Sprint-4

Team ID	PNT2022TMID52559
Project Name	INDUSTRY-SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

CODE:

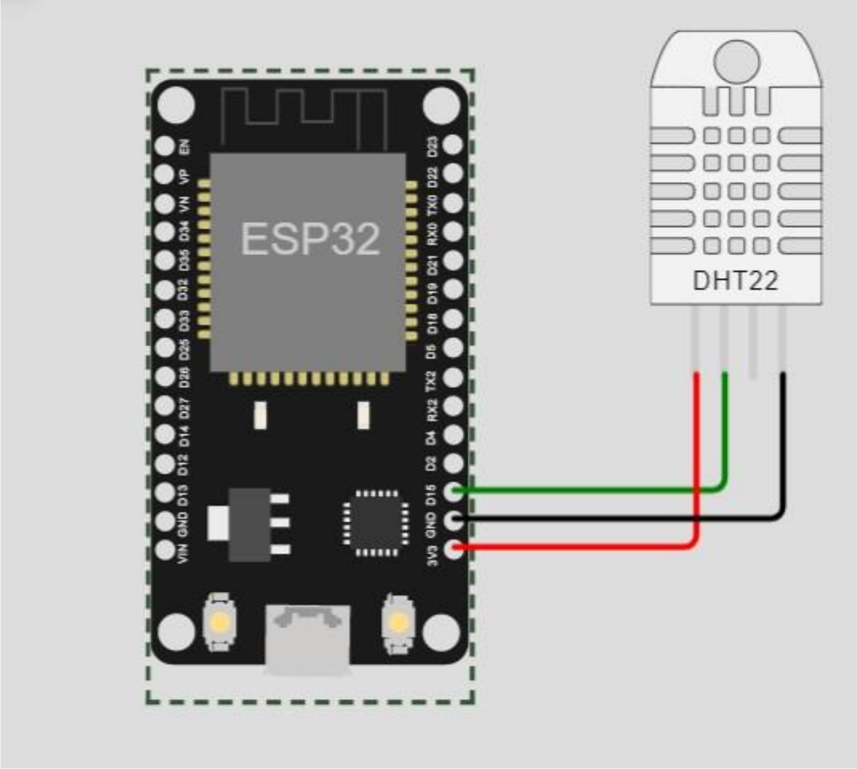
```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#include <cstdlib>
#include <time.h>
#include <mjson.h>

#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT22   // define type of sensor DHT 11


DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of dht connected

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);

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

#define ORG "3e40vw"
#define DEVICE_TYPE "sample-device"
#define DEVICE_ID "8007"
#define TOKEN "987654321"

String data3 = "";
String accidentstatus ="";
String sprinkstatus = "";
float temp =0;
bool isfanon = false;
bool issprinkon = false;
bool cansprinkoperate = true;
bool canfanoperate = true;
bool cansentalert = false;
int gas = 0;
int flame = 0;
int flow = 0;
long int cooldown= 600;




char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/data/fmt/json";
char subscribetopic[] = "iot-2/cmd/command/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;


//----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
```

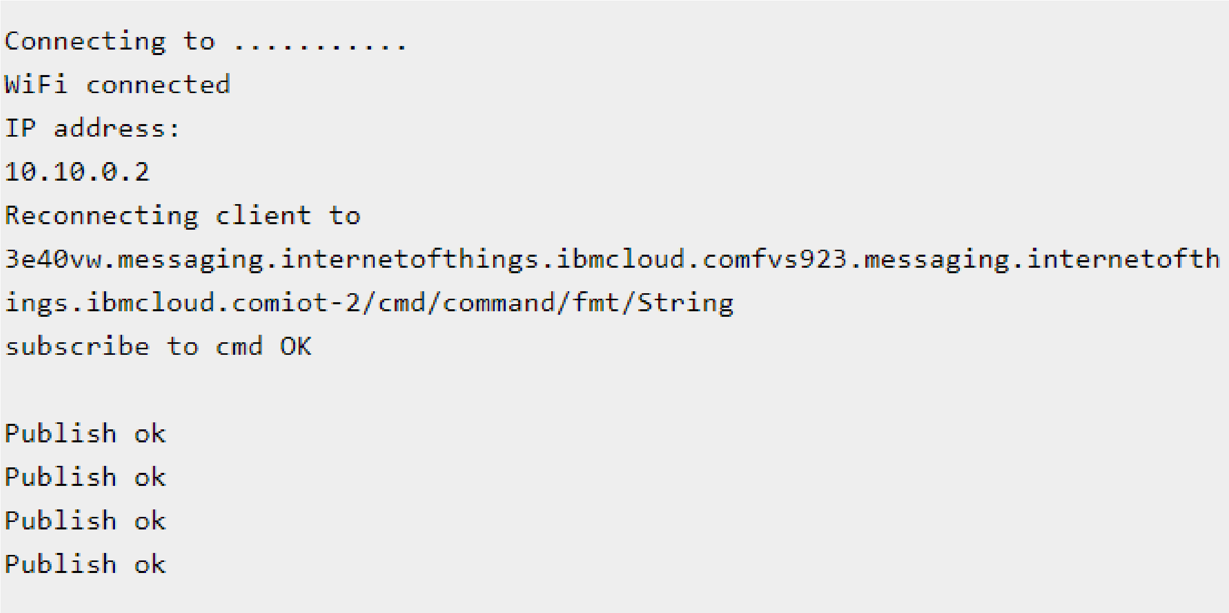
```
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client id by passing
parameter like server id,portand wificredential


void setup()// configureing the ESP32
{
  Serial.begin(115200);
  dht.begin();
  //if real gas sensor is used make sure the senor is heated up for acurate readings
  /*
    - Here random values for readings and stdout were used to show the
      working  of the devices as physical or simulated devices are not
      available.
  */


  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

void loop()
{



  temp = dht.readTemperature();
  //setting a random seed (only for random values not in real life scenarios)
  srand(time(0));

  //initial variable activities like declaring , assigning
  gas = rand()%400;
  int flamereading = rand()%1024;
  flame = map(flamereading,0,1024,0,1024);
  int flow = ((rand()%100)>50?1:0);



  //find the accident status 'cause fake alert may be caused by some mischief activities
  if(temp < 45 ){
    if(flame > 650 ){
      accidentstatus = "Need Auditing";
      if(canfanoperate)
        isfanon = true;
      else
        isfanon = false;
      issprinkon = false;
    }
    else if(flame <= 10){
      accidentstatus = "nothing happened";
      isfanon = false;
      issprinkon = false;
    }

  }else if(temp >= 45 && temp <= 55 ){
    if(flame <=650 && flame >100  ){
```

```
    if(cansprinkoperate)

      issprinkon = true;
    else
      issprinkon = false;
    accidentstatus = "moderate";
    if(gas > 160 && canfanoperate ){
      isfanon = true;
    }
    else{
      isfanon = false;
    }
  }
  else if(flame <= 100 && flame > 10){
   if(cansprinkoperate)
      issprinkon = true;
    else
      issprinkon = false;
    isfanon = false;
    accidentstatus = "moderate";
  }

}else if(temp > 55){
  if(flame > 650){
    gas = 500 + rand()%500;
    accidentstatus = "severe";
    if(cansprinkoperate)
      issprinkon = true;
    else
      issprinkon = false;
    if(canfanoperate)
      isfanon = true;
    else
      isfanon = false;
  }
  else if(flame < 650 && flame > 400 ){
    gas = 300 + rand()%500;
    accidentstatus = "severe";
    if(cansprinkoperate)
      issprinkon = true;
    else
      issprinkon = false;

    if(canfanoperate)
      isfanon = true;
    else
      isfanon = false;

  }
}
else {
  accidentstatus = "Need moderate Auditing";
  isfanon = false;
  issprinkon = false;
}


if(issprinkon){
  if(flow){
      sprinkstatus = "working";
    }

    else{
      sprinkstatus = "not working";
    }
  }
  else if(!issprinkon){
    sprinkstatus = "ready";
  }
  else {
    sprinkstatus = "something's wrong";
  }


  PublishData(temp,gas,flame,flow,isfanon,issprinkon);

  //a cooldown period is set as the values and situations are random in real life sceanarios the time can be
reduced or neclected
  if(accidentstatus=="severe" && cooldown >= 600){
    cooldown = 0;
    sendalert();
    PublishData(temp,gas,flame,flow,isfanon,issprinkon);
    cansentalert = false;

  }

  if(cooldown > 999999){
    cooldown = 601;
  }




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



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

void PublishData(float temp, int gas ,int flame ,int flow,bool isfanon,bool issprinkon) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"temp\":";
  payload += temp;
  payload += "," "\"gas\":";
  payload += gas;
  payload += "," "\"flame\":";
  payload += flame;
  payload += "," "\"flow\":";
  payload += ((flow)?"true":"false");
  payload += "," "\"isfanon\":";

  payload += ((isfanon)?"true":"false");
  payload += "," "\"issprinkon\":";
  payload += ((issprinkon)?"true":"false");

  payload += "," "\"cansentalert\":";
  payload += ((cansentalert)?"true":"false");
  payload += "," "\"accidentstatus\":";
  payload += "\""+accidentstatus+"\"";
  payload += "," "\"sprinkstatus\":";
  payload += "\""+sprinkstatus+"\"";
  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);
  while (WiFi.status() != WL_CONNECTED) {
    delay(100);
    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");
  }
}


//handles commands from user side
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 0; i < payloadLength; i++) {

    data3 += (char)payload[i];
  }
  Serial.println("data: "+ data3);

  const char *s =(char*) data3.c_str();
  double pincode = 0;

  if(mjson_get_number(s, strlen(s), "$.pin", &pincode)){
    if(((int)pincode)==67993){
        const char *buf;
        int len;

        if (mjson_find(s, strlen(s), "$.command", &buf, &len))  // And print it
        {

          String command(buf,len);
          if(command=="\"cantfan\""){
            //this works when there is gas sensor reads high value and if there should be a
            //manual trigger else it will be automate
            canfanoperate = !canfanoperate;
          }
          else if(command=="\"cantsprink\""){
            cansprinkoperate = !cansprinkoperate;
          }else if(command=="\"sentalert\""){
            //this works when there is accident status is severe and if there should be a
            //manual trigger else it will be automate
            resetcooldown();
          }
        }



    }
  }

  data3="";
}

void resetcooldown(){
  cooldown = 0;
}
```

```
//sent alert request to node-red
void sendalert(){

 cansentalert = true;

 cooldown = 0;


}
```

CIRCUIT:





```
Connecting to ...........
WiFi connected
IP address:
10.10.0.2
Reconnecting client to
3e40vw.messaging.internetofthings.ibmcloud.comfvs923.messaging.internetofth
ings.ibmcloud.comiot-2/cmd/command/fmt/String
subscribe to cmd OK

Publish ok
Publish ok
Publish ok
Publish ok
```

WOKWI LINK:

https://wokwi.com/projects/348296083760218708