

Assignment -4
Distance Detection Using Ultrasonic Sensor

Assignment Date	19 October 2022
Student Name	Mr. Gowthaman R
Student Roll Number	MECR19IT018
Maximum Marks	2 Marks

Question-1:

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/345964118720643668>

CODE:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT

void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);

//-----credentials of IBM Accounts-----

#define ORG "f59trs" //IBM ORGANITION ID
#define DEVICE_TYPE "ultrasonicsensor" //Device type mentioned in
ibm watson IOT Platform
#define DEVICE_ID "distancedetection" //Device ID mentioned in ibm
watson IOT Platform
#define TOKEN "AlGMGaaF01nawa1QA3" //Token
String data3;
float dist;

//----- Customise the above values -----
char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; //
Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and
type of event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String"; //
cmd REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth"; // authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client
id

//
WiFiClient wifiClient; // creating the instance for wificlient
```

```

PubSubClient client(server, 1883, callback ,wifiClient);
//calling the predefined client id by passing parameter like
server id,portand wificredential

int LED = 4;
int trig = 5;
int echo = 18;
void setup()
{
  Serial.begin(115200);
  pinMode(trig,OUTPUT);
  pinMode(echo,INPUT);
  pinMode(LED, OUTPUT);
  delay(10);
  wificonnect();
  mqttconnect();
}
void loop()// Recursive Function
{

  digitalWrite(trig,LOW);
  digitalWrite(trig,HIGH);
  delayMicroseconds(10);
  digitalWrite(trig,LOW);
  float dur = pulseIn(echo,HIGH);
  float dist = (dur * 0.0343)/2;
  Serial.print ("Distancein cm");
  Serial.println(dist);

  PublishData(dist);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}

/*.....retrieving to
Cloud. .... */

void PublishData(float dist) {
  mqttconnect();//function call for connecting to ibm
  /*
    creating the String in in form JSon to update the data to
    ibm cloud
  */
  String object;

```

```

if (dist <100)
{
    digitalWrite(LED,HIGH);
    Serial.println("object is near");
    object = "Near";
}
else
{
    digitalWrite(LED,LOW);
    Serial.println("no object found");
    object = "No";
}

String payload = "{\"distance\":";
payload += dist;
payload += "," "\"object\":";
payload += object;
payload += "\"}";

Serial.print("Sending payload: ");
Serial.println(payload);

if (client.publish(publishTopic, (char*) payload.c_str())) {
    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
} else {
    Serial.println("Publish failed");
}
}

void mqttconnect() {
    if (!client.connected()) {
        Serial.print("Reconnecting client to ");
        Serial.println(server);
        while (!!!client.connect(clientId, authMethod, token)) {
            Serial.print(".");
            delay(500);
        }

        initManagedDevice();
        Serial.println();
    }
}
}

```

```

void wificonnect() //function defination for wificonnect
{
    Serial.println();
    Serial.print("Connecting to ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials
to establish the connection
    while (WiFi.status() != WL_CONNECTED) {
        delay(500);
        Serial.print(".");
    }
    Serial.println("");
    Serial.println("WiFi connected");
    Serial.println("IP address: ");
    Serial.println(WiFi.localIP());
}

void initManagedDevice() {
    if (client.subscribe(subscribetopic)) {
        Serial.println((subscribetopic));
        Serial.println("subscribe to cmd OK");
    } else {
        Serial.println("subscribe to cmd FAILED");
    }
}

void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength)
{
    Serial.print("callback invoked for topic: ");
    Serial.println(subscribetopic);
    for (int i = 0; i < payloadLength; i++) {
        //Serial.print((char)payload[i]);
        data3 += (char)payload[i];
    }

    // Serial.println("data: "+ data3);
    // if(data3=="Near")
    // {
    // Serial.println(data3);
    // digitalWrite(LED,HIGH);

    // }

    // else
    // {
    // Serial.println(data3);

```

```
// digitalWrite(LED,LOW);

// }
data3="";

}
```

OUTPUT :

When object is not near to the ultrasonic sensor

The screenshot displays the Wokwi IoT simulator interface. On the left is the code editor for a sketch named 'sketch.ino'. The code includes libraries for WiFi and MQTT, defines IBM IoT credentials, and sets up an ESP32 to send distance data via MQTT. On the right is the 'Simulation' window, which shows a 3D model of the ESP32, the HC-SR04 sensor, and an LED. The simulation output at the bottom shows the sensor detecting 'no object found' and sending a JSON payload: {"distance":403.45,"object":"No"}. The output also shows the MQTT client publishing the data successfully.

```
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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-----
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9 #define ORG "f59trs" //IBM ORGANIZATION ID
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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
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMM
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
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
```

Simulation output:

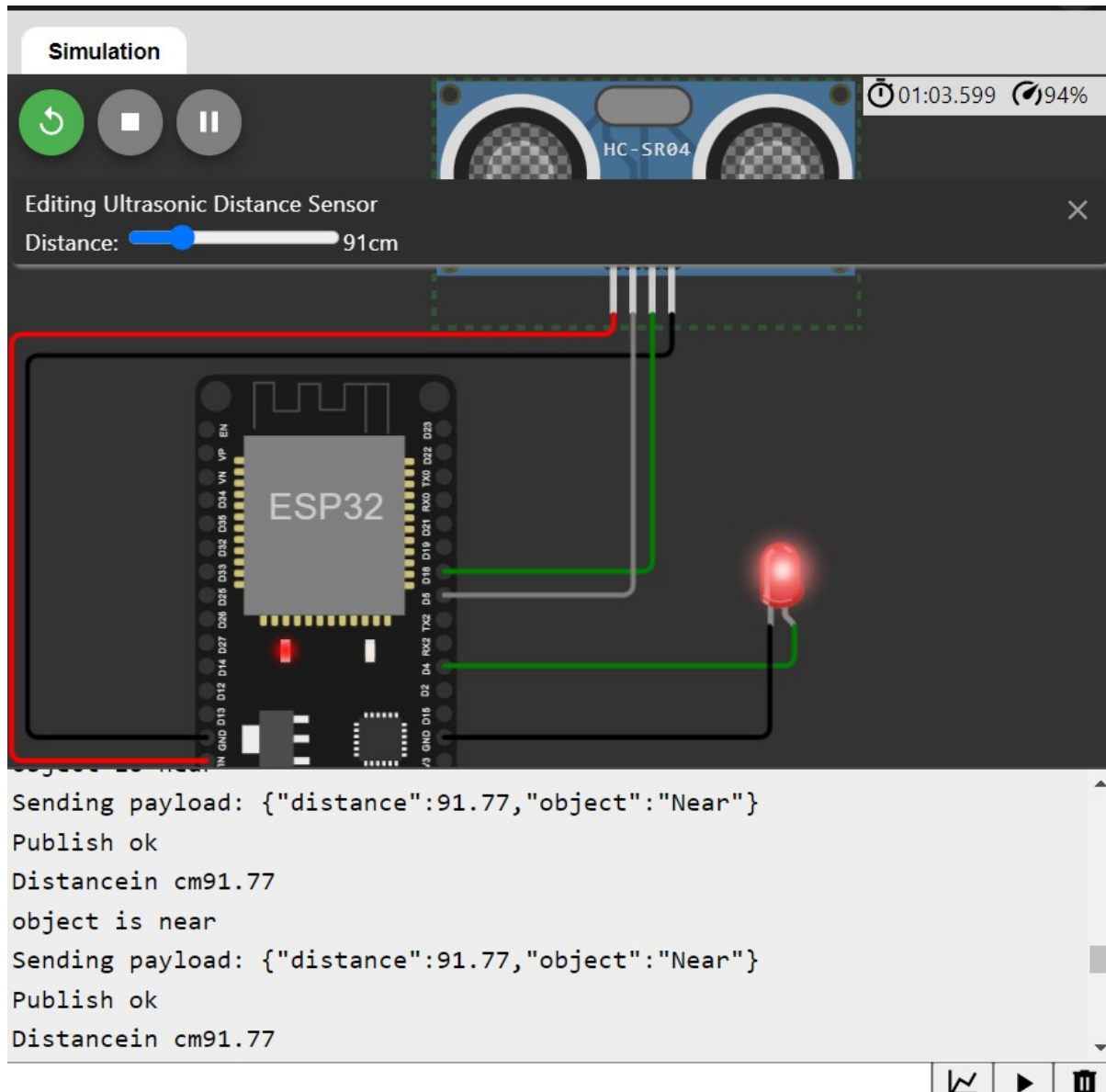
```
no object found
Sending payload: {"distance":403.45,"object":"No"}
Publish ok
Distancein cm233.00
no object found
Sending payload: {"distance":233.00,"object":"No"}
Publish ok
```

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

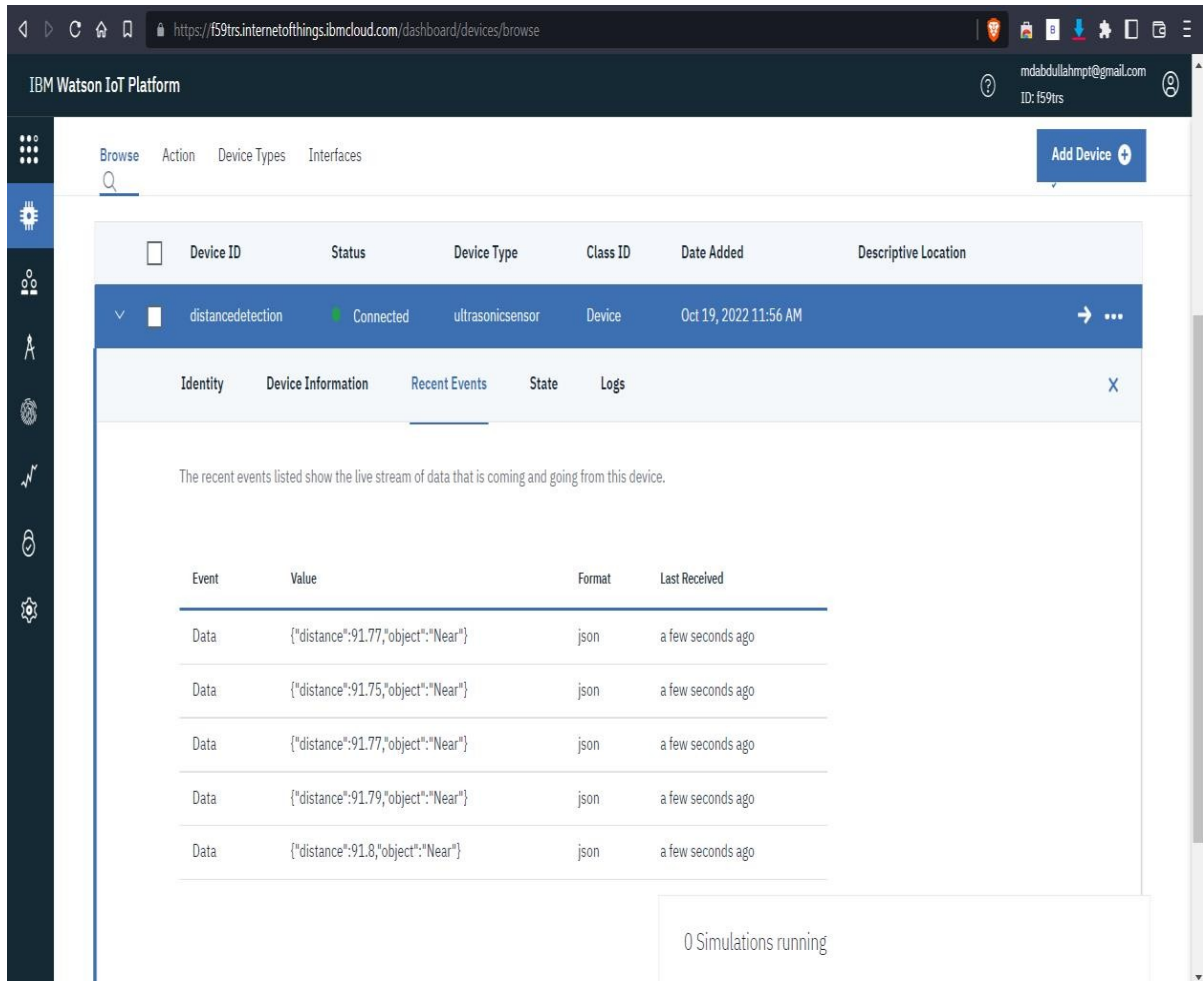
The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains icons for various IoT functions. The main content area displays a device named 'distancedetection' with a status of 'Connected' and a last update time of 'Oct 19, 2022 11:56 AM'. Below this, a 'Recent Events' tab is selected, showing a table of data events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. Five rows of data are shown, all with the same JSON value: '{"distance":235.02,"object":"No"}'. At the bottom, a status bar indicates '0 Simulations running' and 'Items per page 50 | 1-1 of 1 item'.

Event	Value	Format	Last Received
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago

When object is nearer to the ultrasonic sensor



Data sent to the IBM cloud device when the object is near



The screenshot displays the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A search bar is present, and an 'Add Device' button is in the top right. The main content area shows a device named 'distancedetection' with a status of 'Connected' and a device type of 'ultrasonicsensor'. The 'Recent Events' tab is selected, showing a table of data events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. The events are all 'Data' events with JSON values indicating distance and 'Near' status. The 'Last Received' column shows 'a few seconds ago' for each event.

Event	Value	Format	Last Received
Data	{"distance":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.75,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.79,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.8,"object":"Near"}	json	a few seconds ago

0 Simulations running

<https://wokwi.com/projects/345964118720643668>

