

ASSIGNMENT-4

DISTANCE DETECTION USING ULTRASONIC SENSOR

Date	22 October 2022
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Maximum Marks	2 Marks

Question1:

Write code and connections in work 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 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 "wu05s7PR)ZSegV6&Rt" //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);
```


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```
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

```

```

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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());

```

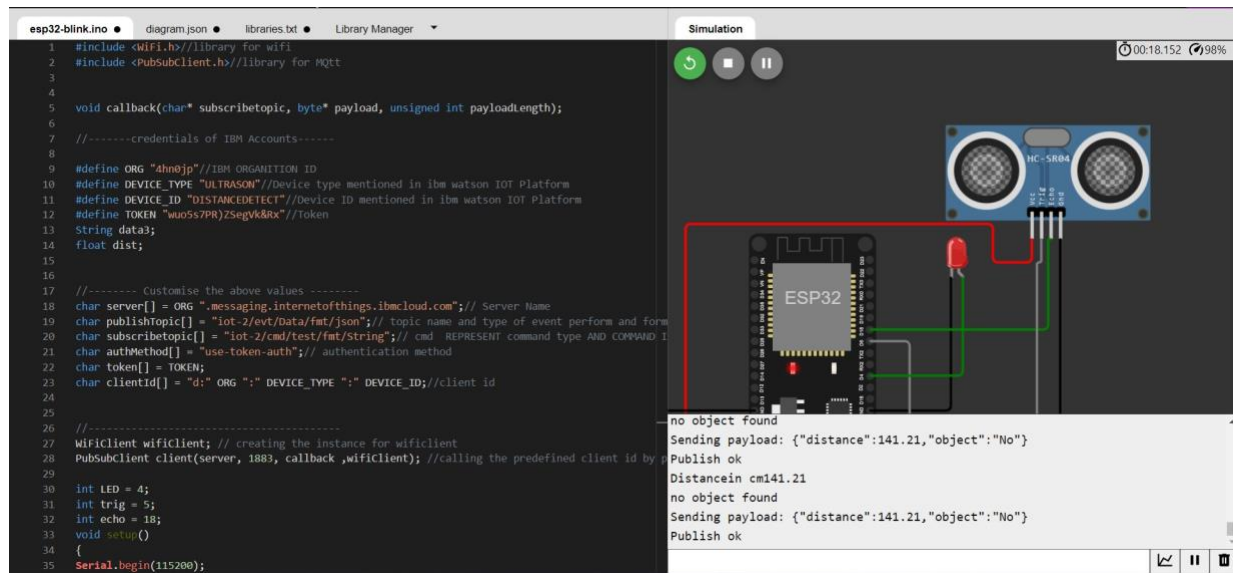

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```
123
124   WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
125   while (WiFi.status() != WL_CONNECTED) {
126       delay(500);
127       Serial.print(".");
128   }
129   Serial.println("");
130   Serial.println("WiFi 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("Near");
159 }
```


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

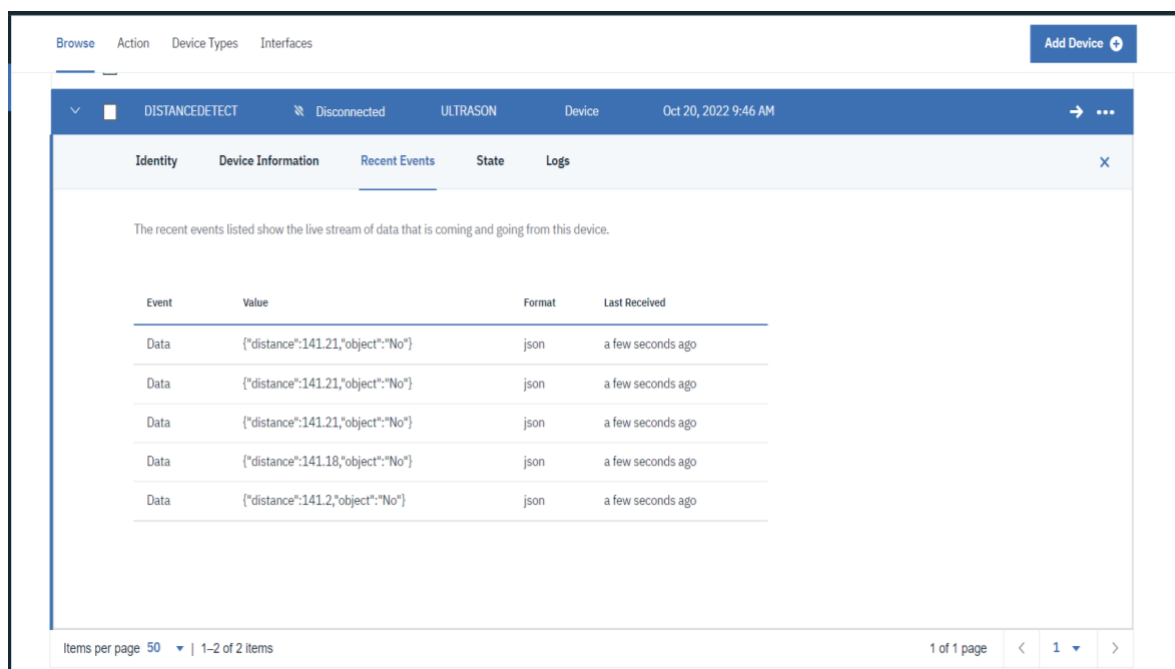

OUTPUT:



The screenshot shows the Arduino IDE interface with a file named 'esp32-blink.ino'. The code is a C++ program for an ESP32 microcontroller, configured to connect to an IBM Watson IoT Platform. It includes libraries for WiFi and PubSubClient. The code defines constants for the organization, device type, device ID, and token. It sets up a WiFi client and a PubSubClient object. The main loop sends a JSON payload to the IoT platform every 10 seconds. The payload is {"distance":141.21,"object":"No"} when the object is found and {"distance":141.21,"object":"No"} when it is not found. The simulation window shows the circuit diagram of the ESP32 connected to an HC-SR04 ultrasonic sensor. The serial monitor displays the output of the code, showing the JSON payloads being sent to the IoT platform.

```
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5 void callback(char* topic, byte* payload, unsigned int payloadLength);
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7 //-----credentials of IBM Accounts-----
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9 #define ORG "ahnp" //IBM ORGANIZATION ID
10 #define DEVICE_TYPE "ULTRASON" //Device type mentioned in ibm watson IOT Platform
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21 char authMethod[] = "use-token-auth"; // authentication method
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25 //-----
26
27 WiFiClient wifiClient; // creating the instance for wifiClient
28 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by y
29
30 int LED = 4;
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32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
```

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



The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A 'Add Device' button is on the right. The main content area displays details for a device named 'DISTANCEDETECT', which is 'Disconnected' and of type 'ULTRASON'. The 'Recent Events' tab is selected, showing a list of events. The events are listed in a table with columns for 'Event', 'Value', 'Format', and 'Last Received'. The events show a stream of data being received from the device, with the value being {"distance":141.21,"object":"No"}.

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

when object is near to the ultrasonic sensor

Wokwi.com project page showing a 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 IBM Cloud Device.

Simulation controls: Run, Stop, Pause. Timer: 00:12.028. Battery: 100%.

object is near
Sending payload: {"distance":97.82,"object":"Near"}
Publish ok
Distancein cm97.82
object is near
Sending payload: {"distance":97.82,"object":"Near"}
Publish ok

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

IBM Cloud IoT Platform interface showing the 'Recent Events' for a device named 'DISTANCEDETECT'.

Identity Device Information Recent Events State Logs

The recent events listed show the live stream of data that is 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

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