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Team Project	Smart solution for railways
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The image displays two screenshots of the Wokwi IDE, showing the simulation of an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor. The top screenshot shows the initial setup and the first data transmission. The bottom screenshot shows the loop logic for distance measurement and MQTT publishing.

Top Screenshot:

```

1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 WiFiClient wifiClient;
4 String data;
5 #define ORG "u3lnz"
6 #define DEVICE_TYPE "mon1"
7 #define DEVICE_ID "14072002"
8 #define TOKEN "5y4gP2w&s+g05X&c"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/shreedhanen/fmt/json";
13 char topic[] = "iot-2/cmd/led/fmt/String";
14 char authMethod[] = "use-token-auth";
15 char token[] = TOKEN;
16 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
17 PubSubClient client(server, 1883, wifiClient);
18
19
20
21 const int trigpin=5;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
28
29
30

```

Bottom Screenshot:

```

31 void setup()
32 {
33   Serial.begin(115200);
34   pinMode(led, OUTPUT);
35   pinMode(trigpin, OUTPUT);
36   pinMode(echopin, INPUT);
37   wifiConnect();
38   mqttConnect();
39 }
40
41 void loop() {
42   bool isNearby = dist < 100;
43   digitalWrite(led, isNearby);
44   publishData();
45   delay(500);
46   if (!client.loop()) {
47     mqttConnect();
48   }
49 }
50
51
52
53 void wifiConnect() {
54   Serial.print("Connecting to "); Serial.print("Wifi");
55   WiFi.begin("Wokwi-GUEST", "", 6);
56   while (WiFi.status() != WL_CONNECTED) {
57     delay(500);
58     Serial.print(".");
59   }
60 }

```

The simulation interface shows the ESP32 microcontroller connected to the HC-SR04 ultrasonic sensor. The sensor's output is displayed as "Distance": 399.96. The MQTT client is configured to publish data to the topic "iot-2/evt/shreedhanen/fmt/json" on the IBM Watson IoT Platform.

WOKWI

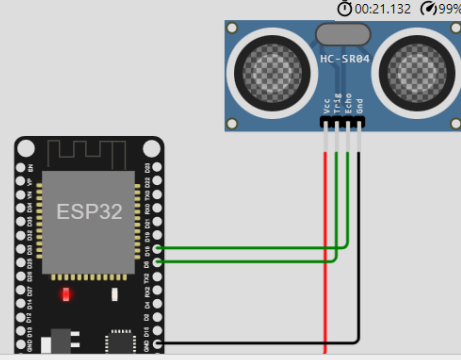
esp32-dht22.ino • diagram.json • libraries.txt • Library Manager

```

60 Serial.print("WiFi connected, IP address: "); Serial.println(WiFi.localIP());
61 }
62
63 void mqttConnect() {
64   if (!client.connected()) {
65     Serial.print("Reconnecting MQTT client to "); Serial.println(server);
66     while (!client.connect(clientId, authMethod, token)) {
67       Serial.print(".");
68       delay(500);
69     }
70     initManagedDevice();
71     Serial.println();
72   }
73 }
74
75 void initManagedDevice() {
76   if (client.subscribe(topic)) {
77     // Serial.println(client.subscribe(topic));
78     Serial.println("IBM subscribe to cmd OK");
79   } else {
80     Serial.println("subscribe to cmd FAILED");
81   }
82 }
83 void publishData()
84 {
85   digitalWrite(trigpin, LOW);
86   digitalWrite(trigpin, HIGH);
87   delayMicroseconds(10);
88   digitalWrite(trigpin, LOW);
89   duration=pulseIn(echopin, HIGH);

```

Simulation



00:21.132 99%

Publish OK

Sending payload: {"Distance":399.94}

Publish OK

Sending payload: {"Distance":399.92}

Publish OK

WOKWI

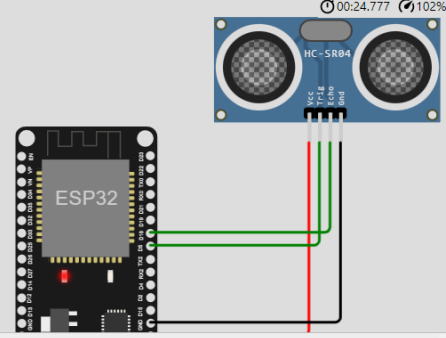
esp32-dht22.ino • diagram.json • libraries.txt • Library Manager

```

84 {
85   digitalWrite(trigpin, LOW);
86   digitalWrite(trigpin, HIGH);
87   delayMicroseconds(10);
88   digitalWrite(trigpin, LOW);
89   duration=pulseIn(echopin, HIGH);
90   dist=duration*speed/2;
91   if(dist<100){
92     String payload = "{\"Alert Distance\":";
93     payload += dist;
94     payload += "}";
95
96     Serial.print("\n");
97     Serial.print("Sending payload: ");
98     Serial.println(payload);
99     if (client.publish(publishTopic, (char*) payload.c_str())) {
100       Serial.println("Publish OK");
101     }
102   }
103
104   if(dist>100){
105     String payload = "{\"Distance\":";
106     payload += dist;
107     payload += "}";
108
109     Serial.print("\n");
110     Serial.print("Sending payload: ");
111     Serial.println(payload);
112     if (client.publish(publishTopic, (char*) payload.c_str())) {
113       Serial.println("Publish OK");

```

Simulation



00:24.777 102%

Publish OK

Sending payload: {"Distance":399.94}

Publish OK

Sending payload: {"Distance":399.96}

Publish OK

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← → ↻ w3inzs.internetofthings.ibmcloud.com/dashboard/devices/browse

IBM Watson IoT Platform

Browse

Action

Device Types

Interfaces

Identity

Device Information

Recent Events

State

Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
data	{"Distance":399.96}	json	a few seconds ago
data	{"Distance":399.94}	json	a few seconds ago
data	{"Distance":400.2}	json	a few seconds ago

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0 Simulations running

Wowki link: <https://wokwi.com/projects/322410731508073042>