Fire Protection System Using Arduino Uno

```
/* Includes Section*/
    #include <Wire.h>
    #include <SoftwareSerial.h>
    #include "LiquidCrystal.h"
    // Initialize the library by associating any needed LCD interface pin
    // with the arduino pin number it is connected to
    const int rs = 7, en = 8, d4 = 3, d5 = 4, d6 = 5, d7 = 6;
    LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
10
    /* Variables Section*/
11
    #define Gas_Sensor_Output 9 // The output signal of the gas detector
12
    #define Flame_Sensor_Output 2 // The output signal of the flame sensor
13
    #define Emergency_LED 10
    #define Emergency_Alarm 11
    #define ELECTRIC_GAS_VALVE A0
    #define FIRE EXTINGUISHING VALVE A1
    #define Emergency_Exhaust_Fan A2
18
    #define LOAD 12
19
    bool Flame_Sensor_state;
21
    bool Gas_Sensor_state;
    void setup()
25
      /* Setting Pin Modes */
27
      pinMode(Flame_Sensor_Output, INPUT);
      pinMode(Gas_Sensor_Output, INPUT);
28
      pinMode(Emergency_Alarm, OUTPUT);
29
30
      pinMode(Emergency_LED, OUTPUT);
      pinMode(ELECTRIC_GAS_VALVE, OUTPUT);
31
32
      pinMode(FIRE_EXTINGUISHING_VALVE, OUTPUT);
33
      pinMode(Emergency_Exhaust_Fan, OUTPUT);
      pinMode(LOAD, OUTPUT);
34
35
      digitalWrite(LOAD, HIGH); // Connect the main building's electricity.
36
      digitalWrite(ELECTRIC_GAS_VALVE, HIGH); // Activate the main gas valve
37
39
      // set up the LCD's number of columns and rows:
      lcd.begin(16, 2);
40
      // Print a message to the LCD.
41
42
      lcd.print("It's All good");
43
44
      // Begin the serial connection with baud rate 9600
45
      Serial.begin(9600);
46
47
    void loop()
48
49
      Flame_Sensor_state = digitalRead(Flame_Sensor_Output); // Check the output signal of the flame sensor.
      Gas_Sensor_state = digitalRead(Gas_Sensor_Output);  // Check the output signal of the gas sensor.
52
      // If the flame is detected
53
54
      if (Flame_Sensor_state == LOW)
55
56
        digitalWrite(Emergency_Alarm, HIGH); // Activate the emergency alarm.
57
        digitalWrite(Emergency_LED, HIGH);
                                             // Activate the emergency alarm.
        digitalWrite(LOAD, LOW);
                                              // Disconnect the building's primary power source.
58
        digitalWrite(ELECTRIC GAS VALVE, LOW);
                                                       // Shut down the main gas valve to stop gas flow.
59
        digitalWrite(FIRE_EXTINGUISHING_VALVE, HIGH); // Activate the extinguishing valve to put down the fire.
60
        digitalWrite(Emergency_Exhaust_Fan, HIGH);
                                                        // Activate an emergency high-pressure exhaust fan to remove leakage gas.
61
        /* Display on the LCD "Flame Detected!!"*/
        lcd.setCursor(0, 0);
64
        lcd.print("Fire Alert!!!!");
65
```

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```
lcd.setCursor(0, 1);
67
        lcd.print("Flame Detected!!");
68
69
      else if (Gas_Sensor_state == LOW)
70
71
        digitalWrite(Emergency_Alarm, HIGH); // Activate the emergency alarm.
72
        digitalWrite(Emergency_LED, HIGH); // Activate the emergency alarm.
73
                                                       // Shut down the main gas valve to stop gas flow.
        digitalWrite(ELECTRIC GAS VALVE, LOW);
74
        digitalWrite(Emergency_Exhaust_Fan, HIGH);
                                                     // Activate an emergency high-pressure exhaust fan to remove leakage gas.
75
76
        /* Display on the LCD "Gas Detected!!"*/
77
        lcd.setCursor(0, 0);
78
        lcd.print("Fire Alert!!!!");
79
        lcd.setCursor(0, 1);
80
        lcd.print("Gas Detected!!");
81
      else if (Flame_Sensor_state != LOW && Gas_Sensor_state != LOW)
83
84
        delay(500);
85
        digitalWrite(Emergency_Alarm, LOW); // Deactivate the emergency alarm.
86
        digitalWrite(Emergency_LED, LOW); // Deactivate the emergency alarm.
87
        digitalWrite(LOAD, HIGH);
                                           // Connect the building's primary power source.
        digitalWrite(ELECTRIC_GAS_VALVE, HIGH);
                                                     // Open the main gas valve to stop gas flow.
89
        digitalWrite(FIRE_EXTINGUISHING_VALVE, LOW); // Deactivate the extinguishing valve to put down the fire.
90
        digitalWrite(Emergency_Exhaust_Fan, LOW);
                                                      // Deactivate an emergency high-pressure exhaust fan to remove leakage gas.
91
92
        lcd.clear();
93
        lcd.setCursor(0, 0);
        lcd.print("It's all good");
96
```

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