

## ASSIGNMENT - 4

<b>DATE</b>	17 OCTOBER 2022
<b>TEAM ID</b>	PNT2022TMID06972
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<b>STUDENT ROLL NUMBER</b>	GCTC1918L16
<b>MAXIMUM MARKS</b>	2 MARKS

### **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

### **WOKWI CODE AND IMPLEMENTATION LINK:**

<https://wokwi.com/projects/346688722332287572>

## CODE:

```
esp32-dht22.ino copy - Wokwi X +
wokwi.com/projects/346687281544823380
Gmail YouTube Maps Implementing HTT...
WOKWI SAVE SHARE Docs
esp32-dht22.ino diagram.json libraries.txt Library Manager
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for Mqtt
3
4 void callback(char *subscriberTopic, byte *payload, unsigned int payloadLength);
5
6 //-----credentials of IBM Accounts -----
7
8 #define ORG "patzi2" //IBM ORGANIZATION ID
9 #define DEVICE_TYPE "Fire_Device" //Device type mentioned in ibm watson IOT Platform
10 #define DEVICE_ID "Fire_i23" //Device ID mentioned in ibm watson IOT Platform
11 #define TOKEN "kiDhLoae9gceHgYHjr" //Token
12
13
14
15 float dist;
16
17 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
18 char publishTopic[] = "iot-2/evt/Data1/fmt/json"; // topic name and type of event perform and format in which data to be send
19 char subscriberTopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
20 char authMethod[] = "use-token-auth"; // authentication method
21 char token[] = TOKEN;
22 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
23
24 WiFiClient wificlient; // creating the instance for wificlient
25
26 PubSubClient client (server,1883, callback,wificlient); //calling the predefined client
27
28 int LED = 4;
29
```

```
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Gmail YouTube Maps Implementing HTT...
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esp32-dht22.ino diagram.json libraries.txt Library Manager
28 int LED = 4;
29
30 int trig =5;
31
32 int echo= 18;
33
34 void setup()
35 {
36
37   Serial.begin(115200);
38   pinMode(trig, OUTPUT);
39   pinMode(echo, INPUT);
40   pinMode(LED, OUTPUT);
41   delay(10);
42
43   wificlient();
44   mqttconnect();
45
46 }
47
48 void loop() // Recursive Function
49 {
50
51   {
52     delayMicroseconds(10);
53     digitalWrite(trig, LOW);
54     digitalWrite(trig, LOW);
55     digitalWrite(trig,HIGH);

```

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```
54 digitalWrite(trig, LOW);
55 digitalWrite(trig,HIGH);
56 float dur= pulseIn(echo,HIGH);
57 float dist = (dur* 0.0343)/2;
58 Serial.print ("Distance in cm : ");
59 Serial.println(dist);
60
61 PublishData(dist);
62
63 delay(1000);
64
65 if (!client.loop()) {
66
67   mqttconnect();
68 }
69 }
70
71 void PublishData(float dist) {
72   mqttconnect();
73
74   String object;
75
76   if (dist<100)
77   {
78     digitalWrite(LED, HIGH);
79     Serial.println("object is near");
80     object = "ALERT! object is near";
81   }
82 }
```

Type here to search

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```
83 else
84 {
85   digitalWrite(LED,LOW);
86   Serial.println("no object found");
87   object ="No object found";
88 }
89
90 String payload="{\"distance\": ";
91 payload += dist;
92 payload += ", \"object\": \"";
93 payload += object;
94 payload += "\"}";
95
96 Serial.print("Sending payload: ");
97 Serial.println(payload);
98
99 if (client.publish(publishTopic, (char*) payload.c_str()))
100 {
101   Serial.println("Publish ok"); // if it sucessfully upload
102 }
103 else {
104   Serial.println("Publish failed");
105 }
106 }
107
108 void mqttconnect() {
109   if (!client.connected()) {
110     Serial.print("Reconnecting client to ");
111     Serial.println(server);
```

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```
111 Serial.println(server);
112 while (!client.connect(clientId, authMethod, token)) {
113     Serial.print(".");
114     delay(500);
115 }
116
117 initManagedDevice();
118 Serial.println();
119 }
120 }
121
122
123 void wificonnect() //function definition for wificonnect
124 {
125     Serial.println();
126     Serial.print("Connecting to ");
127
128     WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
129     while (WiFi.status() != WL_CONNECTED) {
130         delay(500);
131         Serial.print(".");
132     }
133     Serial.println("");
134     Serial.println("WiFi connected");
135     Serial.println("IP address: ");
136     Serial.println(WiFi.localIP());
137 }
138
139 void initManagedDevice() {
```

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esp32-dht22.ino diagram.json libraries.txt Library Manager

```
139 if (client.subscribe(subscribetopic)) {
140     Serial.println((subscribetopic));
141     Serial.println("subscribe to cmd OK");
142 }
143 else {
144     Serial.println("subscribe to cmd FAILED");
145 }
146 }
147 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
148 {
149     Serial.print("callback invoked for topic: ");
150     Serial.println(subscribetopic);
151     for (int i = 0; i < payloadLength; i++) {
152         //Serial.print((char)payload[i]);
153         // data3 += (char)payload[i];
154     }
155     // Serial.println("data: " + data3);
156     //if(data3=="lighton")
157     {
158         //Serial.println(data3);
159         digitalWrite(LED,HIGH);
160     }
161     //else
162     {
163         //Serial.println(data3);
164         digitalWrite(LED,LOW);
165     }
166     //data3="";
167 }
```

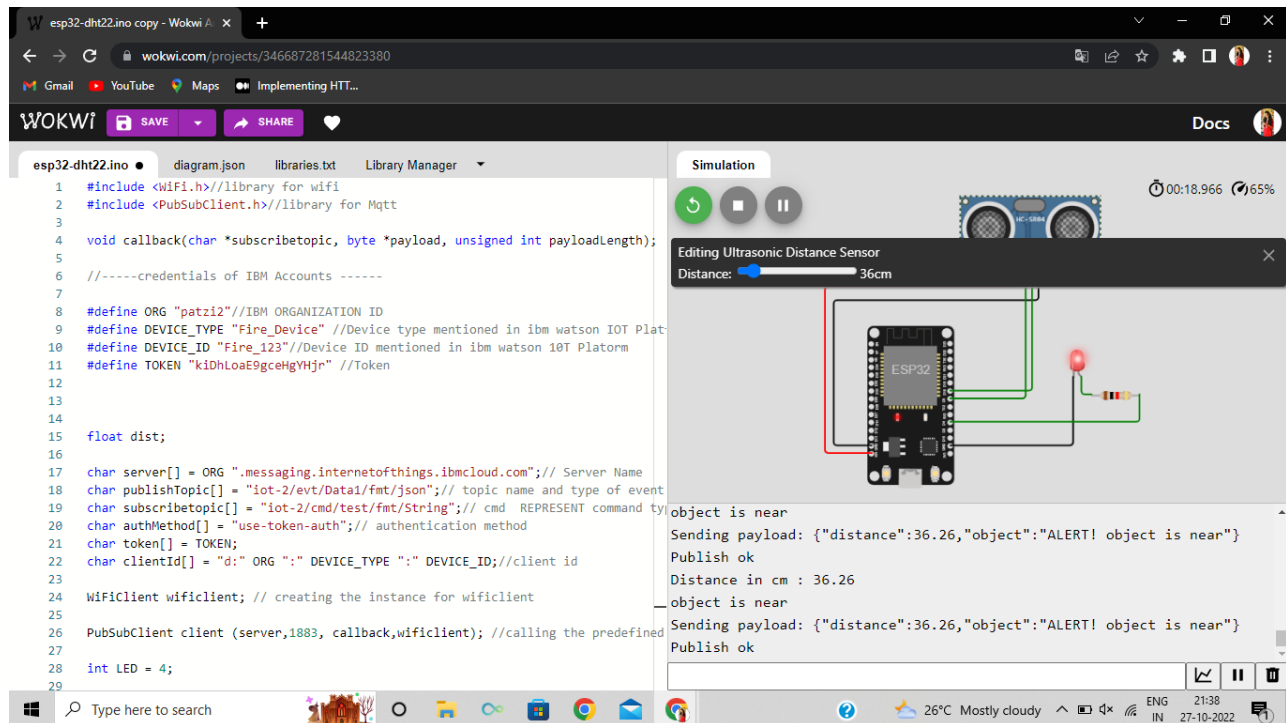
Type here to search

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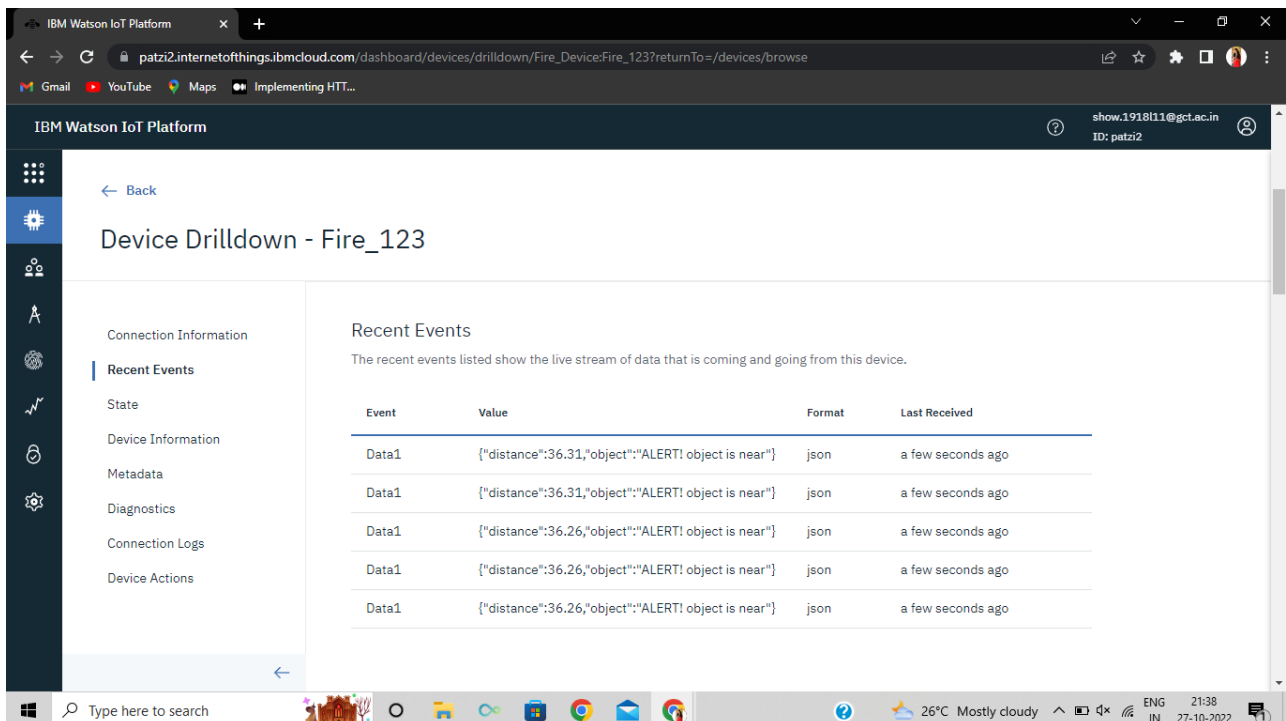
## OUTPUT:

When the distance is less than 100 cms, send an “alert” message to IBM Watson IOT Platform.



The screenshot displays the Wokwi IDE interface. On the left, the Arduino code for an ESP32 is shown, which includes libraries for WiFi and PubSubClient, defines IBM Watson IoT credentials, and sets up an MQTT client. The code triggers an alert when the distance measured by an ultrasonic sensor is less than 100 cm. On the right, a simulation window shows the ESP32 board connected to an ultrasonic sensor. The sensor's distance is displayed as 36 cm. Below the simulation, the console output shows the MQTT client sending a payload: {"distance":36.26,"object":"ALERT! object is near"}.

## IBM CLOUD IMAGE



The screenshot shows the IBM Watson IoT Platform dashboard. The main heading is "Device Drilldown - Fire\_123". The dashboard is divided into two main sections: "Connection Information" and "Recent Events". The "Recent Events" section displays a table of recent data points received from the device.

Event	Value	Format	Last Received
Data1	{"distance":36.31,"object":"ALERT! object is near"}	json	a few seconds ago
Data1	{"distance":36.31,"object":"ALERT! object is near"}	json	a few seconds ago
Data1	{"distance":36.26,"object":"ALERT! object is near"}	json	a few seconds ago
Data1	{"distance":36.26,"object":"ALERT! object is near"}	json	a few seconds ago
Data1	{"distance":36.26,"object":"ALERT! object is near"}	json	a few seconds ago

When the object is far (greater than 100 cms), send “no object found” to the IBM Watson IOT Platform.

The screenshot shows the Wokwi IDE interface. On the left, the code for `esp32-dht22.ino` is displayed, including headers for `WiFi` and `PubSubClient`, and definitions for IBM Watson IoT credentials. The code sets up a `WiFiClient` and a `PubSubClient` to send data to the IBM Watson IoT Platform. On the right, a simulation of an ESP32 microcontroller is shown connected to an Ultrasonic Distance Sensor. The sensor's distance is set to 217cm. The console output shows the device sending a 'no object found' message to the IBM Watson IOT Platform.

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for mqtt
3
4 void callback(char *topic, byte *payload, unsigned int payloadLength) {
5
6   //-----credentials of IBM Accounts -----
7
8   #define ORG "patzi2" //IBM ORGANIZATION ID
9   #define DEVICE_TYPE "Fire_Device" //Device type mentioned in ibm watson IoT
10  #define DEVICE_ID "Fire_123" //Device ID mentioned in ibm watson IoT Platform
11  #define TOKEN "kiDhLoaE9gceHgVHjr" //Token
12
13
14  float dist;
15
16  char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
17  char publishTopic[] = "iot-2/evt/Data1/fmt/json"; // topic name and type of
18  char subscribTopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command
19  char authMethod[] = "use-token-auth"; // authentication method
20  char token[] = TOKEN;
21  char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
22
23  WiFiClient wificlient; // creating the instance for wificlient
24
25  PubSubClient client(server, 1883, callback, wificlient); //calling the prede
26
27  int LED = 4;
28
29
```

Simulation

Editing Ultrasonic Distance Sensor

Distance: 217cm

no object found

Sending payload: {"distance":218.85,"object":"No object found"}

Publish ok

Distance in cm : 218.85

no object found

Sending payload: {"distance":218.85,"object":"No object found"}

Publish ok

## IBM CLOUD IMAGE

The screenshot shows the IBM Watson IoT Platform dashboard. The left sidebar contains navigation links for Back, Recent Events, State, Device Information, Metadata, Diagnostics, Connection Logs, and Device Actions. The main content area displays the Device Drilldown for Fire\_123. The Recent Events section shows a table of recent events.

IBM Watson IoT Platform

show.191811@gct.ac.in  
ID: patzi2

← Back

Device Drilldown - Fire\_123

Connection Information

Recent Events

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
Data1	{"distance":218.85,"object":"No object found"}	json	a few seconds ago
Data1	{"distance":218.85,"object":"No object found"}	json	a few seconds ago
Data1	{"distance":218.85,"object":"No object found"}	json	a few seconds ago
Data1	{"distance":218.85,"object":"No object found"}	json	a few seconds ago
Data1	{"distance":218.85,"object":"No object found"}	json	a few seconds ago