# ASSIGNMENT 4

## Ultrasonic sensor simulation in Wokwi

Question : Write a code and connections in wokwi for the ultrasonic sensor. Whenever the distance is less than 100cms send an “Alert” to IBM cloud and display in the device recent events.

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#define ECHO_PIN 2
#define TRIG_PIN 4
#define LED 5


//-------credentials of IBM Accounts------

#define ORG "fb291t"//IBM ORGANITION ID
#define DEVICE_TYPE "divya"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "2001115"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "daY)!SVVls9mxHpZHW"     //Token



//-------- 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 subscribetopic[] = "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;//client id


//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883,wifiClient); //calling the predefined client id
by passing parameter like server id,portand wificredential
void setup()// configureing the ESP32
{
  Serial.begin(115200);
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  pinMode(LED,OUTPUT);
  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

float readDistanceCM() {
  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);
  int duration = pulseIn(ECHO_PIN, HIGH);
  return duration * 0.034 / 2;
}


void loop()// Recursive Function
{
  float distance = readDistanceCM();
  bool isNearby = distance < 100;
  digitalWrite(LED, isNearby);
  Serial.print("Measured distance: ");
  Serial.println(distance);
  delay(100);
  if (isNearby == 1){
  PublishData(distance);
  }
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}



/*....................................retrieving to
Cloud...............................*/

void PublishData(float distance) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"Alert\":""\"";
  payload += distance;
  payload += " is less than 100cms\"";
  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on 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 credentials to 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");
  }
}
```

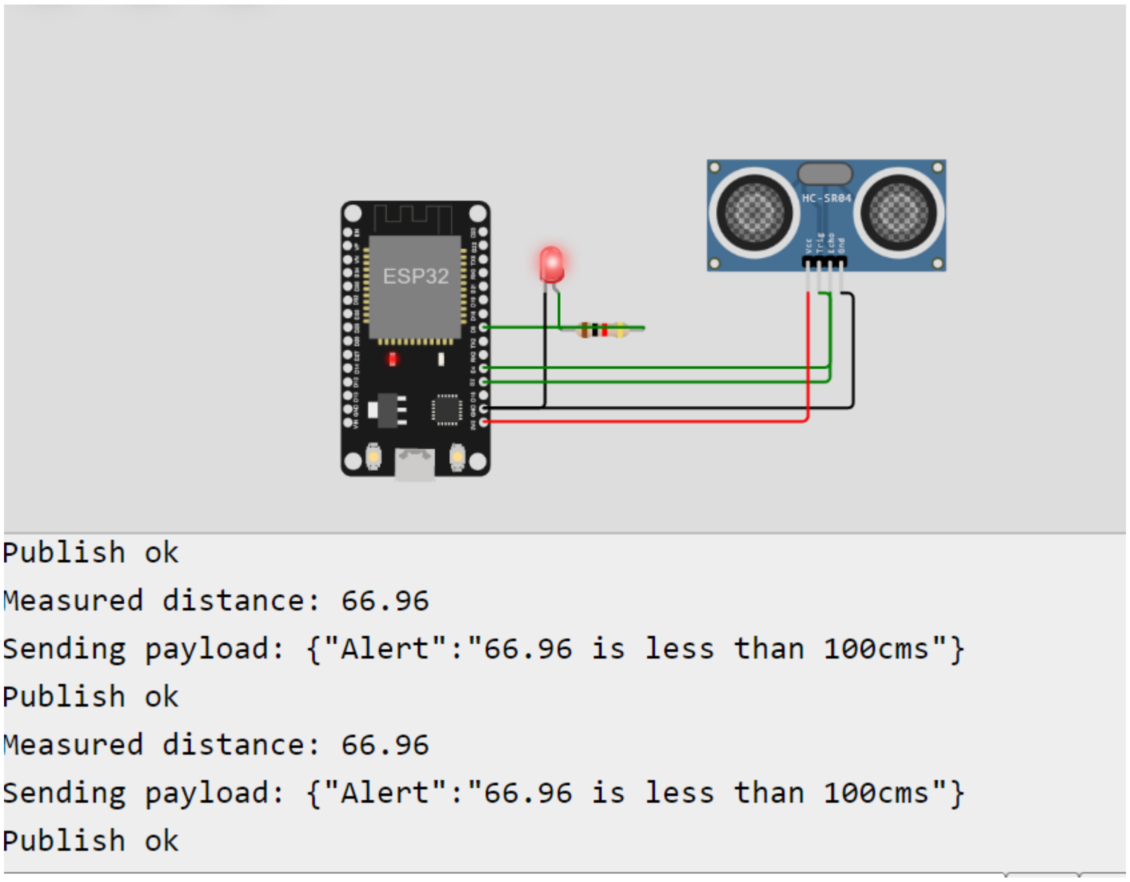
Diagram.json:

```
{
  "version": 1,
  "author": "divya",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -41.73, "left": -
108.18, "attrs": {} },
    {
      "type": "wokwi-led",
      "id": "led1",
      "top": -16.04,
      "left": 21.83,
      "attrs": { "color": "red" }
    },
    {
      "type": "wokwi-resistor",
      "id": "r1",
      "top": 41.63,
      "left": 48.17,
      "attrs": { "value": "1000" }
    },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": -69.2, "left": 151.85,
"attrs": {} }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],
    [ "esp:RX0", "$serialMonitor:TX", "", [] ],
    [ "led1:A", "r1:1", "green", [ "v0" ] ],
    [ "r1:2", "esp:D5", "green", [ "v0" ] ],
    [ "led1:C", "esp:GND.1", "black", [ "v0" ] ],
    [ "esp:D4", "ultrasonic1:TRIG", "green", [ "h246.49", "v-79.83" ] ],
    [ "esp:D2", "ultrasonic1:ECHO", "green", [ "h0" ] ],
    [ "esp:GND.1", "ultrasonic1:GND", "black", [ "h262.72", "v-104.77" ] ],
    [ "ultrasonic1:VCC", "esp:3V3", "red", [ "v0" ] ]
  ]
}
```

Wokwi link:

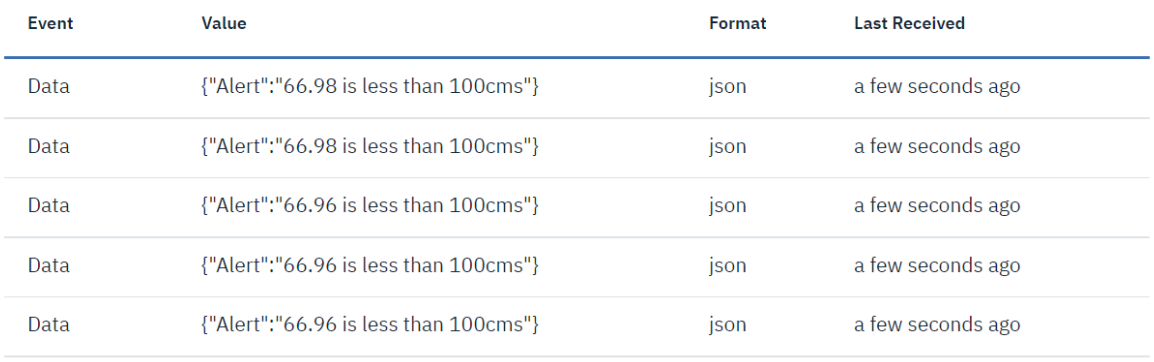
sketch.ino copy - Wokwi Arduino and ESP32 Simulator

Circuit diagram and output:



```
Publish ok
Measured distance: 66.96
Sending payload: {"Alert":"66.96 is less than 100cms"}
Publish ok
Measured distance: 66.96
Sending payload: {"Alert":"66.96 is less than 100cms"}
Publish ok
```

IBM cloud output:



| Event | Value | Format | Last Received |
|---|---|---|---|
| Data | {"Alert":"66.98 is less than 100cms"} | json | a few seconds ago |
| Data | {"Alert":"66.98 is less than 100cms"} | json | a few seconds ago |
| Data | {"Alert":"66.96 is less than 100cms"} | json | a few seconds ago |
| Data | {"Alert":"66.96 is less than 100cms"} | json | a few seconds ago |
| Data | {"Alert":"66.96 is less than 100cms"} | json | a few seconds ago |