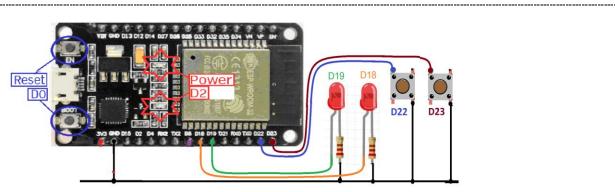
# แนวทางการใช้งานอินเทอร์เน็ตของสรรพสิ่งในระบบการผลิต IoT Approaches to Manufacturing System

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#### 4/4. คำถามท้ายบทเพื่อทดสอบความเข้าใจ

## Quiz\_101 - กดติด กดดับ 2 ชุด

• หากต้องการให้ใช้ 1 สวิตซ์ ควบคุม 1 LED แบบกดติด-กดดับ จำนวน 2 วงจรจะต่อวงจรและเขียน โปรแกรมอย่างไร {SW-D22 -- LED-D19, SW-D23 -- LED-D18}



```
#define pushButton1 22
#define LEDPin1 18
#define pushButton2 23
#define LEDPin2 19
int buttonState1 = 0;
int buttonState2 = 0;
void setup() {
    Serial.begin(115200);
    pinMode(pushButton1, INPUT_PULLUP);
    pinMode(LEDPin1, OUTPUT);
    pinMode(pushButton2, INPUT_PULLUP);
    pinMode(pushButton2, OUTPUT);
}
void loop() {
    if (digitalRead(pushButton1) == LOW) {
```

```
delay(20);
 buttonState1 = 1 - buttonState1;
 digitalWrite(LEDPin1, buttonState1);
 while (digitalRead(pushButton1) == LOW);
 delay(20);
 }
 if (digitalRead(pushButton2) == LOW) {
 delay(20);
 buttonState2 = 1 - buttonState2;
 digitalWrite(LEDPin2, buttonState2);
 while (digitalRead(pushButton2) == LOW);
 delay(20);
 }
                                                                        1 #define pushButton1 22
2 #define LEDPin1 18
3 #define pushButton2 23
4 #define LEDPin2 19
5 int button5tate1 = 0;
6 int button5tate2 = 0;
                                                                        ets Jun 8 2016 00:22:57
                                                                      rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWF:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO,clock_div1]
load:0x3fff0016,len:4
load:0x3fff001c,len:1044
load:0x40078000,len:8986
load:0x40078000,len:5816
entry 0x400806ac
elnt puttonState2 = 0;

/ void setup() (

Serial.begin(115200);

pinNode (pushButton1, INPUT_PULLUB);

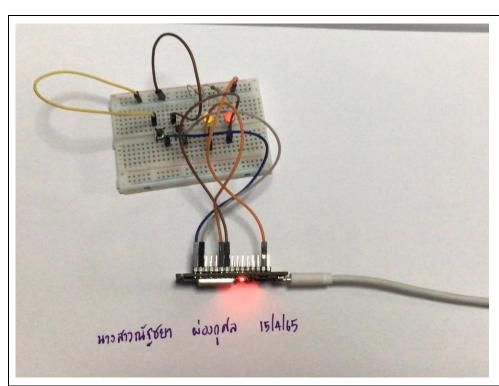
pinNode (ELEPBIN1, OUTPUT);

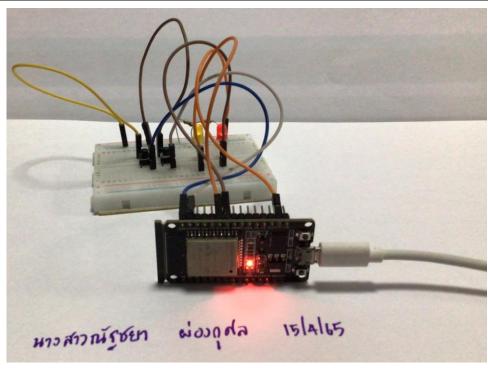
pinNode (ELEPBIN1, OUTPUT);

pinNode (pushButton2, INPUT_PULLUB);

pinNode (LEDBIN2, OUTPUT);

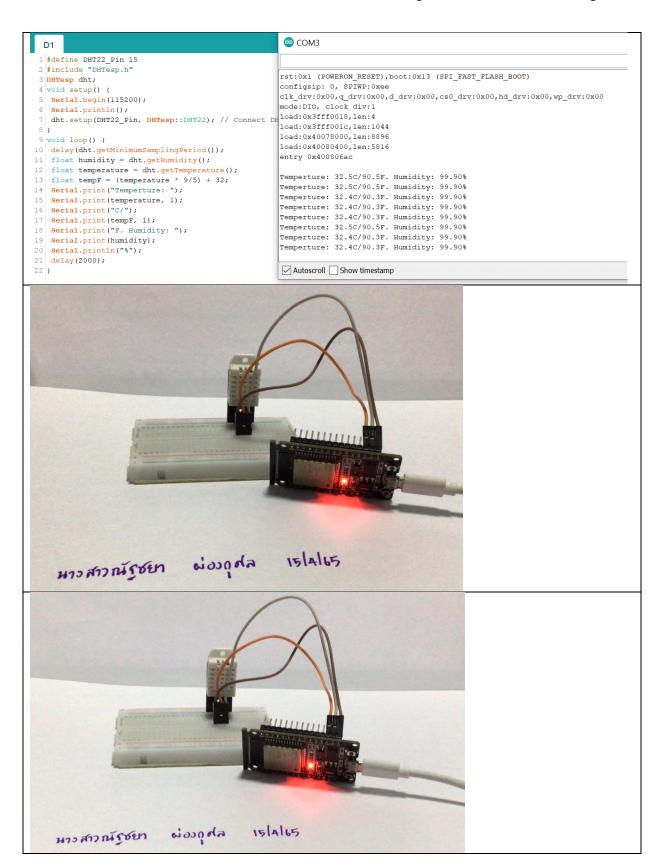
3)
13)
4 void loop() (
15 if (digitalRead(pushButton1) == LOW) {
6 delay(20);
17 buttonState1 = 1 - buttonState1;
    digitalWrite(LEDPin1, buttonState1);
while (digitalRead(pushButton1) == LOW);
delay(20);
21 }
                                                                      Autoscroll Show timestamp
                                                                                                                                                                                 22
3 if (digitalRead(pushButton2) == LOW) {
4 delay(20);
5 buttonState2 = 1 - buttonState2;
6 digitalWrite(LEDPin2, buttonState2);
7 while (digitalRead(pushButton2) == LOW);
28 delay(20);
29 }
30 }
```





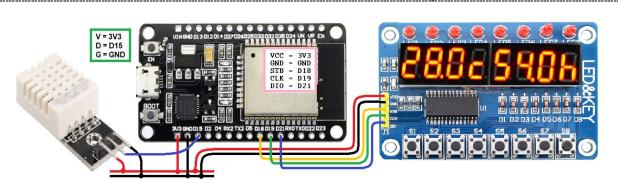
### Quiz 102 - ปรับการแสดงผลที่ Serial Monitor เป็นดังนี้

```
Temperature: 23.0C / 74.7F. Humidity: 24.9%
Temperature: 23.0C / 74.7F. Humidity: 24.9%
Temperature: 23.0C / 74.7F. Humidity: 24.9%
#define DHT22 Pin 15
#include "DHTesp.h"
DHTesp dht;
void setup() {
Serial.begin(115200);
Serial.println();
dht.setup(DHT22 Pin, DHTesp::DHT22); // Connect DHT sensor to GPIO 15
void loop() {
delay(dht.getMinimumSamplingPeriod());
float humidity = dht.getHumidity();
float temperature = dht.getTemperature();
float tempF = (temperature * 9/5) + 32;
Serial.print("Temperture: ");
Serial.print(temperature, 1);
Serial.print("C/");
Serial.print(tempF, 1);
Serial.print("F. Humidity: ");
Serial.print(humidity);
Serial.println("%");
delay(2000);
```



### Quiz\_103 - Read Sensor and Show

• ต่อวงจรเพิ่มเติม ทดสอบการทำงานด้วยโปรแกรมต่อไปนี้ และปรับแก้ให้ถูกต้อง



```
#include <TM1638plus.h>
#include "DHTesp.h"
#define Pin_DHT22 15 // D15
#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 freg = true; //default false,, If using a high freg CPU > ~100 MHZ set to
true.
DHTesp dht:
TM1638plus tm(Brd_STB, Brd_CLK, Brd_DIO, high_freq);
void setup() {
Serial.begin(115200);
dht.setup(Pin DHT22, DHTesp::DHT22);
tm.displayBegin();
void loop() {
float h = dht.getHumidity();
float t = dht.getTemperature();
Serial.print("Temperature: ");
Serial.print(t); Serial.print(" *C\t");
```

```
Serial.print("Humidity: ");
 Serial.print(h); Serial.print(" %\n");
 int Tempp2 = (int)t/10; int Tempp1 = (int)t%10; int Tempp0 = (int)(t*10)%10;
 int Humi2 = (int)h/10; int Humi1 = (int)h%10; int Humi0 = (int)(h*10)%10;
 tm.displayHex(0, Tempp2);
 tm.displayASCIIwDot(1, Tempp1 + '0'); // turn on dot
 tm.displayHex(2, Temppo);
 tm.display7Seg(3, B01011000); // Code=tgfedcba
 tm.displayHex(4, Humi2);
 tm.displayASCIIwDot(5, Humi1 + '0'); // turn on dot
 tm.displayHex(6, Humio);
 tm.display7Seg(7, B01110100); // Code=tgfedcba
 delay(2000);
}
 3 #define Pin_DHT22 15 // D15
4 #define Brd_STB 18 // strobe = GPIO connected to strobe line of module
5 #define Brd_CLK 19 // clock = GPIO connected to clock line of module
6 #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
 8 DHTesp dht;
9 TM1638plus tm(Brd_STB, Brd_CLK , Brd_DIO, high_freq);
10 void setup() {
                                                                                         Temperature: 32.10 *C
                                                                                                                  Humidity: 99.90 %
 11 Serial.begin(115200);
                                                                                         Temperature: 32.00 *C
                                                                                                                  Humidity: 99.90 %
 12 dht.setup(Pin_DHT22, DHTesp::DHT22);
13 tm.displayBegin();
                                                                                         Temperature: 32.00 *C
                                                                                                                  Humidity: 99.90 %
                                                                                                                  Humidity: 99.90 %
Humidity: 99.90 %
                                                                                         Temperature: 32.00 *C
                                                                                          Temperature: 32.10 *C
16 float h = dht.getHumidity();
17 float t = dht.getTemperature();
18 Serial.print("Temperature: ");
                                                                                         Temperature: 32.00 *C
                                                                                                                  Humidity: 99.90 %
                                                                                         Temperature: 32.10 *C
Temperature: 32.00 *C
                                                                                                                  Humidity: 99.90 %
Humidity: 99.90 %
19 Serial.print(t); Serial.print(" *C\t");
20 Serial.print("Humidity: ");
21 Serial.print(h); Serial.print(" %\n");
                                                                                         Temperature: 32.20 *C
                                                                                                                  Humidity: 99.90 %
                                                                                         Temperature: 32.20 *C
                                                                                                                  Humidity: 99.90 %
Humidity: 99.90 %
                                                                                         Temperature: 32.20 *C
22 int Tempp2 = (int)t/l0; int Tempp1 = (int)t%10; int Tempp0 = (int)(t*10)%10;
23 int Humi2 = (int)h/l0; int Humi1 = (int)h%10; int Humi0 = (int)(h*10)%10;
24 tm.displayMex(0, Tempp2);
25 tm.displayMex(0, Tempp2) + '0'); // turn on dot
                                                                                         Temperature: 32.20 *C
                                                                                                                  Humidity: 99.90 %
                                                                                         Temperature: 32.20 *C
Temperature: 32.20 *C
                                                                                                                  Humidity: 99.90 %
                                                                                                                  Humidity: 99.90 %
                                                                                         Temperature: 32.10 *C
                                                                                                                  Humidity: 99.90 %
tm.displayHex(2, Tempp0);
27 tm.display7Seg(3, B01011000); // Code=tgfedcba
28 tm.displayHex(4, Humi2);
                                                                                         ✓ Autoscroll Show timestamp
    tm.displayASCIIwDot(5, Humi1 + '0'); // turn on dot
30 tm.displayHex(6, Humi0);
    tm.display7Seg(7, B01110100); // Code=tgfedcba
    delay(2000);
```

