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Project Name : Smart Solutions for Railways

Assignment-4

Write code and connections in wokwi for ultrasonic sensor.

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

Solution code:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQtt
#define ORG "q1wscz"
#define DEVICE_E "sampledevice"
#define DEVICE_D "24052002"
#define TOKEN "K9)II1C@tX6yO(J6L1"
const int T_PIN = 5;
const int E_PIN = 4;
//----- 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_E ":" DEVICE_D; //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, port and wificredential

void setup() {
```

```
Serial.begin(115200);

pinMode(T_PIN, OUTPUT);
pinMode(E_PIN, INPUT);
wificonnect();
mqttconnect();

}

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

void loop() {

    float distance = readDistanceCM();
    Serial.print("Measured distance: ");
    Serial.println(distance);
    if(distance<=100){
        PublishData(distance);
    }

    delay(1000);
    if (!client.loop()) {
        mqttconnect();
    }
}

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
*/

bool status=true;

String payload = "{\"ALERT_MESSAGE\":\"";
payload += status;
payload += "," "\"DISTANCE\":\"";
payload += distance;
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 ");

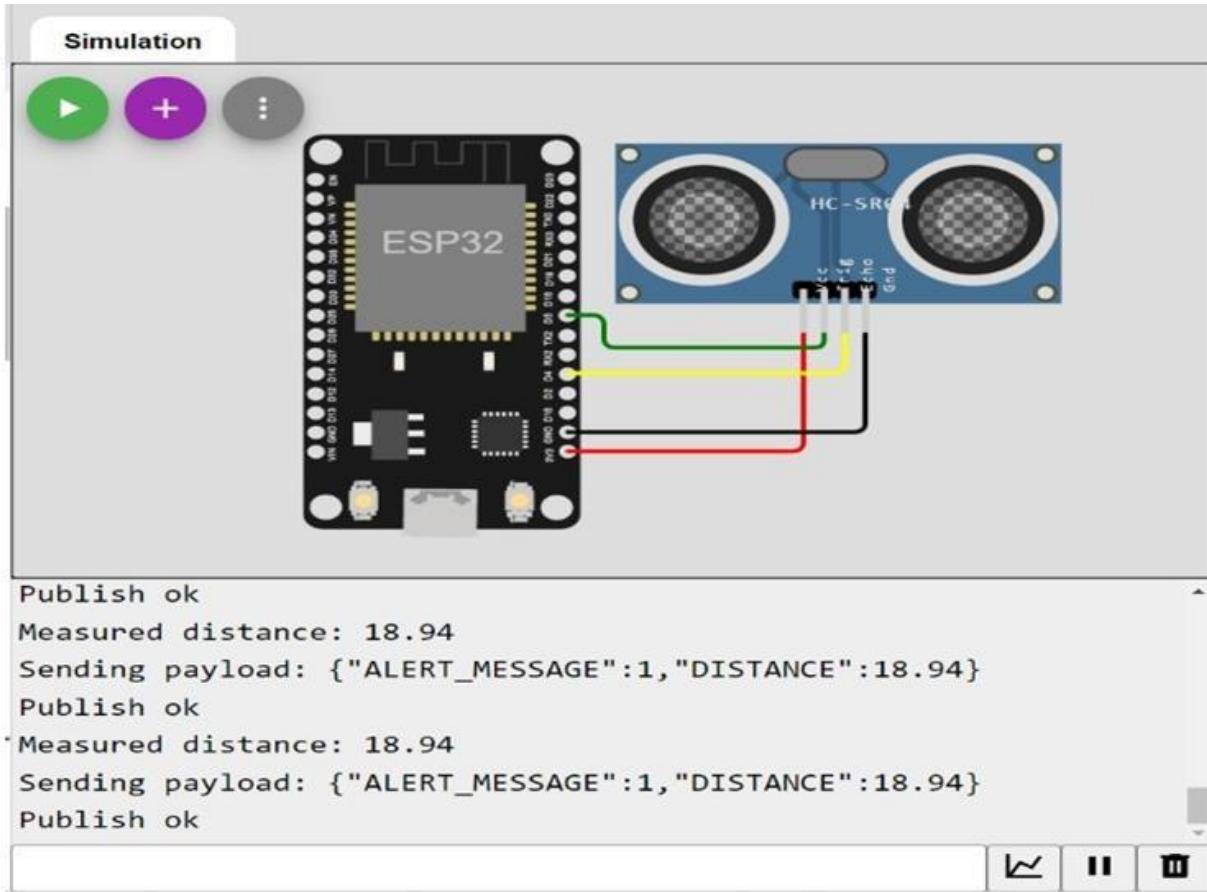
    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the
connection

    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");
    }
}
```

Output:



IBM Cloud Image:

The screenshot shows the Device Simulator interface with the following details:

- Header:** Includes "Add Device" with a plus icon, "Device Simulator" with a switch, and three vertical ellipsis icons.
- Search Bar:** "Search by Device ID" with a magnifying glass icon.
- Table Headers:** Device ID, Status, Device Type, Class ID, Date Added, Descriptive Location.
- Device Data Row:** Device ID 240502002, Status Connected (green), Device Type sampleddevice, Class ID Device, Date Added Oct 6, 2022 7:50 PM, and a "More" button.
- Sub-Header:** Identity, Device Information, Recent Events (underlined), State, Logs.
- Text:** "The recent events listed show the live stream of data that is coming and going from this device."
- Table:** Shows recent events with columns Event, Value, Format, and Last Received.

Event	Value	Format	Last Received
Data	{"ALERT_MESSAGE":1,"DISTANCE":32.95}	json	a few seconds ago
Data	{"ALERT_MESSAGE":1,"DISTANCE":32.98}	json	a few seconds ago
Data	{"ALERT_MESSAGE":1,"DISTANCE":32.98}	json	a few seconds ago
Data	{"ALERT_MESSAGE":1,"DISTANCE":32.98}	json	a few seconds ago
Data	{"ALERT_MESSAGE":1,"DISTANCE":32.98}	json	a few seconds ago
- Footer:** "0 Simulations running".