.displayHex(2, Tempp0);
  tm.display7Seg(3, B01011000); // Code=tgfedcba
  tm.displayHex(4, Humi2);
  tm.displayASCIIwDot(5, Humi1 + '0'); // turn on dot
  tm.displayHex(6, Humi0);
  tm.display7Seg(7, B01110100); // Code=tgfedcba
  delay(2000);
  int WaitTime = 10;
  Serial.print(" >> Wait for next time --> ");
  for (int i = WaitTime; i >= 0; i -= 5) {
    Serial.print(",");
    Serial.print(i);
    delay(5000);
  }
 }
}
```

รูปการต่อวงจร – 1

รูปการต่อวงจร – 2
รูปหน้าจอ Ubidot Dashboard
รูปหน้าจอ LINE ผลการทดสอบ