

ASSIGNMENT-4

DISTANCE DETECTION USING ULTRASONIC SENSOR

Date	18-11-2022
Team ID	PNT2022TMID36821
Project name	Personal Assistance For Seniors Who Are Self-Reliant
Maximum Marks	2 Marks

Question1 :

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.

WOKWI LINK :

<https://wokwi.com/projects/305566932847821378>

CODE :

```
1 #include <Wifi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4
5 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
6
7 //-----credentials of IBM Accounts-----
8
9 #define ORG "4hn0jp" //IBM ORGANITION 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)ZsegV&Rx" //Token
13 String data3;
14 float dist;
15
16
17 //----- Customise the above values -----
18 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
19 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform and format in which data to be send
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
21 char authMethod[] = "use-token-auth"; // authentication method
22 char token[] = TOKEN;
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
24
25
26 //-----
27 WiFiClient wificlient; // creating the instance for wificlient
28 PubSubClient client(server, 1883, callback ,wificlient); //calling the predefined client id by passing parameter like server id,portand wificredential
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   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     // Serial.println("cmd OK");
159 }
```

esp32-blink.ino ●

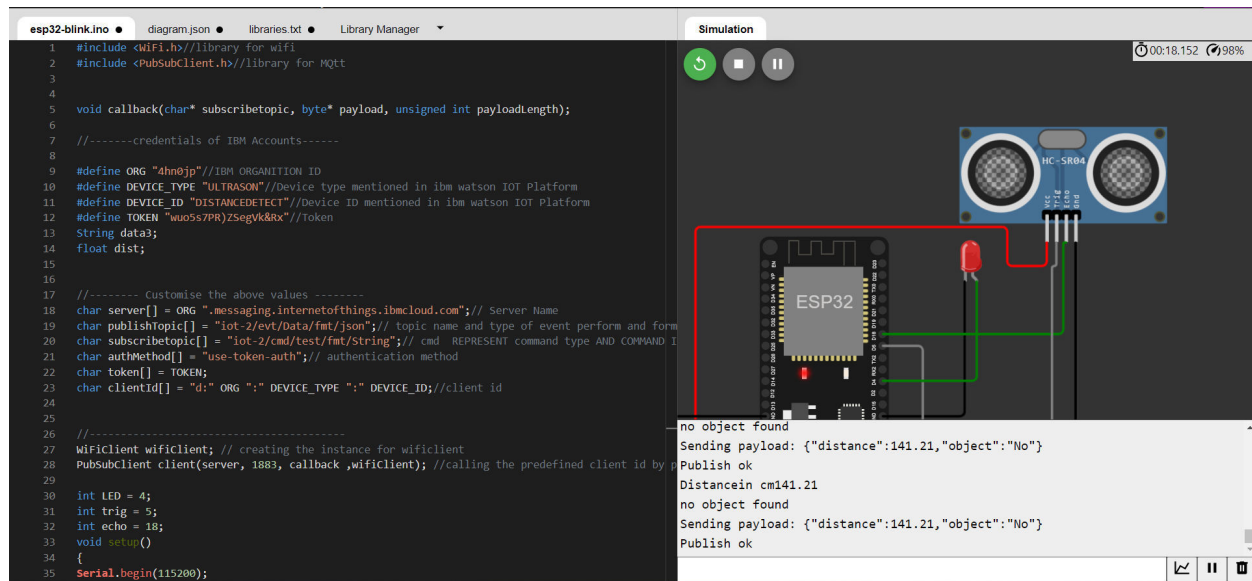
diagram.json ●

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:



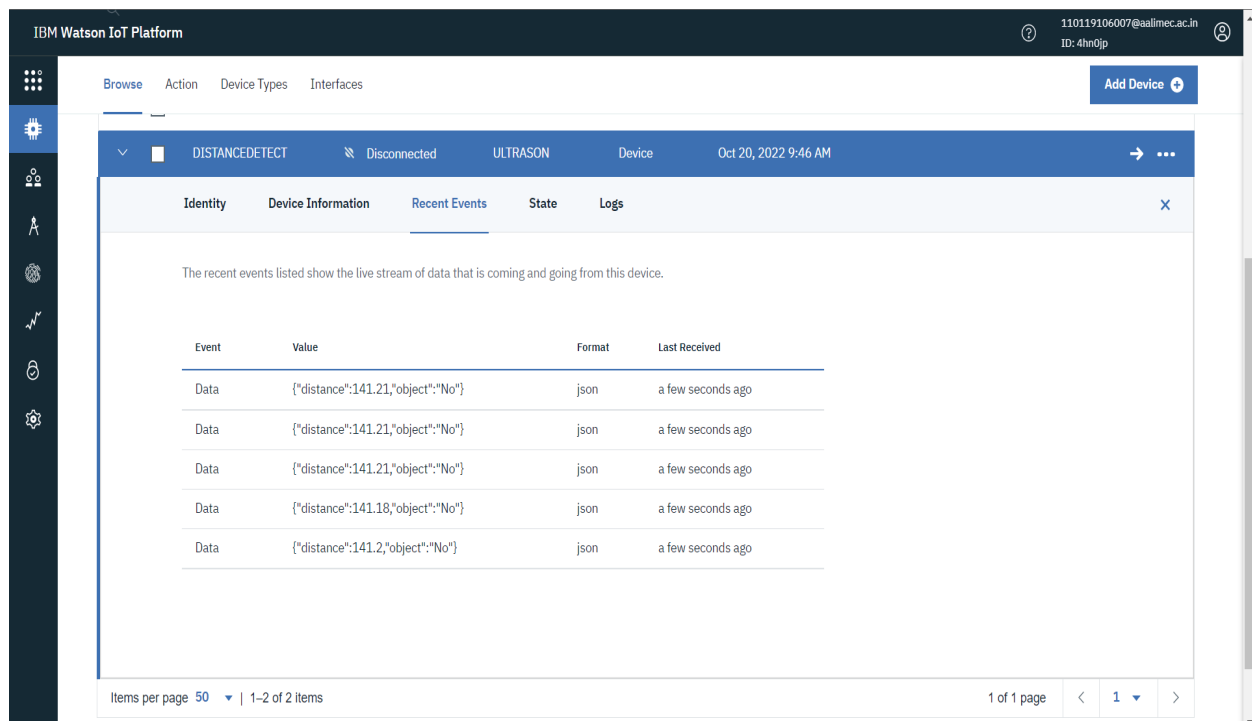
The screenshot shows the Arduino IDE with the following code:

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
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5 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
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16 //----- Customise the above values -----
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18 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
19 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform and form
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND I
21 char authMethod[] = "use-token-auth"; // authentication method
22 char token[] = TOKEN;
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
24
25 //-----
26
27 WiFiClient wifiClient; // creating the instance for wifiClient
28 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by p
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
```

The simulation window shows the following output:

```
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
```

Data send to the IBM cloud device when the object is far



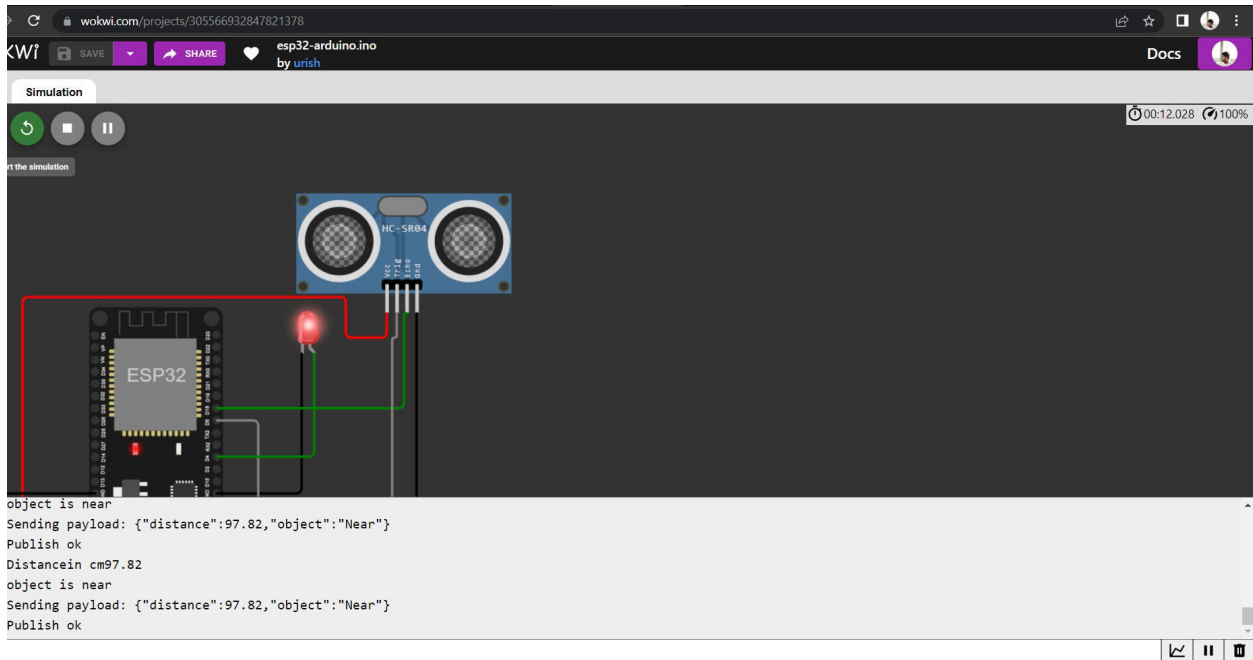
The screenshot shows the IBM Watson IoT Platform dashboard. The 'Recent Events' tab is selected, displaying a table of events for the 'DISTANCEDETECT' device.

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

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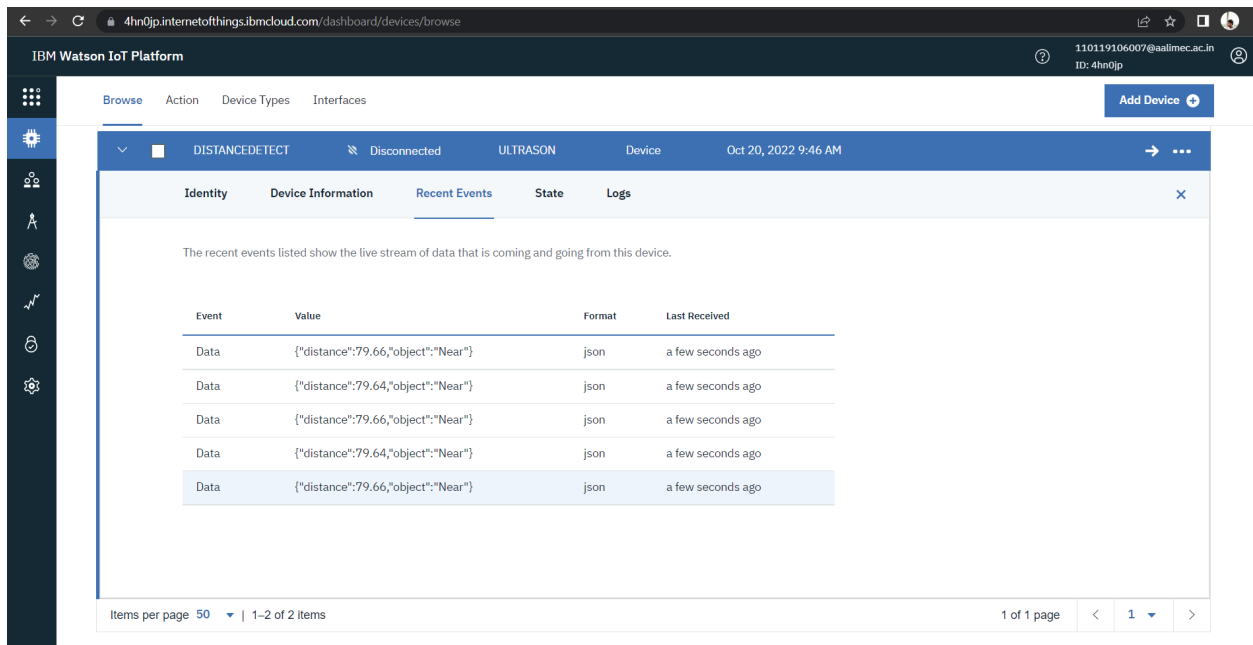
when object is near to the ultrasonic sensor



The screenshot shows a Wokwi simulation of an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor. The sensor is detecting an object, and the ESP32 is sending a JSON payload to the cloud. The console output shows the following messages:

```
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
```

Data sent to the IBM Cloud Device when the object is near



The screenshot shows the IBM Watson IoT Platform dashboard. The device 'DISTANCEDETECT' is selected, and the 'Recent Events' tab is active. The events listed show the live stream of data coming and going from the device. The table below displays the recent events:

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

<https://wokwi.com/projects/305566932847821378>