

# 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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3 //----- credentials of IBM Accounts -----
4 #define ORG "04gt4e" // IBM organisation id
5 #define DEVICE_TYPE "esp32" // Device type mentioned in ibm watson iot platform
6 #define DEVICE_ID "23456" // Device ID mentioned in ibm watson iot platform
7 #define TOKEN "%PS*0TV+fi0h)iq(st" // Token
8 #define speed 0.034
9 #define led 14
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 right side of the interface shows the 'Simulation' window. It features a visual representation of the ESP32 microcontroller and the HC-SR04 ultrasonic sensor. A slider for the sensor's distance is set to 87cm. Below the simulation, a log window displays the following output:

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

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```

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 left sidebar features icons for various functions: a grid, a gear, a group of people, a person, a globe, a line graph, a clock, and a settings gear.

The central content area shows a device card for "esp32". The card header includes a dropdown arrow, a square icon, the ID "23456", a green status indicator labeled "Connected", the device name "esp32", the label "Device", and the timestamp "6 Nov 2022 15:56". Below the header are tabs for "Identity", "Device Information", "Recent Events" (which is selected), "State", and "Logs".

Under the "Recent Events" tab, a message states: "The recent events listed show the live stream of data that is coming and going from this device." Below this message is a table with the following data:

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 indicates "0 Simulations running". The Windows taskbar at the very bottom shows various application icons and the system clock displaying "16:18" on "06-11-2022".