

Assignment - 4

Assignment Date	17 October 2022
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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);
//-----credentials of IBM Accounts-----
#define ORG "yzs5sj"//IBM ORGANITION ID
#define DEVICE_TYPE "fire_IoT"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "17082001"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "1911089abcdefgh" //Token
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++) {
//Serial.print((char)payload[i]);
data3 += (char)payload[i];
}
Serial.println("data: "+ data3);
data3="";
}
```

Wokwi Link :

<https://wokwi.com/projects/347021585567187540>

Output and Simulation :

The screenshot shows the Wokwi web interface with a sketch of an ESP32 microcontroller connected to an HC-SR04 Ultrasonic Distance Sensor. The sketch code is as follows:

```
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 "yz5s5j"//IBM ORGANIZATION ID
7 #define DEVICE_TYPE "fire_IoT"//Device type mentioned in ibm watson IOT Platform
8 #define DEVICE_ID "17082001"//Device ID mentioned in ibm watson IOT Platform
9 #define TOKEN "1911089abcdefgh" //Token
10 String data3;
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/data/fmt/json";
13 char subscribTopic[] = "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   wifiConnect();
29   mqttConnect();
30 }
31 void loop()
```

The simulation shows the sensor's output as "Distance: 89.98cm". The console output shows the device sending a payload to the IBM Cloud IoT Platform:

```
ALERT!!
Sending payload: {"Distance":89.98,"ALERT!!":"Distance less than 100cms"}
Publish ok
Distance (cm): 89.98
ALERT!!
Sending payload: {"Distance":89.98,"ALERT!!":"Distance less than 100cms"}
Publish ok
```

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 Platform dashboard. The device 17082001 is connected. The 'Recent Events' tab is selected, showing a list of events triggered by the device. The events are as follows:

Event	Value	Format	Last Received
Data	{"Distance":89.98,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":89.98,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":89.98,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":89.98,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":89.98,"ALERT!!":"Distance less than ...	json	a few seconds ago