

EMBEDDED FIRE DETECTION AND ALARM NOTIFICATION SYSTEM

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Aim:

To design a simple fire detection and alarm system using ESP32 with a flame sensor, smoke sensor, buzzer, and LEDs.

Tools required:

- ESP32
- Flame Sensor
- MQ-2 Smoke sensor
- Buzzer
- LED

1. ESP32

- The ESP-32 is a powerful, low-cost microcontroller with integrated WiFi and Bluetooth. (240MHz), Dual-core 32-bit LX6 processor.

2. Flame Sensor

- An IR-based flame sensor detects the infrared light emitted by flames in the wavelength 760 - 1100 nm.
- Gives digital o/p in 1's and 0's.

3. MQ-2 Smoke Sensor

- It is a low-cost semiconductor sensor.
- Used to detect smoke and combustible gases such as LPG, methane, and hydrogen.
- It provides both analog and digital o/p signals.

4. Buzzer

- It is a sound-producing device that converts an electrical signal into sound.
- e.g: alarms, indicators, and electrical devices.

5. LED

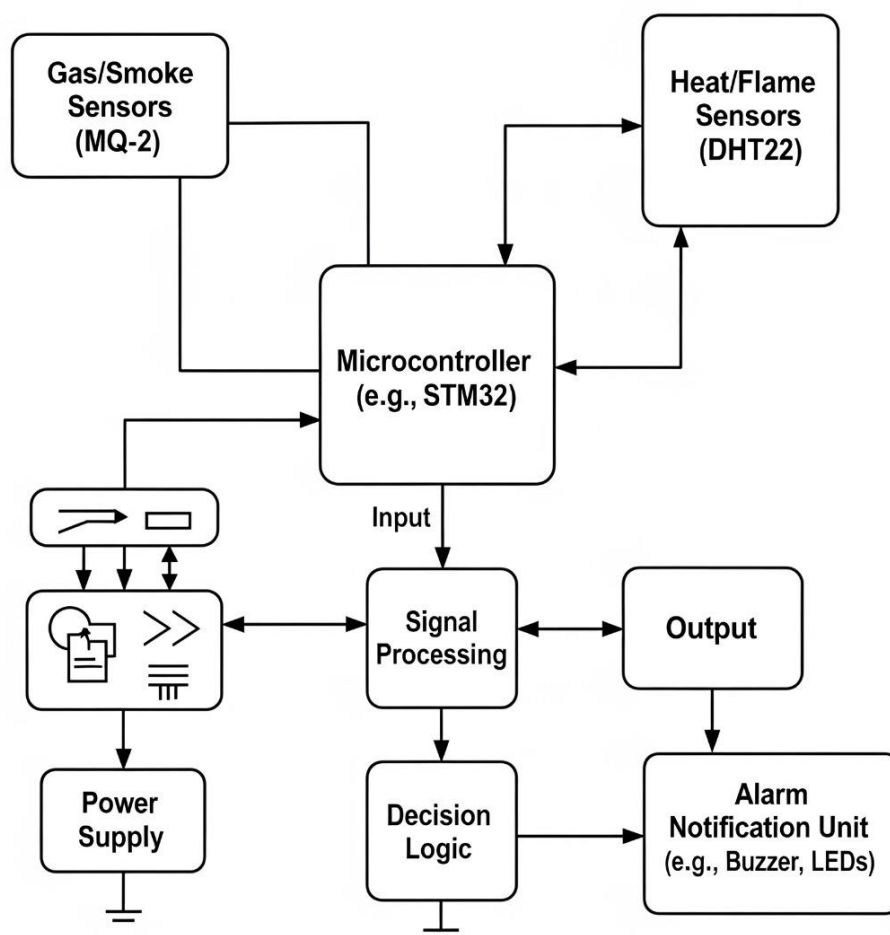
- 'Light Emitting Device'
- It is a semiconductor device that emits light when current flows through it.
- Long-lasting device and in different colours available.

Pin Connections

Component	Pin
Flame Sensor (Digital Output)	D27
Smoke Sensor (Digital Output)	D35
Buzzer	D25
RED LED	D26

FLOW CHART

Fire and Gas Detection System



PROGRAM

```
#include "DHT.h"

#define DHTPIN 16
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);

const int flameSensorPin = 14;
const int buzzerPin = 22;
const int ledPin = 5;

void setup() {
    pinMode(flameSensorPin, INPUT);
    pinMode(buzzerPin, OUTPUT);
    pinMode(ledPin, OUTPUT);

    digitalWrite(buzzerPin, LOW);
    digitalWrite(ledPin, LOW);

    Serial.begin(115200);
    dht.begin();
}

void loop() {
    int flameState = digitalRead(flameSensorPin);
    float t = dht.readTemperature();
```

```
float h = dht.readHumidity();  
float temperature = dht.computeHeatIndex(t, h, false);
```

```
if (isnan(temperature)) {  
    Serial.println("Failed to read from DHT sensor!");  
    delay(500);  
    return;  
}
```

```
bool fireDetected = false;
```

```
if (flameState == LOW) {  
    fireDetected = true;  
}
```

```
if (temperature > 40.0) {  
    fireDetected = true;  
}
```

```
if (fireDetected) {  
    Serial.print("FIRE DETECTED! Temp: ");  
    Serial.println(temperature);  
    digitalWrite(buzzerPin, HIGH);  
    digitalWrite(ledPin, HIGH);  
} else {  
    Serial.print("Safe. Temp: ");  
    Serial.println(temperature);
```

```
    digitalWrite(buzzerPin, LOW);  
    digitalWrite(ledPin, LOW);  
}  
  
delay(1000);  
}
```