Fire Alarm System Project Documentation

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1. Introduction

This project is a simple fire alarm system designed using an Arduino. It detects high temperatures and the presence of gas, triggering an LED indicator and a buzzer alarm to alert the surroundings.

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2. Key Components

- Arduino Board (Uno/Nano)
- Temperature Sensor
- Gas Sensor (MQ series)
- LED
- Piezo Buzzer
- Resistors
- Jumper Wires
- Breadboard

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3. Working Principle

1. The temperature sensor provides an analog voltage based on the surrounding temperature.
2. The gas sensor detects gas concentration and provides an analog output.
3. Arduino reads both sensor outputs via analog input pins (A0 and A1).
4. The code processes these sensor values:
    - If temperature exceeds 80°C, the LED lights up.
    - If gas concentration exceeds a threshold (analog value 100), the piezo buzzer sounds.
5. Sensor readings are continuously displayed on the Serial Monitor for monitoring.

6. The system updates sensor readings every second.

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4. Circuit Overview

- **Temperature Sensor** connected to Analog pin A1.
- **Gas Sensor** connected to Analog pin A0.
- **LED** connected to Digital pin 13 (with appropriate resistor).
- **Piezo Buzzer** connected to Digital pin 7.
- Power (+5V) and Ground (GND) from Arduino distributed appropriately to sensors and components.

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5. Code

```
/*Code written by-
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/*Fire alarm system*/

float temp;
float vout;
float vout1;
int LED = 13;
int gasSensor;
int piezo = 7;

void setup()
{
```

```
 pinMode(A0, INPUT);
 pinMode(A1, INPUT);
 pinMode(LED, OUTPUT);
 pinMode(piezo, OUTPUT);
 Serial.begin(9600);
}

void loop()
{
 vout = analogRead(A1);
 vout1 = (vout/1023)*5000;
 temp = (vout1 - 500)/10;
 gasSensor = analogRead(A0);

 if (temp >= 80)
 {
  digitalWrite(LED, HIGH);
 }
 else
 {
  digitalWrite(LED, LOW);
 }


 if (gasSensor >= 100)
 {
```

```
  digitalWrite(piezo, HIGH);
 }
 else
 {
  digitalWrite(piezo, LOW);
 }

 Serial.print("in DegreeC= ");
 Serial.print(" ");
 Serial.print(temp);
 Serial.print("\t");
 Serial.print("GasSensor= ");
 Serial.print(" ");
 Serial.print(gasSensor);
 Serial.println();
 delay(1000);
}
```

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6. Code Explanation

- **Variable Declaration**:
    - temp, vout, vout1: used to process temperature sensor output.
    - LED and piezo: pins for LED and buzzer respectively.
- **Setup Function**:
    - Initializes A0 and A1 as INPUT for sensors.
    - Sets LED (pin 13) and buzzer (pin 7) as OUTPUT.
    - Starts serial communication at 9600 baud rate.

- **Loop Function**:
    - Reads analog value from A1 (temperature sensor).
    - Converts the raw sensor value to millivolts and then calculates the temperature in Celsius.
    - Reads analog value from A0 (gas sensor).
    - If temperature ≥ 80°C, turns LED ON, else OFF.
    - If gas sensor value ≥ 100, turns buzzer ON, else OFF.
    - Prints the current temperature and gas sensor values on the Serial Monitor.
    - Adds a delay of 1 second before repeating the loop.

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7. Conclusion

This Arduino-based fire alarm system provides a basic but effective way to detect fire hazards by sensing high temperatures and gas leaks. The use of visual (LED) and audio (buzzer) alerts ensures quick response to potential dangers, making it ideal for educational and small-scale safety projects.