

## Assignment - 4

### SmartFarmer - IoT Enabled Smart Farming Application

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#### Question:

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

#### CODE :

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT

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

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

#define ORG "az10eu" //IBM ORGANITION ID
#define DEVICE_TYPE "UltraSonicSensor" //Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "1234" //Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678" //Token
String data3;
float dist;
//----- 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 subscribtopic[] = "iot-2/cmd/test/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

int LED = 4;
int trig = 5;
int echo = 18;
void setup()
{
  Serial.begin(115200);
  pinMode(trig,OUTPUT);
```

```

pinMode(echo, INPUT);
pinMode(LED, OUTPUT);
delay(10);
wificonnect();
mqttconnect();
}
void loop()// Recursive Function
{

digitalWrite(trig, LOW);
digitalWrite(trig, HIGH);
delayMicroseconds(10);
digitalWrite(trig, LOW);
float dur = pulseIn(echo, HIGH);
float dist = (dur * 0.0343)/2;
Serial.print ("Distancein cm");
Serial.println(dist);


PublishData(dist);
delay(1000);
if (!client.loop()) {
    mqttconnect();
}
}

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

void PublishData(float dist) {
    mqttconnect();//function call for connecting to ibm
    /*
        creating the String in in form JSON to update the data to ibm cloud
    */
    String object;
    if (dist < 100)
    {
        digitalWrite(LED, HIGH);
        Serial.println("object is near");
        object = "Alert: Person Detected";
    }
    else
    {
        digitalWrite(LED, LOW);
        Serial.println("no object found");
        object = "No";
    }

    String payload = "{\"distance\":";
    payload += dist;
    payload += "," " \"object\":";
    payload += object;
    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(".");
            delay(500);
        }

        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];
    }

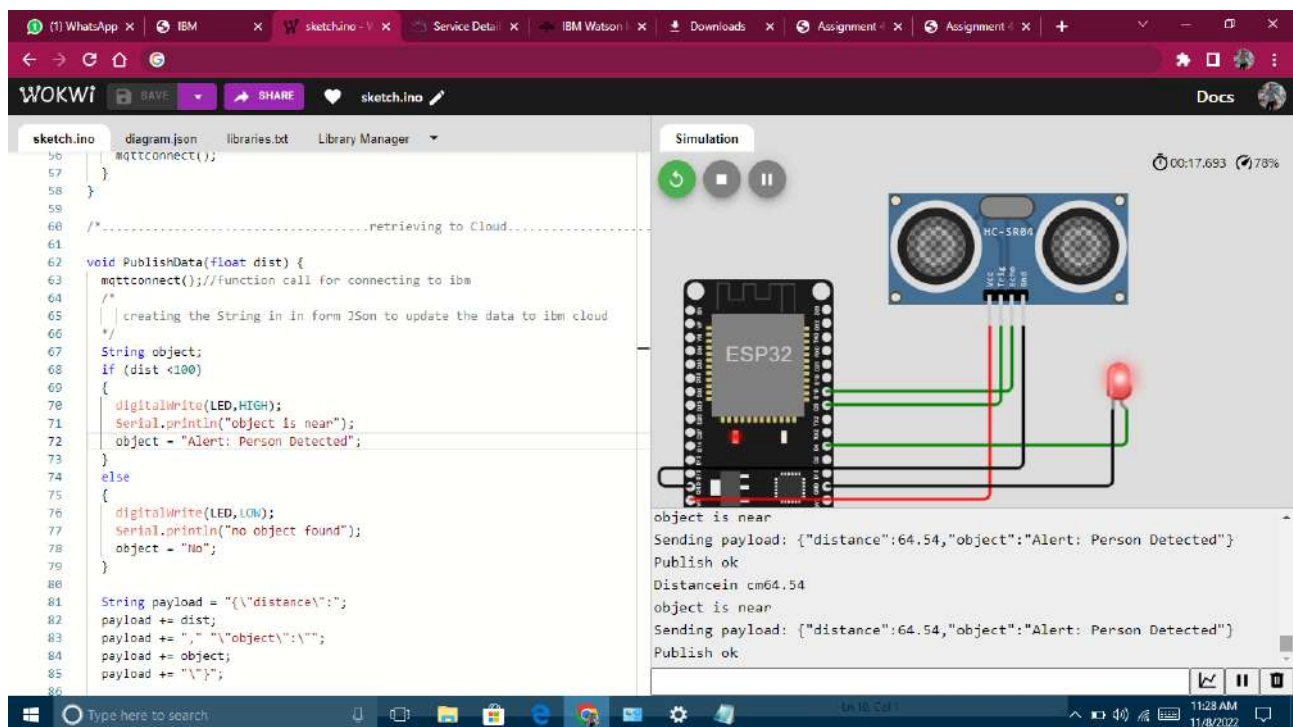
    data3="";
}

```

**Wokwi Link :**

<https://wokwi.com/projects/347204840687927891>

**Output and Simulation :**



## IBM cloud:

### Device Information:

The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons for device management. The main content area displays the 'Device Information' tab for a device with ID 1234. The device is an 'UltraSonicSensor' and is currently 'Disconnected'. It was added on 'Nov 8, 2022 11:11 AM' by the user '611719106030@smartinternz.com'. The connection status details show it was last connected on 'Nov 8, 2022 11:18 AM' from IP '216.246.119.62' for a duration of 3 minutes, transferring 9.0 KB of data.

Device ID	1234
Device Type	UltraSonicSensor
Date Added	Nov 8, 2022 11:11 AM
Added By	611719106030@smartinternz.com
Connection Status	Disconnected Last Connected: Nov 8, 2022 11:18 AM Client Address: 216.246.119.62 Insecure Duration: 3 minutes Data Transferred: 9.0 KB

### Device Recent Events:

Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.

The screenshot shows the 'Recent Events' tab for the same device (ID 1234). The device status is now 'Connected'. The recent events section displays a live stream of data. The events are JSON objects containing distance measurements and alerts. The table below summarizes the data shown in the screenshot.

Event	Value	Format	Last Received
Data	{"distance":64.59,"object":{"Alert: Person Detect...	json	a few seconds ago
Data	{"distance":64.54,"object":{"Alert: Person Detect...	json	a few seconds ago
Data	{"distance":64.54,"object":{"Alert: Person Detect...	json	a few seconds ago
Data	{"distance":64.54,"object":{"Alert: Person Detect...	json	a few seconds ago
Data	{"distance":64.54,"object":{"Alert: Person Detect...	json	a few seconds ago