

Smart Farmer - IoT Enabled Smart Farming Application

ASSIGNMENT -4

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To 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.

Code:

```
#include <WiFi.h> // library for WIFI
#include <PubSubClient.h> // library for MQTT
//----- credentials of IBM Accounts -----
#define ORG "04gt4e" // IBM organisation id
#define DEVICE_TYPE "esp32" // Device type mentioned in ibm watson iot platform
#define DEVICE_ID "23456" // Device ID mentioned in ibm watson iot platform
#define TOKEN "zPS*0TV+fi0h)iq(sT" // Token
#define speed 0.034
#define led 14
String data3;
int LED = 4;
//----- customise 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 topic[] = "iot-2/cmd/test/fmt/String"; // cmd Represent type and command is test format of strings
char authMethod[] = "use-token-auth"; // authentication method char
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //Client id
//-----
WiFiClient wifiClient; // creating instance for wificlient
PubSubClient client(server, 1883, wifiClient); // calling the predefined client id by passing parameter like server id,port and wifi credential
const int trigpin=5; const
int echopin=18;
String command;
String data="";
long duration; float
dist;
```

```

void setup()
{
  Serial.begin(115200);
  pinMode(led, OUTPUT);
  pinMode(trigpin, OUTPUT);
  pinMode(echopin, INPUT);
  wifiConnect(); mqttConnect();
}

void loop() { bool isNearby
= dist < 100;
digitalWrite(led, isNearby);
publishData();
delay(500);
if (!client.loop())
{
  mqttConnect(); // function call to connect to ibm
}
}

/* -----retrieving to cloud-----
-----*/

void wifiConnect()
{
  Serial.print("Connecting to ");
  Serial.print("Wifi");
  WiFi.begin("Wokwi-GUEST", "", 6);
  while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.print(".");
  }
  Serial.print("WiFi connected, IP address: ");
  Serial.println(WiFi.localIP());
}

void mqttConnect()
{
  if (!client.connected())
  {
    Serial.print("Reconnecting MQTT client to ");
    Serial.println(server);
    while (!client.connect(clientId, authMethod, token))
    {
      Serial.print(".");
      delay(500);
    }
    initManagedDevice();
    Serial.println();
  }
}

```

```

void initManagedDevice() {
if (client.subscribe(topic))
{
Serial.println("IBM subscribe to cmd OK");
}
else
{
Serial.println("subscribe to cmd FAILED");
}
}
void publishData()
{
digitalWrite(trigpin,LOW);
digitalWrite(trigpin,HIGH);
delayMicroseconds(10); digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
dist=duration*speed/2;
if(dist<100)
{
digitalWrite(LED,HIGH); String
payload = "{\"Alert Distance\":\"";
payload += dist;
payload += "\"}";
Serial.print("\n");
Serial.print("Sending payload: "); Serial.println(payload); if
(client.publish(publishTopic, (char*)
payload.c_str())) // if data is uploaded to cloud successfully,prints publish
ok else prints publish failed
{
Serial.println("Publish OK");
}
}
if(dist>100)
{
digitalWrite(LED,HIGH);
String payload = "{\"Distance\":\"";
payload += dist;
payload += "\"}";
Serial.print("\n");
Serial.print("Sending payload: ");
Serial.println(payload);
if(client.publish(publishTopic, (char*) payload.c_str()))
{
Serial.println("Publish OK");
}
else
{
digitalWrite(LED,LOW);

```

```
Serial.println("Publish FAILED");
}
}
}
```

Simulation Output:

<https://wokwi.com/projects/347571602979816019>

The screenshot displays the Wokwi web IDE interface. On the left, the 'sketch.ino' file contains the following code:

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10 String data3;
11 int LED = 4;
12 //----- customise above values -----
13 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // server name
14 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event
15 char topic[] = "iot-2/cmd/test/fmt/String"; // cmd Represent type and command
16 char authMethod[] = "use-token-auth"; // authentication method char
17 char token[] = TOKEN;
18 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //Client id
19 //-----
20 WiFiClient wificlient; // creating instance for wificlient
21 PubSubClient client(server, 1883, wificlient); // calling the predefined client
22 const int trigpin=5; const
23 int echopin=18;
24 String command;
25 String data="";
26 long duration; float
27 dist;
28 void setup()
29 {
30 Serial.begin(115200);
```

The simulation window on the right shows an 'Editing Ultrasonic Distance Sensor' dialog with a distance of 87cm. Below it, the console output shows three successful publish operations:

```
Sending payload: {"Alert Distance":86.96}
Publish OK

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Publish OK

Sending payload: {"Alert Distance":86.96}
```

The screenshot displays the IBM Watson IoT Platform interface. At the top, the browser address bar shows the URL: <https://04gt4e.internetofthings.ibmcloud.com/dashboard/devices/browse>. The page header includes the text "IBM Watson IoT Platform" and a user profile section with the email "sec19ec035@sairamtap.edu.in" and ID "04gt4e".

The main navigation bar contains tabs: "Browse", "Action", "Device Types", and "Interfaces". An "Add Device" button is located on the right. The central panel shows a device card for "esp32", which is "Connected" and was last seen on "6 Nov 2022 15:56". Below the device card, there are tabs for "Identity", "Device Information", "Recent Events", "State", and "Logs". The "Recent Events" tab is active, displaying a message: "The recent events listed show the live stream of data that is coming and going from this device."

A table of recent events is shown below the message:

Event	Value	Format	Last Received
Data	{"Alert Distance":86.96}	json	a few seconds ago
Data	{"Alert Distance":86.96}	json	a few seconds ago
Data	{"Alert Distance":86.96}	json	a few seconds ago
Data	{"Alert Distance":86.96}	json	a few seconds ago
Data	{"Alert Distance":86.96}	json	a few seconds ago

At the bottom of the device card, it states "0 Simulations running". The Windows taskbar is visible at the very bottom of the image.