

Assignment -4

Distance Detection Using Ultrasonic Sensor

Assignment Date	26 October 2022
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Student Roll Number	830119106012
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/346574219953308244>

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 "AIGMGaaF01nawa1QA3"
//Toke

nString 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
performand 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; //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  
  ("Distancein cm");Serial.println(dist);  
  
  PublishData(dist  
  );delay(1000);  
  if (!client.loop()) {  
    mqttconnect();  
  }  
}
```

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

```
void PublishData(float dist) { mqttconnect();//function call for  
connectingto ibm
```

```
/*
```

creating the String in in form JSon to update the data toibm 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 defination for wificonnect
{
    Serial.println();
    Serial.print("Connectingto ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentialsto 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 intpayloadLength)
{
    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 ORGANITION 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 "AlGMGaaF01nawa1QA3" //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
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

Browse Action Device Types Interfaces
Add Device +

▼
 distancedetection
● Connected
ultrasonicsensor
Device
Oct 19, 2022 11:56 AM
→ ...

Identity Device Information Recent Events State Logs
×

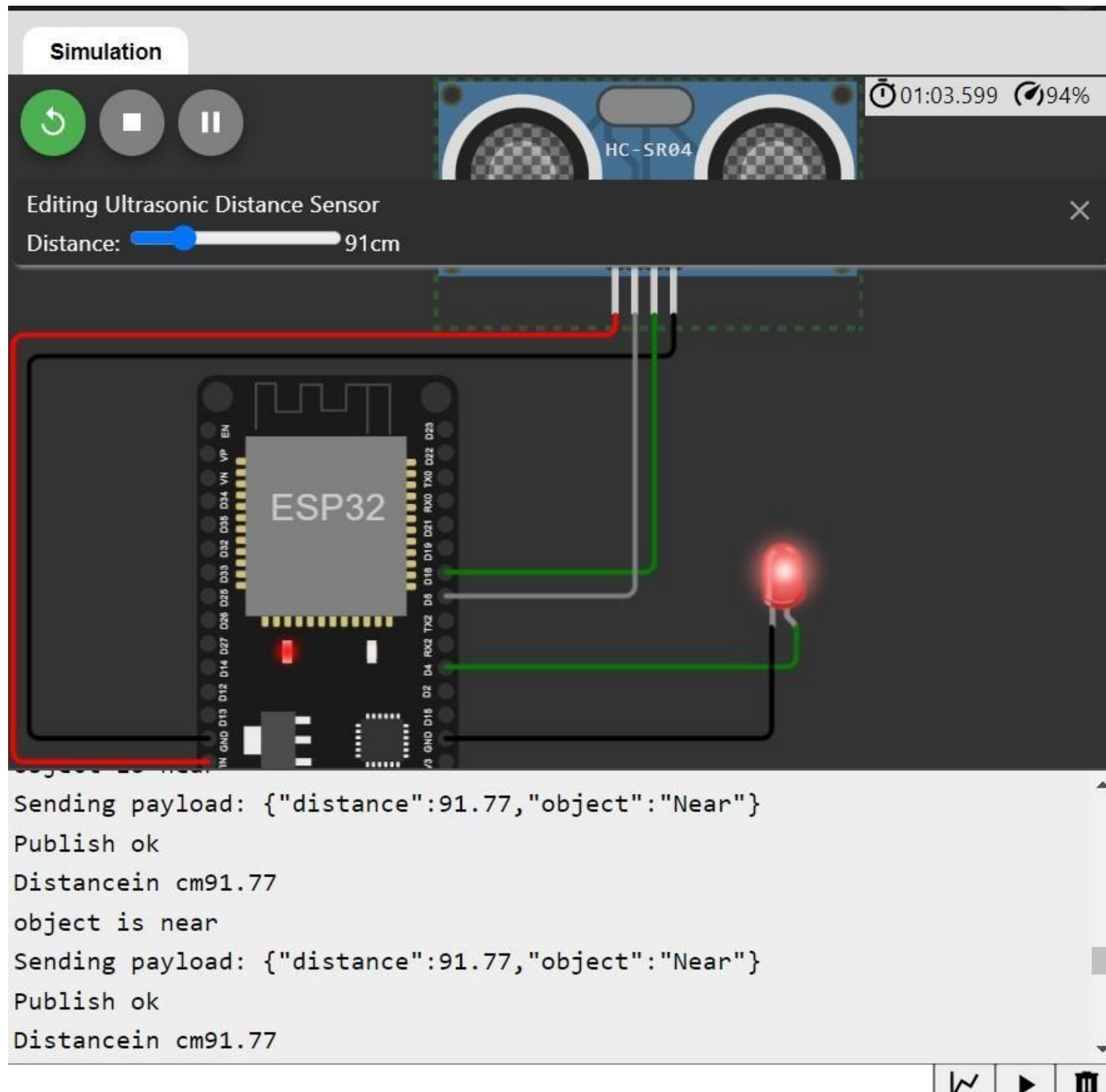
The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
Data	{"distance":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

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0 Simulations running

When object is nearer to the ultrasonic sensor



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

The screenshot displays the ROS 2 GUI interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A search bar is located next to the 'Browse' tab. In the top right corner, there is a blue button labeled 'Add Device' with a plus icon. Below the tabs, a table lists devices. The first device is 'distancedetection', which is 'Connected' (indicated by a green dot). Its 'Device Type' is 'ultrasonicsensor', 'Class ID' is 'Device', and 'Date Added' is 'Oct 19, 2022 11:56 AM'. To the right of the table is a blue button with a right arrow and three dots. Below the table, there are tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is selected. Below the tabs, there is a text box stating: 'The recent events listed show the live stream of data that is coming and going from this device.' Below this text is a table with the following data:

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 interface, there is a status bar that says '0 Simulations running'.

