

**Assignment - 4**  
ESP 32 – Ultrasonic Sensor

Assignment Date	3 NOVEMBER 2022
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Maximum Marks	2 Marks

**Question-1:**

Write code and Connection in wokwi for ultrasonic sensor. Whenever distance is less than 100cmssend “alert”to the ibm cloud and display in device recent events.

**Solution:**

**Program:**

```
#include <WiFi.h> #include
<WiFiClient.h> #include
<PubSubClient.h>const int
trigPin = 5; const int echoPin =
18;
//define sound speed in cm/uS
#define SOUND_SPEED 0.034
#define CM_TO_INCH 0.393701
long duration;
float distanceCm; float
distanceInch;

void callback(char* subscribtopic, byte* payload, unsigned intpayloadLength);
//----credentials of IBMAccounts----

#define ORG "b31tni"//IBM ORGANITION ID
#define DEVICE_TYPE "Assignment4"//Device type mentioned in ibm watson IOTPlatform
#define DEVICE_ID "assignment"//Device ID mentioned in ibm watson IOTPlatform#define TOKEN
"6r?TKCluy+okJ?9B+7" //Token
String data3;

//----- Customise the above values -----
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Namechar
publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in
which data to be send
char subscribtopic[] = "iot-2/cmd/test/fmt/String";// cmd REPRESENT commandtype 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 wificlientPubSubClient
client(server, 1883, callback, wifiClient);
```

```
void setup() {
  Serial.begin(115200); // Starts the serial communication pinMode(trigPin,
  OUTPUT); // Sets the trigPin as an Output pinMode(echoPin, INPUT); //
  Sets the echoPin as an Input Serial.println();
  wificonnect();
  mqttconnect();
}
```

```
void loop() {
  // Clears the trigPin
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  // Sets the trigPin on HIGH state for 10 micro seconds
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  // Reads the echoPin, returns the sound wave travel time in microseconds duration =
  pulseIn(echoPin, HIGH);

  // Calculate the distance
  distanceCm = duration * SOUND_SPEED/2;

  // Convert to inches
  distanceInch = distanceCm * CM_TO_INCH;

  // Prints the distance in the Serial Monitor
  Serial.print("Distance (cm): ");
  Serial.println(distanceCm); Serial.print("Distance (inch):
  "); Serial.println(distanceInch);

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

```
void PublishData(float Cm) {
```

```

mqttconnect();//function call for connecting to ibm
/*
    creating the String in in form JSon to update the data to ibm cloud
*/
String payload = "{\"Distance (cm)\":";payload +=
Cm;
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 cloudthen it will print publish
    ok in Serial monitor or else it will print publishfailed
} 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];
  }
}

```

## Wokwi Simulation:

The screenshot displays the Wokwi web-based simulation environment. On the left, the 'sketch.ino' file is open, showing the following code:

```

1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 void callback(char* subscribetopic, byte* payload, unsigned int
4 payloadLength);
5 //-----credentials of IBM Accounts-----
6 #define ORG "9lxobn"//IBM ORGANITION ID
7 #define DEVICE_TYPE "ESP32PROJECT"//Device type mentioned in ibm watson IOT Platform
8 #define DEVICE_ID "ESP32"//Device ID mentioned in ibm watson IOT Platform
9 #define TOKEN "ESP32PROJECT" //Token
10 String data3;
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/Data/fmt/json";
13 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
14 char authMethod[] = "use-token-auth";
15 char token[] = TOKEN;
16 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
17 WiFiClient wificlient;
18 PubSubClient client(server, 1883, callback ,wificlient);
19 const int trigPin = 5;
20 const int echoPin = 18;
21 #define SOUND_SPEED 0.034
22 long duration;
23 float distance;
24 void setup() {
25   Serial.begin(115200);
26   pinMode(trigPin, OUTPUT);
27   pinMode(echoPin, INPUT);
28   wificlient.connect();
29   mqttconnect();
30 }
31 void loop()
32 {
33   digitalWrite(trigPin, LOW);
34   delayMicroseconds(2);
35   digitalWrite(trigPin, HIGH);

```

On the right, the 'Simulation' window shows a visual representation of the ESP32 microcontroller connected to an ultrasonic sensor module. Below the simulation, the output console displays the following distance measurements:

```

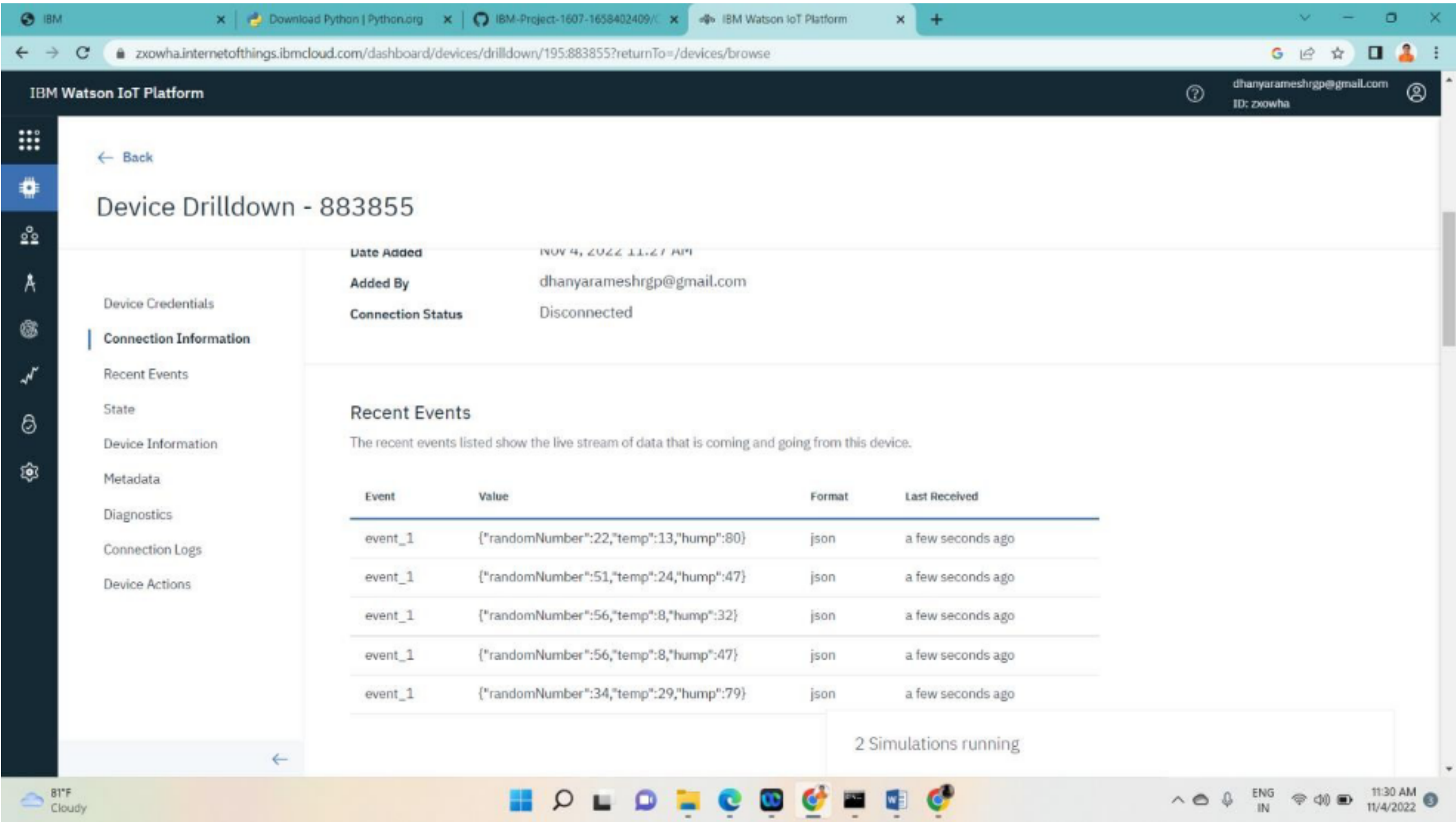
Distance (cm): 399.96
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.92
Distance (cm): 399.94
Distance (cm): 399.94

```

The bottom status bar indicates the system is running on a Windows 10 desktop, with the temperature at 79°F and the time at 10:51 AM on 11/4/2022.



IoT Watson Platform:



<https://wokwi.com/projects/347372760316510804>

