

Problem statement : IoT based safety gadget for child safety monitoring and notification.

Domain : Internet of Things

Assignment 4: Distance detection using ultrasonic sensor

By,

R.SAMUEL RAJ - 421219104322

S.VIJAY - 421219104333

B.THAIBHA - 421219104317

M.VIGNESH - 421219104331

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* subscribtopic, 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 "A1GMGaaF01nawa1QA3" //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 subscribtopic[] = "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 connecting
  to 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 sucessfully upload dataon 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 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

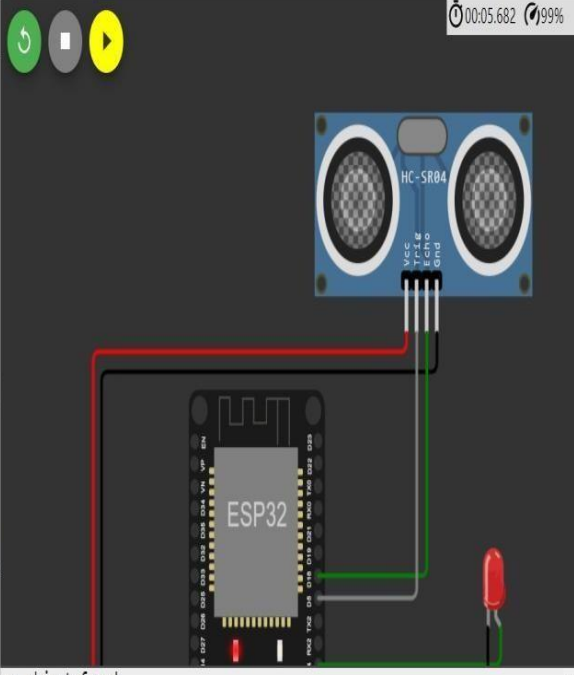
```

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 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 "ALGMGaaF01nawa1Qh3" //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 sidebar on the left contains various icons for navigation. The main content area shows a device named 'distancedetection' with a status of 'Connected' and a timestamp of 'Oct 19, 2022 11:56 AM'. Below this, there are tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, showing 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'. At the bottom, there is a status bar indicating '0 Simulations running' and a pagination control showing '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	<code>{"distance":235.02,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":235.02,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":235.02,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":235.02,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":235.02,"object":"No"}</code>	json	a few seconds ago

When object is nearer to the ultrasonic sensor

