

INDUSTRY SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

SPRINT – 1: Simulation creation (connect sensor Arduino with python code)

CODE:

```
#include "DHTesp.h"
#include <cstdlib>
#include <time.h>

const int DHT_PIN = 15;

bool is_exhaust_fan_on = false;
bool is_sprinkler_on = false;

float temperature = 0;

int gas_ppm = 0;
int flame = 0;
int flow = 0;

String flame_status = "";
String accident_status = "";
String sprinkler_status = "";

DHTesp dhtSensor;

void setup() {
  Serial.begin(99900);

  /**** sensor pin setups ***/
```

```

dhtSensor.setup(DHT_PIN, DHTesp::DHT22);

//if real gas sensor is used make sure the sensor is heated up for accurate 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.
*/

}

void loop() {

  TempAndHumidity data = dhtSensor.getTempAndHumidity();

  //setting a random seed
  srand(time(0));

  //initial variable activities like declaring , assigning
  temperature = data.temperature;
  gas_ppm = rand()%1000;
  int flamereading = rand()%1024;
  flame = map(flamereading,0,1024,0,1024);
  int flamerange = map(flamereading,0,1024,0,3);
  int flow = ((rand()%100)>50?1:0);

  //set a flame status based on how close it is.....
  switch (flamerange) {
  case 2: // A fire closer than 1.5 feet away.
    flame_status = "Close Fire";
    break;
  case 1: // A fire between 1-3 feet away.

```

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    flame_status = "Distant Fire";

    break;
case 0: // No fire detected.
    flame_status = "No Fire";

    break;
}

//toggle the fan according to gas in ppm in the room
if(gas_ppm > 100){
    is_exhaust_fan_on = true;
}
else{
    is_exhaust_fan_on = false;
}

//find the accident status 'cause fake alert may be caused by some mischief activities
if(temperature < 40 && flamerange ==2){
    accident_status = "need auditing";
    is_sprinkler_on = false;
}
else if(temperature < 40 && flamerange ==0){
    accident_status = "nothing found";
    is_sprinkler_on = false;
}
else if(temperature > 50 && flamerange == 1){
    is_sprinkler_on = true;
    accident_status = "moderate";
}
else if(temperature > 55 && flamerange == 2){
    is_sprinkler_on = true;

```

```

    accident_status = "severe";
} else {
    is_sprinkler_on = false;
    accident_status = "nil";
}

```

```

//send the sprinkler status

```

```

if(is_sprinkler_on){
    if(flow){
        sprinkler_status = "working";
    }
    else{
        sprinkler_status = "not working";
    }
}
else if(is_sprinkler_on == false){
    sprinkler_status = "now it shouldn't";
}
else{
    sprinkler_status = "something's wrong";
}

```

```

//Obviously the output. It is like json format 'cause it will help us for future sprints

```

```

String out = "{\n\t\"senor_values\":{ ";
out+="\n\t\t\"gas_ppm\": "+String(gas_ppm)+" , ";
out+="\n\t\t\"temperature\": "+String(temperature,2)+" , ";
out+="\n\t\t\"flame\": "+String(flame)+" , ";
out+="\n\t\t\"flow\": "+String(flow)+" , \n\t} ";
out+="\n\t\"output\":{ ";

```

```

out+="\n\t\t\"is_exhaust_fan_on\":"+String((is_exhaust_fan_on)?"true":"false")+",";
out+="\n\t\t\"is_sprinkler_on\":"+String((is_sprinkler_on)?"true":"false")+",";
out+="\n\t}";
out+="\n\t\"messages\":"+{ ";
out+="\n\t\t\"fire_status\":"+flame_status+",";
out+="\n\t\t\"flow_status\":"+sprinkler_status+",";
out+="\n\t\t\"accident_status\":"+accident_status+",";
out+="\n\t}";
out+="\n}";
Serial.println(out);

```

```

delay(1000);

```

```

}

```

diagram.json:

```

{
  "version": 1,
  "author": "PNT2022TMID51903",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -16.32, "left": -0.82, "attrs": { } },
    {
      "type": "wokwi-dht22",
      "id": "dht1",
      "top": -30.22,
      "left": 165.89,
      "attrs": { "temperature": "59.3" }
    }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],

```

```
[ "esp:RX0", "$serialMonitor:TX", "", [ ] ],  
[ "dht1:SDA", "esp:D15", "green", [ "v0" ] ],  
[ "dht1:VCC", "esp:3V3", "red", [ "v0" ] ],  
[ "dht1:GND", "esp:GND.1", "black", [ "v0" ] ]  
]  
}
```