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| **การใช้งาน ThingsBoard IoTs Platform เพื่อสร้างและจัดการระบบอัฉริยะ**  **ThingsBoard IoTs Platform for smart system** |
| **ขื่อ-สกุล : วราสิริ ลิ้มประเสริฐ B6214005** |

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| **5/5 -- คำถามท้ายบทเพื่อทดสอบความเข้าใจ** |

**Quiz\_301 – MAP Widgets and Multilayer Dashboard – 2 Point Data**

* แสดงรูป โปรแกรม ของผลการทำงานตามหัวข้อ Lab304 – Using Rule Chains, MAP Widget and Multilayer dashboard

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| Code:  **// Add Library “ThingsBoard by ThingsBoard Team -- V 0.4.0”**  **// Add Library “ArduinoHttpClient by Arduino -- V 0.4.0”**  **// Add Library “ArduinoJson by Benoit Blanchon – V6.18.3”**  **#include "ThingsBoard.h"**  **#include <WiFi.h>**  **#define WIFI\_AP "V2036"**  **#define WIFI\_PASSWORD "fnafchica"**  **#define TOKEN "0oTEO8EpTBamgCgBjfxp"**  **#define THINGSBOARD\_SERVER "demo.thingsboard.io"**  **#define THINGSBOARD\_PORT 1883**  **#define SERIAL\_DEBUG\_BAUD 115200**  **// Initialize ThingsBoard client**  **WiFiClient espClient;**  **// Initialize ThingsBoard instance**  **ThingsBoard tb(espClient);**  **// the Wifi radio's status**  **int status = WL\_IDLE\_STATUS;**  **void setup() {**  **// initialize serial for debugging**  **Serial.begin(SERIAL\_DEBUG\_BAUD);**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **InitWiFi();**  **}**  **void loop() {**  **if (WiFi.status() != WL\_CONNECTED) {**  **reconnect();**  **}**  **if (!tb.connected()) {**  **// Connect to the ThingsBoard**  **Serial.print("Connecting to: "); Serial.print(THINGSBOARD\_SERVER);**  **Serial.print(" with token "); Serial.println(TOKEN);**  **if (!tb.connect(THINGSBOARD\_SERVER, TOKEN, THINGSBOARD\_PORT)) {**  **Serial.println("Failed to connect");**  **return;**  **}**  **}**  **Serial.print("Sending data...");**  **// Uploads new telemetry to ThingsBoard using MQTT.**  **// See https://thingsboard.io/docs/reference/mqtt-api/#telemetry-upload-api**  **// for more details**  **float xTempp = random(2000, 5000) / 100.0;**  **float xHdmid = random(6000, 8000) / 100.0;**  **Serial.print(xTempp, 2); Serial.print(",");**  **Serial.print(xHdmid, 2); Serial.println();**  **//tb.sendTelemetryInt("temperature", xTempp);**  **//tb.sendTelemetryInt("humidity", xTempp);**  **tb.sendTelemetryFloat("temperature", xTempp);**  **tb.sendTelemetryFloat("humidity", xHdmid);**  **tb.loop();**  **delay(5000);**  **}**  **void InitWiFi()**  **{**  **Serial.println("Connecting to AP ...");**  **// attempt to connect to WiFi network**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **while (WiFi.status() != WL\_CONNECTED) {**  **delay(500);**  **Serial.print(".");**  **}**  **Serial.println("Connected to AP");**  **}**  **void reconnect() {**  **// Loop until we're reconnected**  **status = WiFi.status();**  **if ( status != WL\_CONNECTED) {**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **while (WiFi.status() != WL\_CONNECTED) {**  **delay(500);**  **Serial.print(".");**  **}**  **Serial.println("Connected to AP");**  **}**  **}** |
| รูปการทดสอบ 1: Dashboard |
| **https://demo.thingsboard.io/dashboards/2886fab0-c822-11eb-9f3e-5da2986ee45a** |

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| รูปการทดสอบ 2: |
| รูปการทดสอบ 3: |

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| รูปการทดสอบ 4: |
| รูปการทดสอบ 5:  C:\Users\ADMIN\Downloads\Frame 13.png |
| รูปการทดสอบ 6:  C:\Users\ADMIN\Downloads\Frame 13 (1).png |

**Quiz\_302 – MAP Widgets and Multilayer Dashboard – 4 Point Data**

* **จากหัวข้อ Quiz\_301 ลองปรับเพิ่มจุดข้อมูลจากสองจุด(STP,SUT) เป็นสี่จุดข้อมูล ตามแต่ผู้เรียนกำหนด**

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| Code :  **#include "ThingsBoard.h"**  **#include <WiFi.h>**  **#define WIFI\_AP "V2036"**  **#define WIFI\_PASSWORD "fnafchica"**  **#define TOKEN "0oTEO8EpTBamgCgBjfxp"**  **#define THINGSBOARD\_SERVER "demo.thingsboard.io"**  **#define THINGSBOARD\_PORT 1883**  **#define SERIAL\_DEBUG\_BAUD 115200**  **WiFiClient espClient;**  **ThingsBoard tb(espClient);**  **int status = WL\_IDLE\_STATUS;**  **void setup() {**  **// initialize serial for debugging**  **Serial.begin(SERIAL\_DEBUG\_BAUD);**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **InitWiFi();**  **}**  **void loop() {**  **if (WiFi.status() != WL\_CONNECTED) {**  **reconnect();**  **}**  **if (!tb.connected()) {**  **// Connect to the ThingsBoard**  **Serial.print("Connecting to: "); Serial.print(THINGSBOARD\_SERVER);**  **Serial.print(" with token "); Serial.println(TOKEN);**  **if (!tb.connect(THINGSBOARD\_SERVER, TOKEN, THINGSBOARD\_PORT)) {**  **Serial.println("Failed to connect");**  **return;**  **}**  **}**  **Serial.print("Sending data...");**  **// Uploads new telemetry to ThingsBoard using MQTT.**  **// See https://thingsboard.io/docs/reference/mqtt-api/#telemetry-upload-api**  **// for more details**  **float xTempp = random(2000, 5000) / 100.0;**  **float xHdmid = random(6000, 8000) / 100.0;**  **Serial.print(xTempp, 2); Serial.print(",");**  **Serial.print(xHdmid, 2); Serial.println();**  **//tb.sendTelemetryInt("temperature", xTempp);**  **//tb.sendTelemetryInt("humidity", xTempp);**  **tb.sendTelemetryFloat("temperature", xTempp);**  **tb.sendTelemetryFloat("humidity", xHdmid);**  **tb.loop();**  **delay(5000);**  **}**  **void InitWiFi()**  **{**  **Serial.println("Connecting to AP ...");**  **// attempt to connect to WiFi network**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **while (WiFi.status() != WL\_CONNECTED) {**  **delay(500);**  **Serial.print(".");**  **}**  **Serial.println("Connected to AP");**  **}**  **void reconnect() {**  **// Loop until we're reconnected**  **status = WiFi.status();**  **if ( status != WL\_CONNECTED) {**  **WiFi.begin(WIFI\_AP, WIFI\_PASSWORD);**  **while (WiFi.status() != WL\_CONNECTED) {**  **delay(500);**  **Serial.print(".");**  **}**  **Serial.println("Connected to AP");**  **}**  **}** |
| **https://demo.thingsboard.io/dashboards/2ccee2f0-c835-11eb-9f3e-5da2986ee45a?state=W3siaWQiOiJkZWZhdWx0IiwicGFyYW1zIjp7fX1d** |
| รูปการทดสอบ 1: Dashboard |

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| รูปการทดสอบ 2:  C:\Users\ADMIN\Downloads\Frame 13 (2).png |
| รูปการทดสอบ 3:  C:\Users\ADMIN\Downloads\Frame 13 (3).png |
| รูปการทดสอบ 4:  C:\Users\ADMIN\Downloads\Frame 13 (4).png |
| รูปการทดสอบ 5:  C:\Users\ADMIN\Downloads\Frame 13 (6).png |