

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

    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 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 "ALGMGaaF01naw1QA3" //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

The screenshot displays the IBM Cloud IoT Platform console. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A blue header bar shows the device name 'distancedetection', its status 'Connected', the device type 'ultrasonicsensor', and the timestamp 'Oct 19, 2022 11:56 AM'. Below this, a tabbed interface shows 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, displaying a table of recent data events. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. It lists five 'Data' events, each with a JSON value '{"distance":235.02,"object":"No"}' in 'json' format, received 'a few seconds ago'. A status box at the bottom right indicates '0 Simulations running'. The bottom left shows 'Items per page 50' and '1-1 of 1 item'.

Items per page 50 | 1-1 of 1 item

0 Simulations running

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

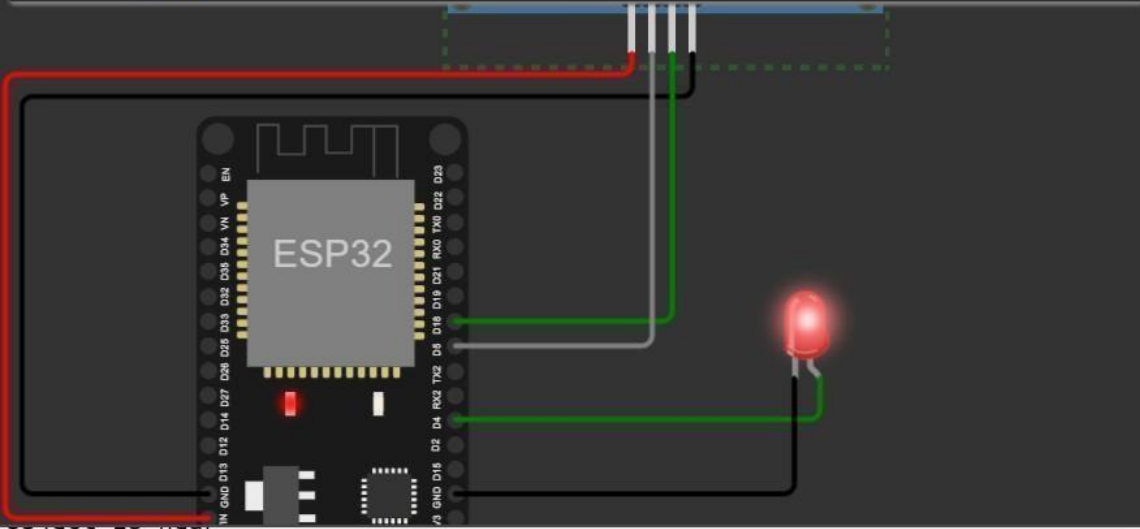
Simulation

HC-SR04

01:03.599 94%

Editing Ultrasonic Distance Sensor

Distance: 91cm



Sending payload: {"distance":91.77,"object":"Near"}

Publish ok

Distancein cm91.77

object is near

Sending payload: {"distance":91.77,"object":"Near"}

Publish ok

Distancein cm91.77

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, there is a button labeled 'Add Device' with a plus icon.

The main content area shows a table of devices. The first device is 'distancedetection', which is 'Connected' and has a 'Device Type' of 'ultrasonicsensor'. The 'Date Added' is 'Oct 19, 2022 11:56 AM'. To the right of the device name is a dropdown menu icon.

Below the device list, there is a section for 'Recent Events'. The 'Identity' tab is selected, and the 'Recent Events' sub-tab is active. A message states: 'The recent events listed show the live stream of data that is coming and going from this device.'

The 'Recent Events' table has the following columns: 'Event', 'Value', 'Format', and 'Last Received'. The data shows five events, all of type 'Data', with a 'Value' of '{"distance":91.77,"object":"Near"}' and a 'Format' of 'json'. The 'Last Received' time for all events is 'a few seconds ago'.

At the bottom right, there is a status indicator that says '0 Simulations running'.

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

