

Assignment -4

Distance Detection Using Ultrasonic Sensor

Assignment Date	27 October 2022
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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/346502216516895315>

CODE:

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

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

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

#define ORG "f59trs" //IBM ORGANITION ID
#define DEVICE_TYPE "ultrasonicsensor" //Device type mentioned inibm watson IOT
Platform
#define DEVICE_ID "distancedetection" //Device ID mentioned in ibmwatson IOT
Platform
#define TOKEN "AIGMGaaF01nawa1QA3" //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 andtype 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 methodchar token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //clientid

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

```

PubSubClient client(server, 1883, callback, wifiClient);
//calling the predefined client id by passing parameter likeserver 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
    ("Distance in 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 successfully 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 definition 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

sketch.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 "f59trs" //IBM ORGANIZATION ID
10 #define DEVICE_TYPE "ultrasonicsensor" //Device type mentioned in ibm watson IOT Platform
11 #define DEVICE_ID "distancedetection" //Device ID mentioned in ibm watson IOT Platform
12 #define TOKEN "ALGMGaaF0inawa1QA3" //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
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

00:05.682 99%

↺

⏸

▶

```

no object found
Sending payload: {"distance":403.45,"object":"No"}
Publish ok
Distance in cm 233.00
no object found
Sending payload: {"distance":233.00,"object":"No"}
Publish ok

```

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

Browse

Action

Device Types

Interfaces

Add Device

distanceDetection

Connected

ultrasonicsensor

Device

Oct 19, 2022 11:56 AM

Identity

Device Information

Recent Events

State

Logs

X

The recent events listed show the live stream of data that is coming and going from this device.

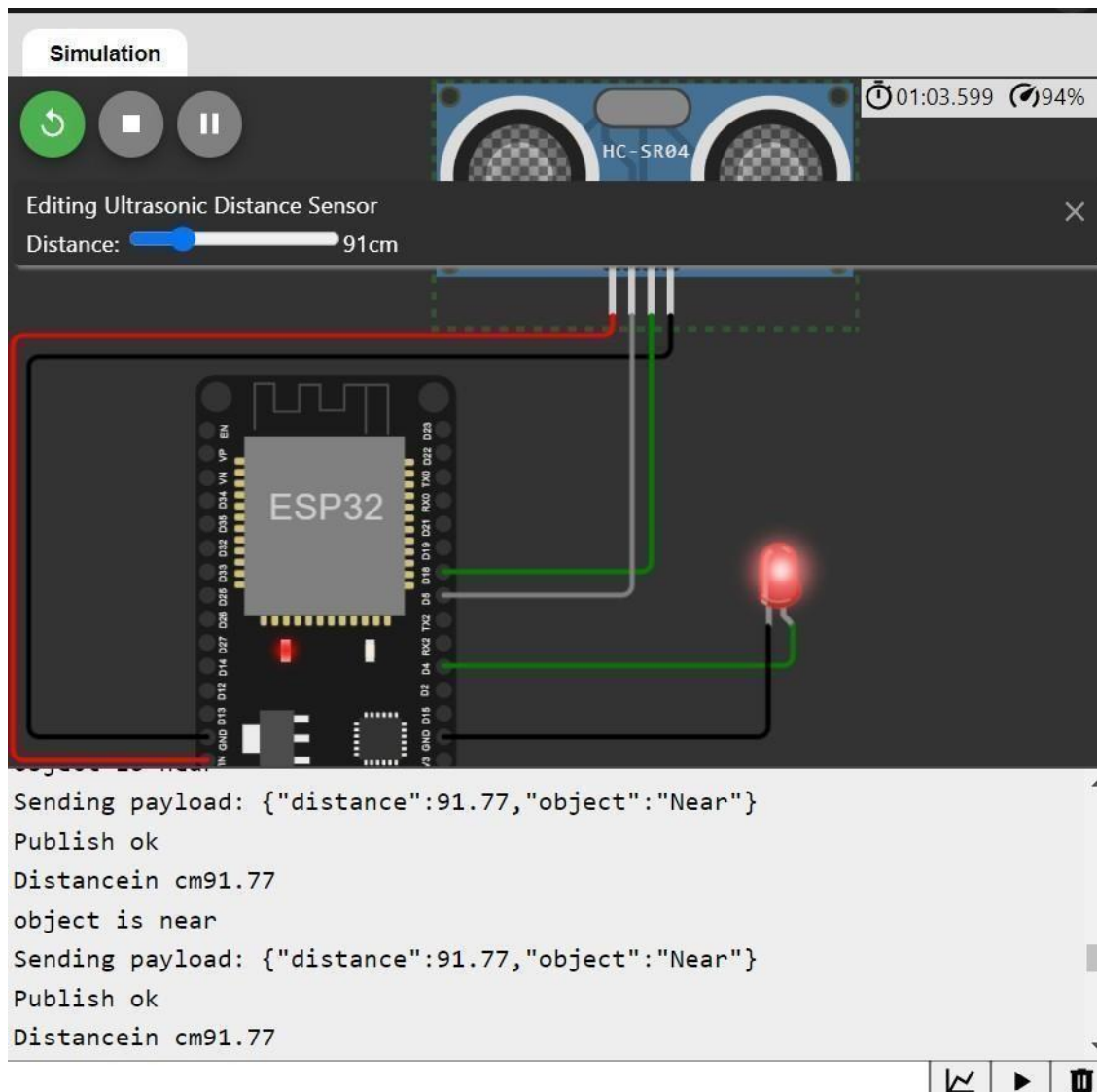
Event	Value	Format	Last Received
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}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

0 Simulations running

Items per page 50

1-1 of 1 item

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 Cloud IoT Platform console. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A search bar is located below these tabs. On the right side of the top bar, there is a button labeled 'Add Device' with a plus icon.

The main content area shows a list of devices. The first device is 'distancedetection', which is 'Connected'. It is an 'ultrasonicsensor' of class 'Device', added on 'Oct 19, 2022 11:56 AM'. A dropdown menu is open for this device, showing tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is selected.

Below the tabs, a message states: 'The recent events listed show the live stream of data that is coming and going from this device.'

A table of recent events is displayed with the following columns: 'Event', 'Value', 'Format', and 'Last Received'.

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

At the bottom right of the console, a status bar indicates '0 Simulations running'.

