

## ASSIGNMENT – 4

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**Project Title:** Smart Solutions for Railways

### Question:

Write code and connections in wokwi for the ultrasonic sensor.  
Whenever the distance is less than 100 cm 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.

### PROGRAM:

```
#include <WiFi.h>

#include <PubSubClient.h>

#include <ArduinoJson.h>

WiFiClient wifiClient;

#define ORG "syhyfl"

#define DEVICE_TYPE "pon"

#define DEVICE_ID "4321"

#define TOKEN "ponbalaji"

#define speed 0.034

char server[] = ORG ".messaging.internetofthings.ibmcloud.com";

char publishTopic[] = "iot-2/evt/Data/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=13;

const int echopin=12;
```

```
String command;

String data="";

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(".");
    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) {
    DynamicJsonDocument doc(1024);
    String payload;
    doc["Distance Alert:"] = 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");

}

}

}

}

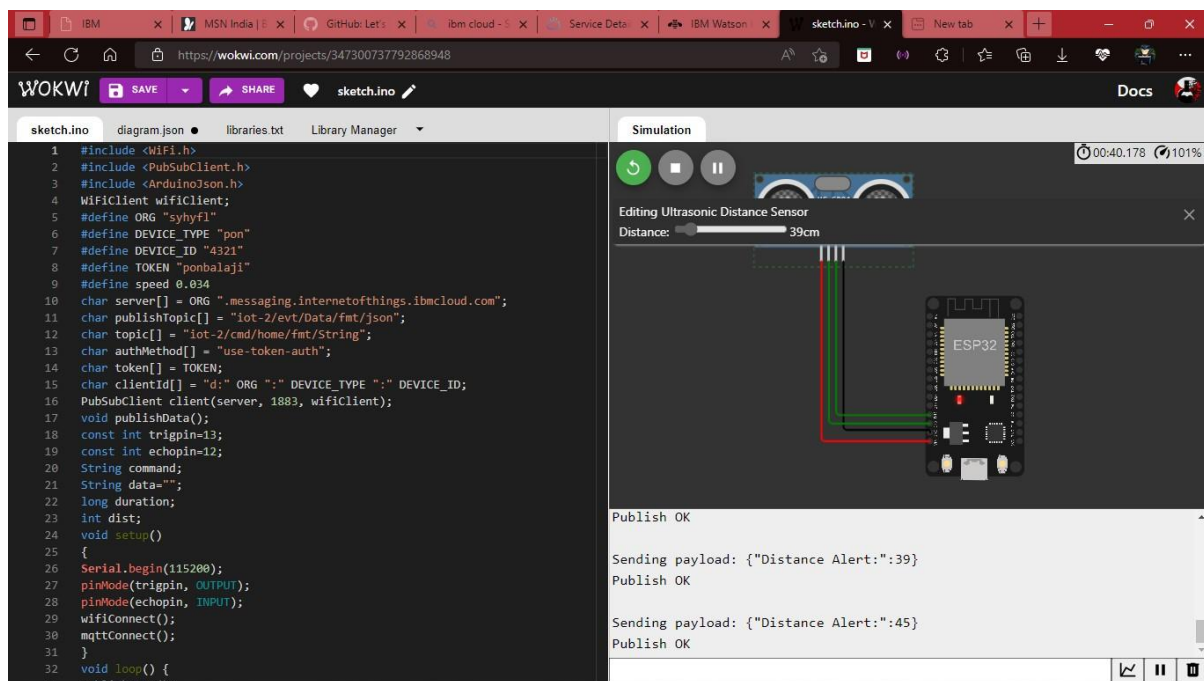
```

### Wokwi Link:

<https://wokwi.com/projects/347300737792868948>

### Output Images:

#### Wokwi Output Screen



## IBM Cloud Result:

The screenshot displays the IBM Watson IoT Platform dashboard. The top navigation bar includes tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A search bar labeled 'Search by Device ID' is present. The main content area shows a table of devices. The first device listed has ID 4321, status 'Connected', device type 'pon', class ID 'Device', and was added on 'Nov 3, 2022 3:38 PM'. Below the device list, a section titled 'Recent Events' shows a stream of data events. The events are listed in a table with columns: Event, Value, Format, and Last Received. All events are of type 'Data' and have a value of '{"Distance Alert":"63"}' or '{"Distance Alert":"39"}', with a format of 'json' and received 'a few seconds ago'.

Device ID	Status	Device Type	Class ID	Date Added
4321	Connected	pon	Device	Nov 3, 2022 3:38 PM

Event	Value	Format	Last Received
Data	{"Distance Alert":"63"}	json	a few seconds ago
Data	{"Distance Alert":"63"}	json	a few seconds ago
Data	{"Distance Alert":"39"}	json	a few seconds ago
Data	{"Distance Alert":"39"}	json	a few seconds ago