

Assignment-4

Distance Detection Using Ultrasonic Sensor

Assignment Date	19 October 2022
Student Name	R C CHANDHANA
Student Roll Number	113319106013
Maximum Marks	2 Marks

Question-1:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100cms send "alert" to ibm cloud and display in device recent events.

WOKWI LINK : <https://wokwi.com/projects/346518948162830932>

CODE:

```
#include <WiFi.h>
#include <PubSubClient.h>

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

#define ORG "f59trs"
#define DEVICE_TYPE "ultrasonicsensor"
#define DEVICE_ID "distancedetection"
#define TOKEN "AlGMGaaF01nawa1QA3"
String data3;
float dist;

char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribetopic[] = "iot-2/cmd/test/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;

WiFiClient wifiClient;
PubSubClient client(server, 1883, callback ,wifiClient);

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

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

void PublishData(float dist) {
    mqttconnect();
    String object;
    if (dist <100)

```

```

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");
    } 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()
{
    Serial.println();
    Serial.print("Connecting to ");
    WiFi.begin("Wokwi-GUEST", "", 6);
    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");
    }
}

```

```

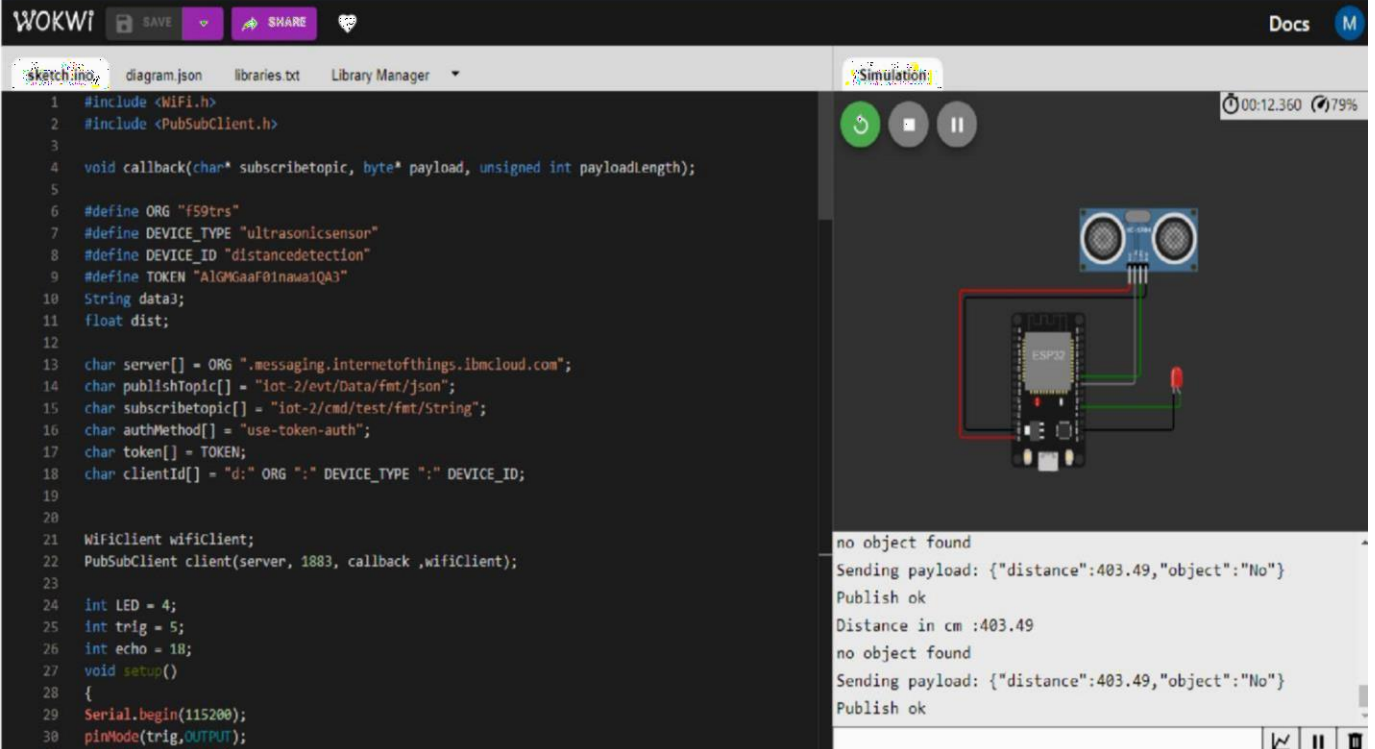
        Serial.println("subscribe to cmd FAILED");
    }
}

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++) {
        data3 += (char)payload[i];
    }
    data3="";
}

```

OUTPUT:

When object is not near to the ultrasonic sensor



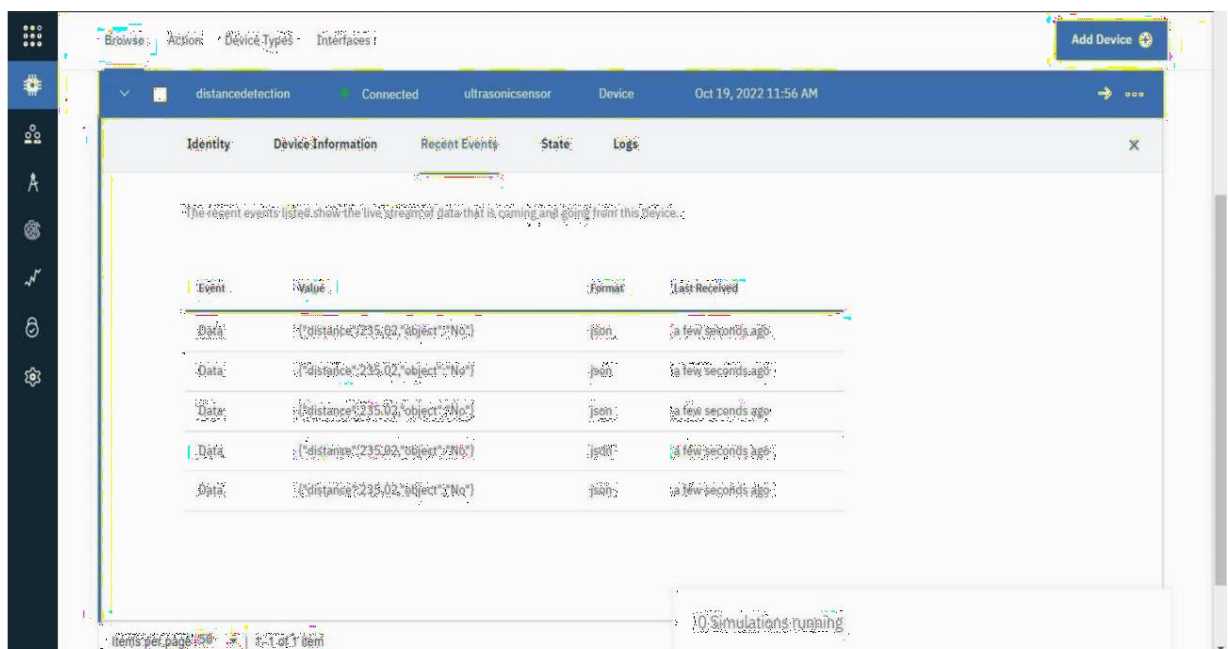
The screenshot shows the Wokwi IoT simulator interface. On the left, the code editor displays the following code:

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3
4 void callback(char* topic, byte* payload, unsigned int payloadLength);
5
6 #define ORG "f59trs"
7 #define DEVICE_TYPE "ultrasonicsensor"
8 #define DEVICE_ID "distancedetection"
9 #define TOKEN "AlGMGaaF0Inawa1QA3"
10 String data3;
11 float dist;
12
13 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
14 char publishTopic[] = "iot-2/evt/Data/fmt/json";
15 char subscribtopic[] = "iot-2/cmd/test/fmt/String";
16 char authMethod[] = "use-token-auth";
17 char token[] = TOKEN;
18 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
19
20
21 WiFiClient wifiClient;
22 PubSubClient client(server, 1883, callback, wifiClient);
23
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig, OUTPUT);
```

On the right, the simulation window shows a visual representation of the ESP8266 module connected to an ultrasonic sensor. Below the visual, the console output displays the following messages:

```
no object found
Sending payload: {"distance":403.49,"object":"No"}
Publish ok
Distance in cm :403.49
no object found
Sending payload: {"distance":403.49,"object":"No"}
Publish ok
```

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

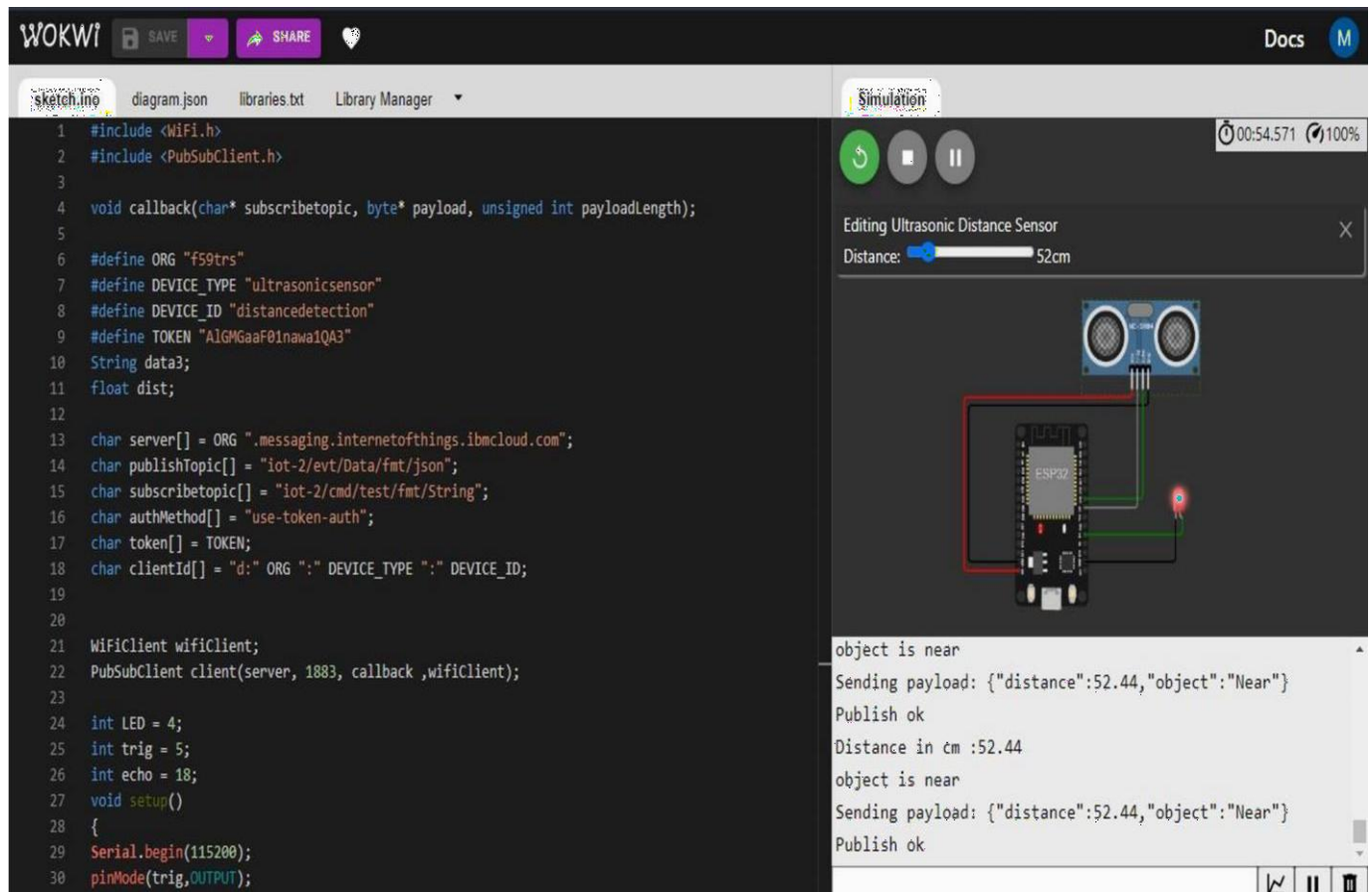


The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes "Browse", "Actions", "Device Types", and "Interfaces". The main content area displays a table of device data for the device "distancedetection" (Connected, ultrasonicsensor, Device, Oct 19, 2022 11:56 AM).

Identity	Device Information	Recent Events	State	Logs
The recent events table shows the live (streaming) data that is coming and going from this device.				
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	

At the bottom of the interface, a status bar indicates "10 simulations running".

When object is nearer to the ultrasonic sensor



```
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6 #define ORG "f59trs"
7 #define DEVICE_TYPE "ultrasonicsensor"
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10 String data3;
11 float dist;
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13 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
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21 WiFiClient wifiClient;
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24 int LED = 4;
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27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig, OUTPUT);
```

Simulation

00:54.571 100%

Editing Ultrasonic Distance Sensor

Distance: 52cm

object is near

Sending payload: {"distance":52.44,"object":"Near"}

Publish ok

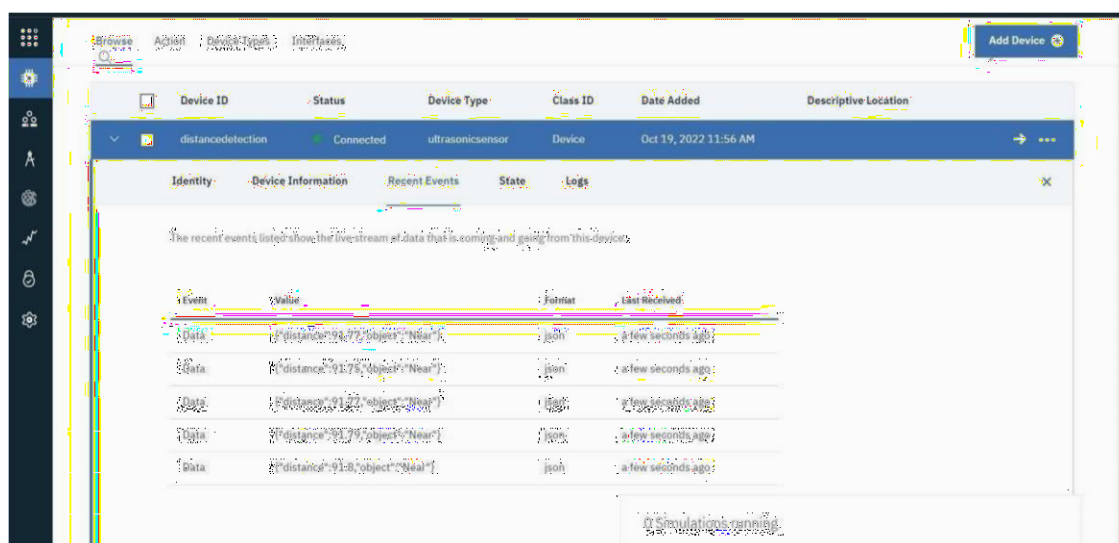
Distance in cm :52.44

object is near

Sending payload: {"distance":52.44,"object":"Near"}

Publish ok

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



Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
distancedetection	Connected	ultrasonicsensor	Device	Oct 19, 2022 11:56 AM	

Event	Value	Format	Last Received
Data	{"distance":52.44,"object":"Near"}	json	a few seconds ago
Data	{"distance":52.44,"object":"Near"}	json	a few seconds ago
Data	{"distance":52.44,"object":"Near"}	json	a few seconds ago
Data	{"distance":52.44,"object":"Near"}	json	a few seconds ago

<https://wokwi.com/projects/346518948162830932>