## README – Execution Instructions

**Project Title:** Fire Detection and Alert System (FDAS) for Electric Vehicles

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**Board Used:** STM32F103C8T6 (Blue Pill)

**Power Source:** 5V Battery (used for GSM module only)

## Power Supply

* Power the STM32 board via USB (through ST-Link or FTDI)
* Connect the 5V battery to SIM800L GSM module (directly or via AMS1117 3.3V regulator)
* Make sure the GSM module ground is connected to STM32 GND

## Sensor Connections

|  |  |  |
| --- | --- | --- |
| **Sensor** | **Pin on STM32** | **Notes** |
| LM35 (Analog Temp) | PA1 (ADC) | Vout to PA1, GND, VCC (5V) |
| DHT22 | PA0 | Digital pin, add pull-up resistor |
| MQ-2 (Digital Out) | PA6 | Digital HIGH/LOW |
| Flame Sensor | PA4 | IR flame detector, digital LOW = flame |
| Buzzer | PA5 | Digital Output, active HIGH |
| INA219 (Optional) | SDA: PB7, SCL: PB6 | I2C voltage/current monitoring |
| 20x4 I2C LCD | SDA: PB7, SCL: PB6 | I2C LCD, address 0x27 |
| GPS Module (NEO-6M) | TX → PA3, RX → PA2 | Connect GPS TX to STM32 RX |
| GSM Module (SIM800L) | TX → PA10, RX → PA9 | Baud: 9600, AT commands |

## Uploading the Code

1. Open the `.ino` file in Arduino IDE
2. Select Board: Generic STM32F103C series
3. Upload method: STM32CubeProgrammer (SWD) if using ST-Link, or Serial for USB-TTL
4. Install libraries:  
    - DHT sensor library  
    - TinyGPS++  
    - Adafruit INA219 (if used)  
    - LiquidCrystal\_I2C
5. Click Upload

## Execution Flow

* On power-up, LCD shows “FDAS SYSTEM”
* Sensors begin sampling
* Safe readings → display values on LCD
* Smoke detected → LCD warns, no SMS
* Flame detected → Buzzer ON, GPS acquired, SMS sent
* Message format:  
   FLAME DETECTED  
   Lat: 12.957709  
   Lng: 77.528410

## Testing Procedure

* To simulate temperature: Use hairdryer over LM35
* To simulate smoke: Light incense near MQ-2
* To simulate flame: Use lighter or matchstick near flame sensor
* Check serial monitor: Verify temperature, flame, smoke status, and GPS
* Check mobile phone: Verify SMS received from SIM800L

## Precautions

* Don’t exceed 5V to SIM800L (use regulator)
* GSM antenna should be properly connected
* DHT22 can give NaN if not initialized properly
* GPS takes 30–60 seconds to get fix outdoors