

- **PROBLEM STATEMENT :**

IoT Based Smart Solution for Railways

- **DOMAIN :**

Internet of Things

- **ASSIGNMENT 4:**

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

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Question-1:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 cm send "alert" to IBM cloud and display in device recent events.

CODE:

```
#include <WiFi.h>

#include<WiFiClient.h>

#include<PubSubClient

.h> const int trigPin =

5; const int echoPin =

18;

//define sound speed in cm/uS

#define SOUND_SPEED

0.034 #define CM_TO_INCH

0.393701 long duration; float

distanceCm; float

distanceInch;
```

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

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

```
#define ORG "w68scq"//IBM ORGANITION ID
```

```
#define DEVICE_TYPE "Esp32_connector"//Device type  
mentioned in ibm watson IOT Platform
```

```
#define DEVICE_ID "Premnath"//Device ID mentioned in ibm  
watson IOT Platform
```

```
#define TOKEN "9150196901" //Token
```

```
String data3;
```

```
//----- 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/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);
```

```
void setup() {  
    Serial.begin(115200); // Starts the serial communication  
    pinMode(trigPin, OUTPUT); // Sets the trigPin as an  
    Output  pinMode(echoPin, INPUT); // Sets the echoPin as  
    an Input  Serial.println(); wificonnect(); mqttconnect();  
  
}
```

```
void loop() { // Clears the  
    trigPin  
    digitalWrite(trigPin,  
    LOW);  
    delayMicroseconds(2);
```

```
// Sets the trigPin on HIGH state for 10 micro  
seconds  digitalWrite(trigPin, HIGH);  
delayMicroseconds(10);  digitalWrite(trigPin,  
LOW);
```

```
// Reads the echoPin, returns the sound wave travel time in  
microseconds
```

```
duration = pulseIn(echoPin, HIGH);
```

```
// Calculate the distance
```

```
distanceCm = duration * SOUND_SPEED/2;
```

```
// Convert to inches
```

```
distanceInch = distanceCm * CM_TO_INCH;
```

```
// Prints the distance in the Serial Monitor
```

```
Serial.print("Distance (cm): ");
```

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

```
Serial.print("Distance (inch): ");
```

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

```
PublishData(distanceC  
m); delay(1000); if  
(!client.loop()) {  
mqttconnect();  
}  
}
```

```
void PublishData(float Cm) {  
mqttconnect();//function call for connecting to ibm  
/*  
creating the String in in form JSon to update the data to ibm  
cloud  
*/  
String payload = "{\"Distance  
(cm)\":\""; payload += Cm; 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());
```

```
}
```



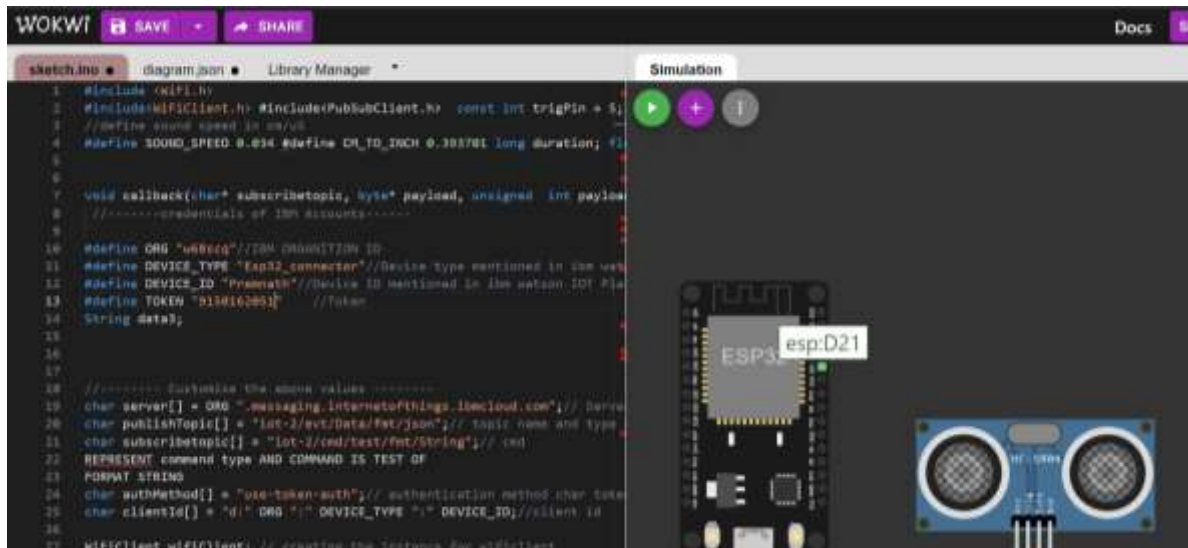
```
void initManagedDevice() {    if
(client.subscribe(subscribetopic)) {
Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
} else
{
    Serial.println("subscribe to cmd FAILED");

}
}

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];
    }
}
```

OUTPUT:



Watson IoT connected:

The screenshot shows the Watson IoT console interface. The 'Recent Events' tab is selected, displaying a table of events. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. The events are listed as follows:

Event	Value	Format	Last Received
Data	["Distance (cm)":216.94]	json	a few seconds ago
Data	["Distance (cm)":216.94]	json	a few seconds ago
Data	["Distance (cm)":216.94]	json	a few seconds ago
Data	["Distance (cm)":216.97]	json	a few seconds ago
Data	["Distance (cm)":216.97]	json	a few seconds ago

