

ASSIGNMENT 4

Team ID :- PNT2022TMID33628

Project name :- IOT based smart crop protection for agricultural system

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QUESTION:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 cms send "alert" to IBM cloud and display in device recent events. Upload document with wokwi share link and images of ibm cloud.

SOLUTION:

CODE:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT
// creating the instance by passing pin and typr of dht connected
float distance;
#define sound_speed 0.034
int trigpin=18;
int echopin=19;
int led=5;
int LED=9;
long duration;
```

```

String message;// creating the instance by passing pin and typr of dht connected

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);

//-----credentials of IBM Accounts-----

#define ORG "93oivx"//IBM ORGANITION ID
#define DEVICE_TYPE "NodeMCU"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "12345"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678" //Token
String data3;
float h, t;

//----- Customise the above values -----
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event
perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd REPRESENT
command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id

//-----

```

```

WiFiClient wifiClient; // creating the instance for wificlient

PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client
id by passing parameter like server id,portand wificredential

void setup()// configureing the ESP32
{
    Serial.begin(115200);
    pinMode(trigpin,OUTPUT);
    pinMode(echopin,INPUT);
    pinMode(led,OUTPUT);
    delay(10);
    Serial.println();
    wificonnect();
    mqttconnect();
}

void loop()// Recursive Function
{

    digitalWrite(trigpin,LOW);
    digitalWrite(trigpin,HIGH);
    delay(1000);
    digitalWrite(trigpin,LOW);
    duration=pulseIn(echopin,HIGH);
    distance=duration*sound_speed/2;
    Serial.println("distance"+String(distance)+"cm");
    if(distance<100)
    {

```

```

    message="Alert";
    digitalWrite(led,HIGH);
} else
{
    message="No problem";
    digitalWrite(led,LOW);
}
delay(1000);
PublishData(distance,message);
if (!client.loop()) {
    mqttconnect();
}
}

```

/.....retrieving to Cloud...../

```

void PublishData(float d, String a) {
    mqttconnect();//function call for connecting to ibm
    /*
        creating the String in in form JSon to update the data to ibm cloud
    */
    String payload = "{\"distance\":";
    payload += d; payload += "}";
    payload += "," "{\"message\":";

```

```
payload += a;  
payload += "}";
```

```
Serial.print("Sending payload: ");  
Serial.println(payload);
```

```
if (client.publish(publishTopic, (char*) payload.c_str())) {
```

```
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud then it will  
    print publish ok in Serial monitor or else it will print publish failed
```

```
    } else {  
        Serial.println("Publish failed");  
    }
```

```
}
```

```
void mqttconnect() {
```

```
    if (!client.connected())
```

```
    { Serial.print("Reconnecting client to ");
```

```
    Serial.println(server);
```

```
    while (!client.connect(clientId, authMethod, token)) {
```

```
        Serial.print(".");
```

```
        initManagedDevice();
```

```
        Serial.println();
```

```
    }
```

```
}
```

```
void wificonnect() //function defination for wificonnect
```

```

{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the
connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}

void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{
  Serial.print("callback invoked for topic: ");

```

```

Serial.println(subscribetopic);

for (int i = 0; i < payloadLength; i++) {

    //Serial.print((char)payload[i]);

    data3 += (char)payload[i];

}

data3="";

}

```

DISTANCE IS LESS THAN 100 cms:

The screenshot displays the WOKWI simulation interface. On the left, the sketch.ino file contains the following code:

```

1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3 // creating the instance by passing pin and typr of dht connected
4 float distance;
5 #define sound_speed 0.034
6 int trigpin=18;
7 int echopin=19;
8 int led=5;
9 int LED=9;
10 long duration;
11 String message; // creating the instance by passing pin and typr of dht connected
12
13 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
14
15 //-----credentials of IBM Accounts-----
16
17 #define ORG "93oiyx" //IBM ORGANITION ID
18 #define DEVICE_TYPE "NodeMCU" //Device type mentioned in ibm watson IOT Platform
19 #define DEVICE_ID "12345" //Device ID mentioned in ibm watson IOT Platform
20 #define TOKEN "12345678" //Token
21 String data3;
22 float h, t;
23
24
25 //----- Customise the above values -----
26 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
27 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform a
28 char subscribetopic[] = "iot-2/cmd/command/fmt/String"; // cmd REPRESENT command type AND
29 char authMethod[] = "use-token-auth"; // authentication method
30 char token[] = TOKEN;
31 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
32
33

```

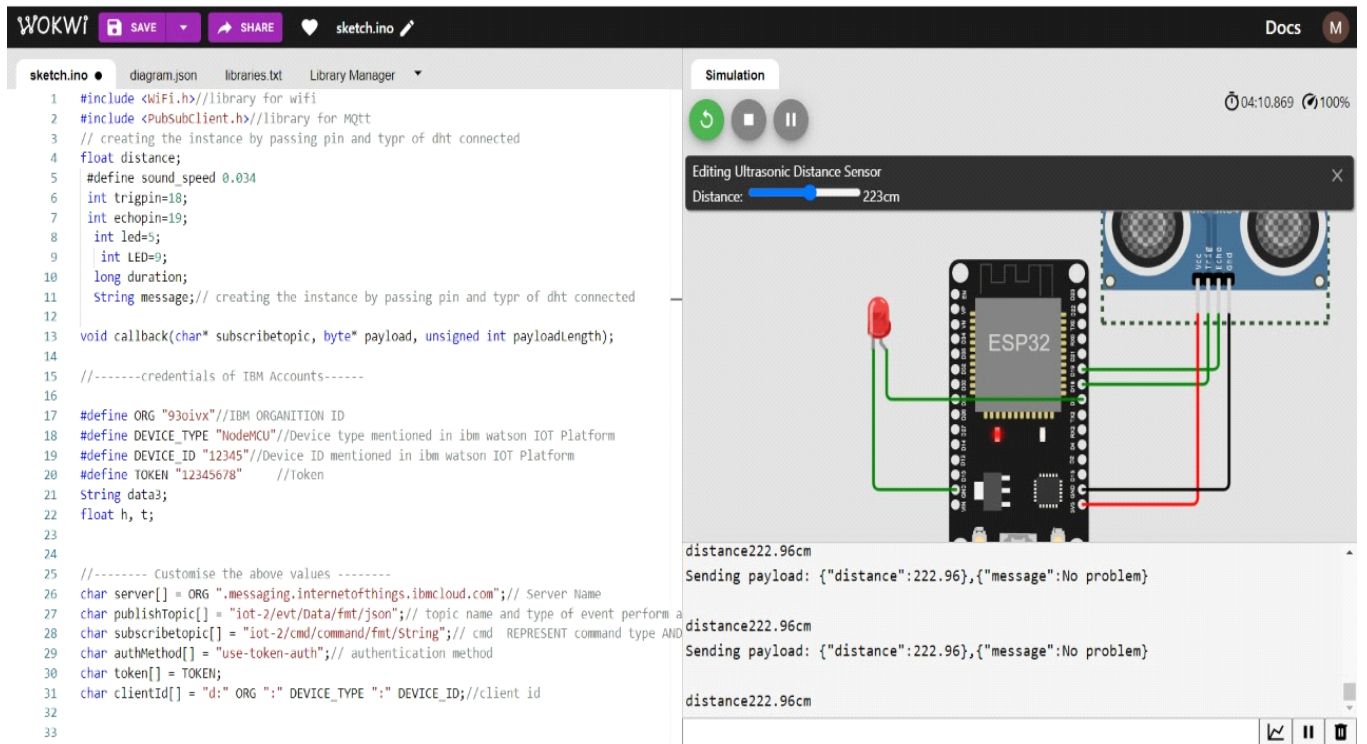
On the right, the simulation window shows an ESP32 board connected to an Ultrasonic Distance Sensor. The sensor's distance is set to 82cm. The console output shows the sensor reading 81.97cm and the resulting JSON payload being sent:

```

distance81.97cm
Sending payload: {"distance":81.97},{"message":Alert}
distance81.97cm
Sending payload: {"distance":81.97},{"message":Alert}
distance81.97cm

```

DISTANCE IS GREATER THAN 100 cms:



DEVICE RECENT EVENTS IN IBM WATSON:

The image shows the IBM Watson IoT Platform console. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The left sidebar contains various icons for navigation. The main content area displays the 'Recent Events' for a device with ID 12345, which is in a 'Connected' state.

The 'Recent Events' table shows the following data:

Event	Value	Format	Last Received
Data	{"d":{"distance":222.96,"message":"No problem"}}	json	a few seconds ago
Data	{"d":{"distance":222.96,"message":"No problem"}}	json	a few seconds ago
Data	{"d":{"distance":81.97,"message":"Alert"}}	json	a few seconds ago
Data	{"d":{"distance":81.97,"message":"Alert"}}	json	a few seconds ago
Data	{"d":{"distance":81.97,"message":"Alert"}}	json	a few seconds ago

