

## Assignment-4

### Distance Detection Using Ultrasonic Sensor

Assignment Date	05 November 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 100cms send "alert" to ibm cloud and display in device recent events.

WOKWI LINK : <https://wokwi.com/projects/347459854010417746>

#### CODE:

```
#include <WiFi.h>
#include <PubSubClient.h>
#include <ArduinoJson.h>
WiFiClient wifiClient;
#define ORG "9tg03j"
#define DEVICE_TYPE "RaspberryPi"
#define DEVICE_ID "12345"
#define TOKEN "12345678"
#define speed 0.034
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/status1/fmt/json";
char topic[] = "iot-2/cmd/home/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
PubSubClient client(server, 1883, wifiClient);
void publishData();
const int trigpin=5;
const int echopin=19;
String command;
String data="";
String name="Alert";
String icon="";
long duration;
int dist;
void setup()
{
  Serial.begin(115200);
  pinMode(trigpin, OUTPUT);
  pinMode(echopin, INPUT);
  wifiConnect();
  mqttConnect();
}
void loop() {
  publishData();
  delay(500);
  if (!client.loop()) {
    mqttConnect();
  }
}
void wifiConnect() {
  Serial.print("Connecting to "); Serial.print("Wifi");
```

```

WiFi.begin("Wokwi-GUEST", "", 6);
while (WiFi.status() != WL_CONNECTED) {
  delay(500);
  Serial.print(".");
}
Serial.print("WiFi connected, IP address: "); Serial.println(WiFi.localIP());
}
void mqttConnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting MQTT client to "); Serial.println(server);
    while (!client.connect(clientId, authMethod, token)) {
      Serial.print(".");
      Serial.print("*");
      delay(1000);
    }
    initManagedDevice();
    Serial.println();
  }
}
void initManagedDevice() {
  if (client.subscribe(topic)) {
    Serial.println(client.subscribe(topic));
    Serial.println("subscribe to cmd OK");
  }
  else {
    Serial.println("subscribe to cmd FAILED");
  }
}
void publishData()
{
  digitalWrite(trigpin,LOW);
  digitalWrite(trigpin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin,LOW);
  duration=pulseIn(echopin,HIGH);
  dist=duration*speed/2;
  if(dist<100){
    dist=100-dist;
    icon="Not-Crashed";
  }
  else{
    dist=0;
    icon="Crashed";
  }
  DynamicJsonDocument doc(1024);
  String payload;
  doc["Name"]=name;
  doc["Impact"]=icon;
  doc["Distance"]=dist;
  serializeJson(doc, payload);
  delay(3000);
  Serial.print("\n");
  Serial.print("Sending payload: ");
  Serial.println(payload);
  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish OK");
  }
  else {
    Serial.println("Publish FAILED");
  }
}

```

OUTPUT:

The screenshot displays the Arduino IDE interface. On the left, the 'sketch.ino' file is open, showing a C++ sketch for an ESP32. The sketch includes libraries for WiFi, PubSubClient, and ArduinoJson. It defines a device type 'RaspberryPi', a device ID '12345', a token '12345678', and a speed of 0.034. The main logic involves connecting to a MQTT server at 'messaging.internetofthings.ibmcloud.com' on port 1883, publishing data to the topic 'iot-2/cmd/home/fmt/String' using 'use-token-auth'. The data payload is a JSON object: {"Name": "Alert", "Impact": "Not-Crashed", "Distance": 100}. The sketch also includes a trigpin (5) and an echopin (19) for sensor input/output.

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 #include <ArduinoJson.h>
4 WiFiClient wifiClient;
5 #define ORG "Stg03j"
6 #define DEVICE_TYPE "RaspberryPi"
7 #define DEVICE_ID "12345"
8 #define TOKEN "12345678"
9 #define speed 0.034
10 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
11 char publishTopic[] = "iot-2/evt/status1/fmt/json";
12 char topic[] = "iot-2/cmd/home/fmt/String";
13 char authMethod[] = "use-token-auth";
14 char token[] = TOKEN;
15 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
16 PubSubClient client(server, 1883, wifiClient);
17 void publishData();
18 const int trigpin=5;
19 const int echopin=19;
20 String command;
21 String data="";
22 String name="Alert";
23 String icon="";
24 long duration;
25 int dist;
26 void setup()
27 {
28   Serial.begin(115200);
29   pinMode(trigpin, OUTPUT);
30   pinMode(echopin, INPUT);
31   wifiConnect();
32   mqttConnect();
33 }
```

On the right, the 'Simulation' window shows a visual representation of the ESP32 board connected to a red LED. The simulation is running, as indicated by the green play button and the timer '00:21.655' and '12%' battery level. The output window shows the following messages:

```
Sending payload: {"Name":"Alert","Impact":"Not-Crashed","Distance":100}
Publish OK

Sending payload: {"Name":"Alert","Impact":"Not-Crashed","Distance":100}
Publish OK
```

The screenshot displays the AWS IoT console interface. At the top, there's a navigation bar with 'Browse', 'Action', 'Device Types', and 'Interfaces'. On the right, there's a button 'Add Device' with a plus icon. The main content area shows the details for a device named 'distance-detection', which is 'Connected' and uses an 'ultrasonicsensor'. The 'Recent Events' tab is selected, showing a table of events. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. It lists five events, all of type 'Data', with a value of '{\"distance\":235.02,\"object\":\"No\"}', in 'json' format, and a 'last received' timestamp. The bottom of the console shows '0 Simulations running'.

Event	Value	Format	Last Received
Data	{\"distance\":235.02,\"object\":\"No\"}	json	last received
Data	{\"distance\":235.02,\"object\":\"No\"}	json	last received
Data	{\"distance\":235.02,\"object\":\"No\"}	json	last received
Data	{\"distance\":235.02,\"object\":\"No\"}	json	last received
Data	{\"distance\":235.02,\"object\":\"No\"}	json	last received



