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Code:

```
#include <WiFi.h>
#include <PubSubClient.h>
#include <ArduinoJson.h>
WiFiClient wifiClient;
#define ORG "u3syx4"
#define DEVICE_TYPE "CROP"
#define DEVICE_ID "MAHAS13"
#define TOKEN "maharms13"
#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=5;
const int echopin=18;
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/347297192445215314>

Output :

The screenshot displays the Wokwi IDE interface. On the left, the 'sketch.ino' file is open, showing a C++ program for an ESP32. The code includes headers for `Arduino.h`, `WiFi.h`, and `MQTT.h`. It defines pins for an ultrasonic sensor and sets up an MQTT client. The `setup` function initializes the serial port and connects to the MQTT broker. The `loop` function publishes distance data every 500ms. On the right, the 'Simulation' window shows a virtual circuit with an ESP32 and an Ultrasonic Distance Sensor. A dialog box indicates the sensor's distance is 69cm. Below the simulation, the 'Output' console shows the following log:

```

Publish OK
Sending payload: {"Distance Alert":68}
Publish FAILED
Reconnecting MQTT client to
u3syx4.messaging.internetofthings.ibmcloud.com
.....

```

IBM Cloud:

The screenshot displays the IBM Watson IoT Platform dashboard. The browser address bar shows the URL: `u3syx4.internetofthings.ibmcloud.com/dashboard/devices/browse`. The dashboard header includes the IBM Watson IoT Platform logo, a user profile icon, and the email address `922119106052@smartintenz.com` with the ID `u3syx4`. The main navigation bar has tabs for `Browse`, `Action`, `Device Types`, and `Interfaces`, along with an `Add Device` button. The `Browse` tab is active, showing a message: "The recent events listed show the live stream of data that is coming and going from this device." Below this message is a table with the following data:

Event	Value	Format	Last Received
Data	{"Distance Alert":69}	json	a few seconds ago
Data	{"Distance Alert":68}	json	a few seconds ago
Data	{"Distance Alert":68}	json	a few seconds ago
Data	{"Distance Alert":68}	json	a few seconds ago
Data	{"Distance Alert":68}	json	a few seconds ago

At the bottom of the table, there is a pagination control showing "Items per page 50" and "1 of 1 page". The Windows taskbar at the bottom of the screen shows the time as 3:28 PM on 03-Nov-22.