

Assignment -4

Gas Leakage Monitoring And Alerting System

Assignment Date	17 October 2022
Maximum Marks	2 Marks

Question-1:

Write code and connections in wokwi for the ultrasonic sensor. Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events. Upload document with wokwi share link and images of IBM cloud

CODE 1 :

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribtopic, byte* payload, unsigned int payloadLength);
#define ORG "z9xrcm"
#define DEVICE_TYPE "ESP32"
#define DEVICE_ID "12345"
#define TOKEN "12345678"
String data3;
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribtopic[] = "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);
const int trigPin = 5;
const int echoPin = 18;
#define SOUND_SPEED 0.034
long duration;
float distance;
void setup() {
  Serial.begin(115200);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  wificonnect();
  mqttconnect();
}
void loop()
{
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * SOUND_SPEED/2;
  Serial.print("Distance (cm): ");
  Serial.println(distance);
  if(distance<100)
  {
    Serial.println("ALERT!!");
    delay(1000);
    PublishData(distance);
    delay(1000);
    if (!client.loop()) {
```

```

mqttconnect();
}
}
delay(1000);
}
void PublishData(float dist) {
mqttconnect();
String payload = "{\"Distance\":";
payload += dist;
payload += ", \"ALERT!!\": \"Distance less than 100cms\"";
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");
}
}

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];
}
Serial.println("data: " + data3);
data3="";
}

```

Wokwi Link :

<https://wokwi.com/projects/346904807848542803>

Output and Simulation :

The screenshot displays the Wokwi simulation interface. On the left, the Arduino IDE editor shows a sketch for an ESP32 connected to an HC-SR04 ultrasonic sensor. The code includes necessary libraries, defines credentials for IBM Watson IoT, and sets up a PubSubClient to send distance data. The sensor is configured with trigPin = 5 and echoPin = 18. The simulation window on the right shows the physical components connected. Below the sensor diagram, the output console displays a series of distance readings, all of which are 399.94 cm.

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 void callback(char* topic, byte* payload, unsigned int
4   payloadLength);
5 //-----credentials of IBM Accounts-----
6 #define ORG "z9xrcm"//IBM ORGANITION ID
7 #define DEVICE_TYPE "ESP32"//Device type mentioned in ibm watson IOT Platform
8 #define DEVICE_ID "12345"//Device ID mentioned in ibm watson IOT Platform
9 #define TOKEN "12345678" //Token
10 String data3;
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/Data/fmt/json";
13 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
14 char authMethod[] = "use-token-auth";
15 char token[] = TOKEN;
16 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
17 WiFiClient wificlient;
18 PubSubClient client(server, 1883, callback, wificlient);
19 const int trigPin = 5;
20 const int echoPin = 18;
21 #define SOUND_SPEED 0.034
22 long duration;
23 float distance;
24 void setup() {
25   Serial.begin(115200);
26   pinMode(trigPin, OUTPUT);
27   pinMode(echoPin, INPUT);
28   wificlient.connect();
29   wificlient.connect();
```

Simulation
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Editing Ultrasonic Distance Sensor
Distance: 400cm

Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94

Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.

The screenshot shows the IBM Watson IoT dashboard. The 'Recent Events' tab is selected, displaying a list of events received from the device. The events are triggered by the distance being less than 100 cm, as indicated by the 'Alert!!' in the event values. The dashboard includes a sidebar with navigation icons and a top bar with tabs for Identity, Device Information, Recent Events, State, and Logs. The bottom of the dashboard shows pagination information: 'Items per page 50' and '1 of 1 page'.

Event	Value	Format	Last Received
Data	{"Distance":1.99,"Alert!!":"Distance less than 100cm"}	json	a few seconds ago
Data	{"Distance":34.02,"Alert!!":"Distance less than 100cm"}	json	a few seconds ago
Data	{"Distance":33.98,"Alert!!":"Distance less than 100cm"}	json	a few seconds ago
Data	{"Distance":58.97,"Alert!!":"Distance less than 100cm"}	json	a few seconds ago

Items per page 50 | 1-1 of 1 item

1 of 1 page < 1 >