

## ASSIGNMENT-4

### DISTANCE DETECTION USING ULTRASONIC SENSOR

Date	16 November 2022
Team ID	PNT2022TMID34961
Name	Surya N
Register No	962819205033
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/347194582937633363>

```
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 "wu05s7PR)ZSegV&R&R" //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);
```

CODE :

```
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 definition 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());

```

```

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     // }

```

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:

esp32-blink.ino

diagram.json

libraries.txt

Library Manager

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 "4hnojp" //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 "wu0s57PR)ZSegV6&Rxc" //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 form

20

char subscribetopic[] = "iot-2/cmd/test/fmt/string"; // cmd REPRESENT command type AND COMMAND ID

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

29

30

int LED = 4;

31

int trig = 5;

32

int echo = 18;

33

void setup()

34

{

35

Serial.begin(115200);

Simulation

00:18.152 98%

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 interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons. 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 table of events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. The events listed are 'Data' events with JSON payloads like '{"distance":141.21,"object":"No"}' and '{"distance":141.18,"object":"No"}', all in 'json' format, received 'a few seconds ago'. The bottom of the interface shows '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

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 connected to the ESP32 via a breadboard. The simulation output shows the sensor detecting an object is near and sending a JSON payload to the cloud. The output text is as follows:

```
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

4hn0jp.internetofthings.ibmcloud.com/dashboard/devices/browse

IBM Watson IoT Platform

110119106007@aalimec.ac.in  
ID: 4hn0jp

Browse 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 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

Items per page 50 | 1-2 of 2 items

1 of 1 page

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