

ASSIGNMENT-4

Date	28October2022
TeamID	PNT2022TMID07789
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MaximumMarks	2 Marks

Question1:

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

CODE:

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4 void callback(char* subscribtopic, byte* payload, unsigned int payloadLength);
5
6 //-----credentials of IBM Accounts-----
7
8 #define ORG "4hn0jp" //IBM ORGANITION ID
9 #define DEVICE_TYPE "ULTRASON" //Device type mentioned in ibm watson IOT Platform
10 #define DEVICE_ID "DISTANCEDETECT" //Device ID mentioned in ibm watson IOT Platform
11 #define TOKEN "wu05s7PR)ZSegVk&Rx" //Token
12 String data3;
13 float dist;
14
15 //----- Customise the above values -----
16
17 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
18 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform and format in which data to be send
19 char subscribtopic[] = "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 //-----
25
26 WiFiClient wifiClient; // creating the instance for wifiClient
27 PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client id by passing parameter like server id,portand wificredential
28
29 int LED = 4;
30 int trig = 5;
31 int echo = 18;
32 void setup()
33 {
34   Serial.begin(115200);
```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager ▼

```
36  pinMode(trig,OUTPUT);
37  pinMode(echo,INPUT);
38  pinMode(LED, OUTPUT);
39  delay(10);
40  wificonnect();
41  mqttconnect();
42  }
43  void loop()// Recursive Function
44  {
45
46      digitalWrite(trig,LOW);
47      digitalWrite(trig,HIGH);
48      delayMicroseconds(10);
49      digitalWrite(trig,LOW);
50      float dur = pulseIn(echo,HIGH);
51      float dist = (dur * 0.0343)/2;
52      Serial.print ("Distancein cm");
53      Serial.println(dist);
54
55
56      PublishData(dist);
57      delay(1000);
58      if (!client.loop()) {
59          mqttconnect();
60      }
61  }
62
63
64
65  /*.....retrieving to Cloud.....*/
66
67  void PublishData(float dist) {
68      mqttconnect();//function call for connecting to ibm
69      /*
70      | creating the String in in form JSon to update the data to ibm cloud
```

```

70 | creating the String in in form JSON to update the data to ibm cloud
71 */
72 String object;
73 if (dist <100)
74 {
75     digitalWrite(LED,HIGH);
76     Serial.println("object is near");
77     object = "Near";
78 }
79 else
80 {
81     digitalWrite(LED,LOW);
82     Serial.println("no object found");
83     object = "No";
84 }
85
86 String payload = "{\"distance\":";
87 payload += dist;
88 payload += ", \"object\":\":";
89 payload += object;
90 payload += "\"}";
91
92
93 Serial.print("Sending payload: ");
94 Serial.println(payload);
95
96
97
98

```

```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager
98
99 if (client.publish(publishTopic, (char*) payload.c_str())) {
100     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
101 } else {
102     Serial.println("Publish failed");
103 }
104
105 }
106 void mqttconnect() {
107     if (!client.connected()) {
108         Serial.print("Reconnecting client to ");
109         Serial.println(server);
110         while (!client.connect(clientId, authMethod, token)) {
111             Serial.print(".");
112             delay(500);
113         }
114
115         initManagedDevice();
116         Serial.println();
117     }
118 }
119 void wificonnect() //function defination for wificonnect
120 {
121     Serial.println();
122     Serial.print("Connecting to ");
123
124     WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish the connection
125     while (WiFi.status() != WL_CONNECTED) {
126         delay(500);
127         Serial.print(".");
128     }
129     Serial.println("");
130     Serial.println("WiFi connected");
131     Serial.println("IP address: ");
132     Serial.println(WiFi.localIP());

```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager ▾

```
123
124   WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
125   while (WiFi.status() != WL_CONNECTED) {
126       delay(500);
127       Serial.print(".");
128   }
129   Serial.println("");
130   Serial.println("WiFi connected");
131   Serial.println("IP address: ");
132   Serial.println(WiFi.localIP());
133 }
134
135 void initManagedDevice() {
136     if (client.subscribe(subscribetopic)) {
137         Serial.println((subscribetopic));
138         Serial.println("subscribe to cmd OK");
139     } else {
140         Serial.println("subscribe to cmd FAILED");
141     }
142 }
143
144 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
145 {
146
147     Serial.print("callback invoked for topic: ");
148     Serial.println(subscribetopic);
149     for (int i = 0; i < payloadLength; i++) {
150         //Serial.print((char)payload[i]);
151         data3 += (char)payload[i];
152     }
153
154     // Serial.println("data: "+ data3);
155     // if(data3=="Near")
156     // {
157     // Serial.println(data3);
158     // if(data3=="Near") {
159     //     Serial.println("Near");
160     // }
```

esp32-blink.ino ●

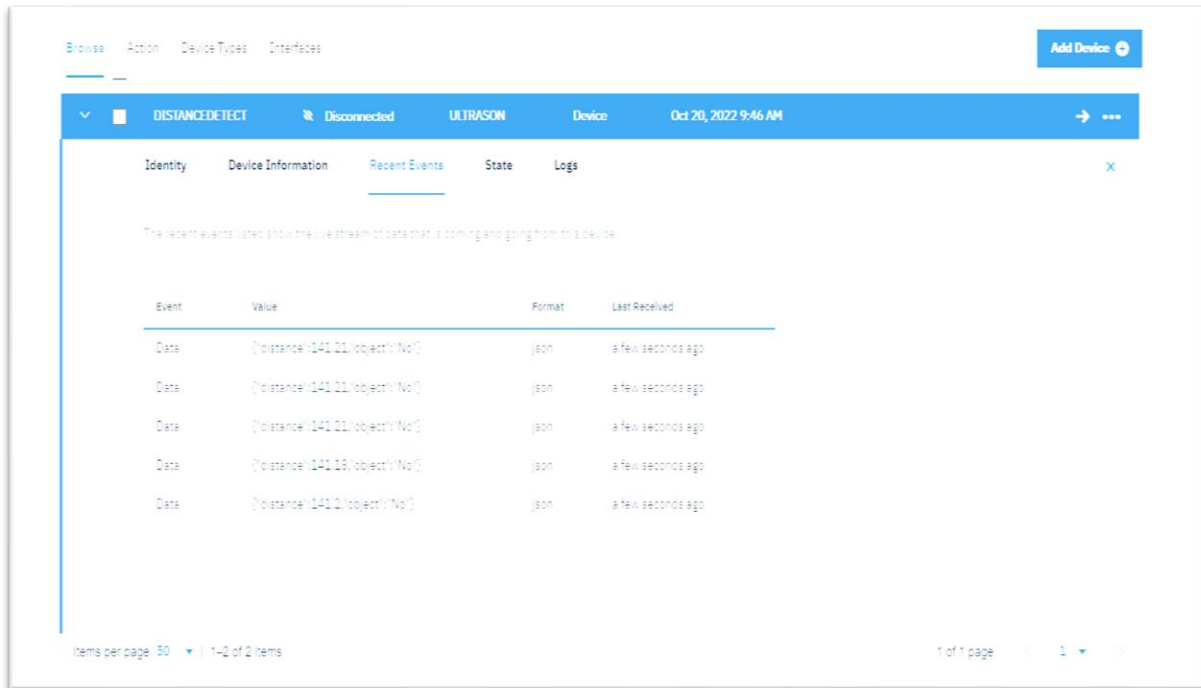
diagram.json ●

libraries.txt ●

Library Manager ▼

```
142 }
143
144 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
145 {
146
147     Serial.print("callback invoked for topic: ");
148     Serial.println(subscribetopic);
149     for (int i = 0; i < payloadLength; i++) {
150         //Serial.print((char)payload[i]);
151         data3 += (char)payload[i];
152     }
153
154     // Serial.println("data: "+ data3);
155     // if(data3=="Near")
156     // {
157     // Serial.println(data3);
158     // digitalWrite(LED,HIGH);
159
160     // }
161
162     // else
163     // {
164     // Serial.println(data3);
165     // digitalWrite(LED,LOW);
166
167     // }
168     data3="";
169
170
171 }
```

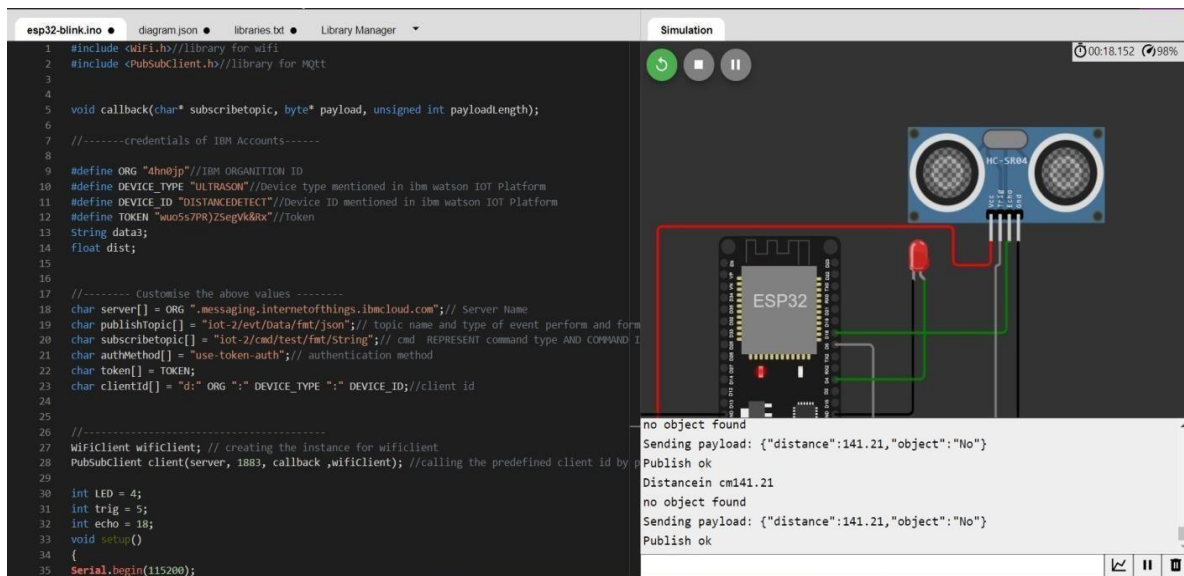
OUTPUT:



The screenshot shows the IBM Watson IoT Platform interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A blue bar at the top contains the device name 'DISTANCEDETECT', its status 'Disconnected', type 'ULTRASON', and location 'Device'. Below this, there are tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is selected, showing a table of events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. There are five rows of data, all with a value of '{\"distance\":141.21,\"object\":\"No\"}' and a format of 'json'. The 'Last Received' column shows 'a few seconds ago' for each row. At the bottom, there is a pagination bar showing 'Items per page 50' and '1-2 of 2 items'.

Event	Value	Format	Last Received
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.18,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.2,\"object\":\"No\"}	json	a few seconds ago

DatasendtotheIBMclouddevicewhentheobjecticsfar



The screenshot shows the Arduino IDE with the code for the ESP32. The code includes the necessary libraries for WiFi and MQTT, and defines the device type as 'ULTRASON' and the device ID as 'DISTANCEDETECT'. It also defines the token and client ID. The code then sets up the WiFi client and publishes the distance data to the MQTT topic. The simulation output shows the device sending the payload '{\"distance\":141.21,\"object\":\"No\"}' and publishing it successfully.

```
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7 //-----credentials of IBM Accounts-----
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9 #define ORG "dhn0jp" //IBM ORGANIZATION ID
10 #define DEVICE_TYPE "ULTRASON" //Device type mentioned in ibm watson IOT Platform
11 #define DEVICE_ID "DISTANCEDETECT" //Device ID mentioned in ibm watson IOT Platform
12 #define TOKEN "wuo5s7PR)2sepV&k&Rk" //Token
13 String data3;
14 float dist;
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16 //----- Customise the above values -----
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19 char subscribtopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND ID
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21 char token[] = TOKEN;
22 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
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26 WiFiClient wificlient; // creating the instance for wificlient
27 PubSubClient client(server, 1883, callback, wificlient); //calling the predefined client id by
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29 int LED = 4;
30 int trig = 5;
31 int echo = 18;
32 void setup()
33 {
34   Serial.begin(115200);
```

Simulation

no object found
Sending payload: {\"distance\":141.21,\"object\":\"No\"}
Publish ok
Distancein cm141.21
no object found
Sending payload: {\"distance\":141.21,\"object\":\"No\"}
Publish ok

DatasenttotheIBMCloudDevicewhentheobjectisnear

Browser Action Device Types Interfaces

ADD DEVICE

DISTANCEDETECT Disconnected ULTRASON Device Oct 20, 2022 9:46 AM

Identity Device Information Recent Events State Logs

The recent events list shows the last details of data that's coming and going from this device.

Event	Value	Format	Last Received
Data	[{"distance":79.66,"object":"Near"}]	json	a few seconds ago
Data	[{"distance":79.64,"object":"Near"}]	json	a few seconds ago
Data	[{"distance":79.66,"object":"Near"}]	json	a few seconds ago
Data	[{"distance":79.64,"object":"Near"}]	json	a few seconds ago
Data	[{"distance":79.66,"object":"Near"}]	json	a few seconds ago

Items per page: 50 1-2 of 2 items 1 of 1 page 1

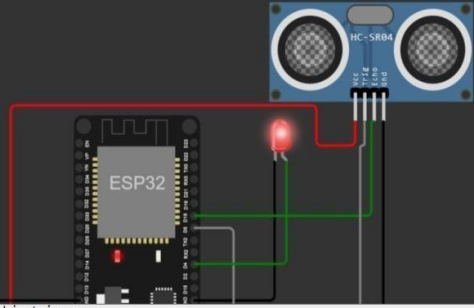
Whenobjecticsneartotheultrasonicsensor

wokwi.com/projects/305566932847821378

esp32-arduino.ino by urish

Simulation

00:12.028 100%



```
object is near
Sending payload: {"distance":97.82,"object":"Near"}
Publish ok
Distance in cm 97.82
object is near
Sending payload: {"distance":97.82,"object":"Near"}
Publish ok
```