Project Report

Student Name: Aravind Kumar
UID: 24MCI10171
Branch: AIML
Section/Group: 24MAM-3B
Semester: 3rd
Date of Performance: 7-11-2025
Subject Name: IOT
Subject Code: 24CAH-723

1. **Aim:** To design and implement an IoT-based fire and smoke detection system using Arduino that monitors fire and smoke and alerts via an alarm. The system is powered by direct laptop connection (without battery) and displays real-time status on an OLED display.
2. **Objectives:**
   - To detect the presence of flammable gas and fire in the surroundings.
   - To alert users immediately through buzzer, LED, and mobile notifications.
   - To display real-time sensor readings on an OLED display and Blynk app.
   - To ensure a low-cost, reliable, and real-time IoT safety system.
3. **Components Required:**

Sno	Name of Component	Quantity
1	NodeMCU (ESP8266)	1
2	Flame Sensor Module	1
3	Smoke Sensor Module (MQ2)	1

4	OLED Display	1
5	Buzzer	1
6	Mini Breadboard	1
7	Jumper Wires	As required
8	USB Cable (to laptop)	1

4. Details of Components:

1. NodeMCU:

The NodeMCU board is a low-cost, open-source IoT platform widely recognized for its user-friendly approach to building Internet-connected projects. Based on the ESP8266 WiFi chip, it combines a microcontroller with WiFi capabilities, enabling developers to create connected devices with ease.

2. MQ2 Gas Sensor:

The MQ2 sensor is capable of detecting a wide range of combustible gases such as LPG, methane, butane, and smoke. It consists of a small heater and an electrochemical sensing layer made of tin dioxide (SnO2), which has lower conductivity in clean air. When gas is detected, its resistance drops, and the output voltage increases. The NodeMCU reads this change and determines if gas concentration exceeds the threshold level.

3. **Flame Sensor**:

The flame sensor is designed to detect infrared light emitted by flames. It consists of a photodiode that reacts to the IR spectrum of fire. When a flame is present, it outputs a LOW signal (0), which the NodeMCU interprets as fire detection. It is a simple yet effective sensor for fire alert systems, making it suitable for real-time fire detection.

4. **OLED Display:**

The OLED (Organic Light Emitting Diode) display shows real-time sensor status and alerts. Compared to traditional LCDs, OLEDs have better contrast, lower power consumption, and faster response times, making them suitable for compact embedded systems

5. **Buzzer:**

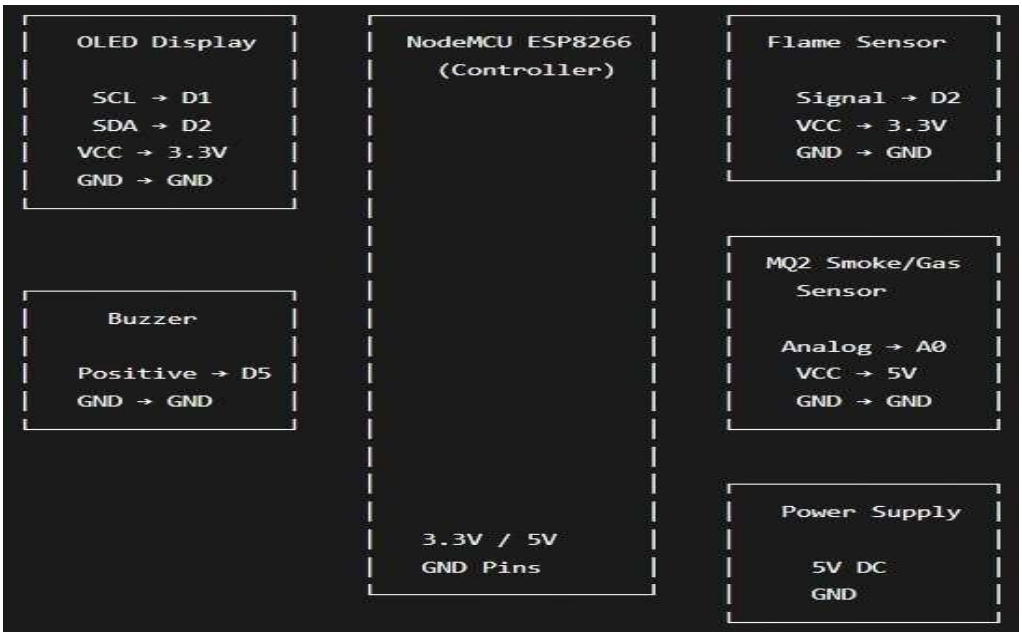
A buzzer is an audio signaling device that produces a sound alert when a dangerous condition is detected. It is connected to the NodeMCU and activated through a digital output pin. In this system, it serves as an alarm to notify the user locally about the presence of gas or fire.

6. Mini Breadboard and Jumper Wires:

These are used to build the prototype circuit by connecting all components without soldering, enabling easy testing and modifications.

5. Block Diagram of Designed Model:

The gas and flame sensors act as input devices and send their readings to the NodeMCU. The NodeMCU processes this data and communicates with the Blynk cloud through Wi-Fi. Based on the readings, it triggers output devices like the buzzer and LED. The OLED display continuously shows live sensor data and status messages.



i. **Central Controller: NodeMCU ESP8266 The main microcontroller that:**

- Reads sensor data
- Processes information
- Controls output devices
- Can connect to WiFi for IoT capabilities

ii. **Sensing Layer (Input Devices)**

a. Flame Sensor

- Detects infrared light emitted by flames
- Sends digital signal to NodeMCU when fire is detected
- Connection: D2 (GPIO4) - Digital Input

b. **MQ2 Smoke/Gas Sensor**

- Detects various gases and smoke particles
- Provides analog readings (0-1024) based on gas concentration

- Connection: A0 - Analog Input

iii. **Output Layer (Actuation & Display)**

a. **OLED Display**

- Visual interface for the system
- Shows real-time sensor readings
- Displays warnings and alerts
- Connection: I2C (D1-SCL, D2-SDA)

b. **Buzzer**

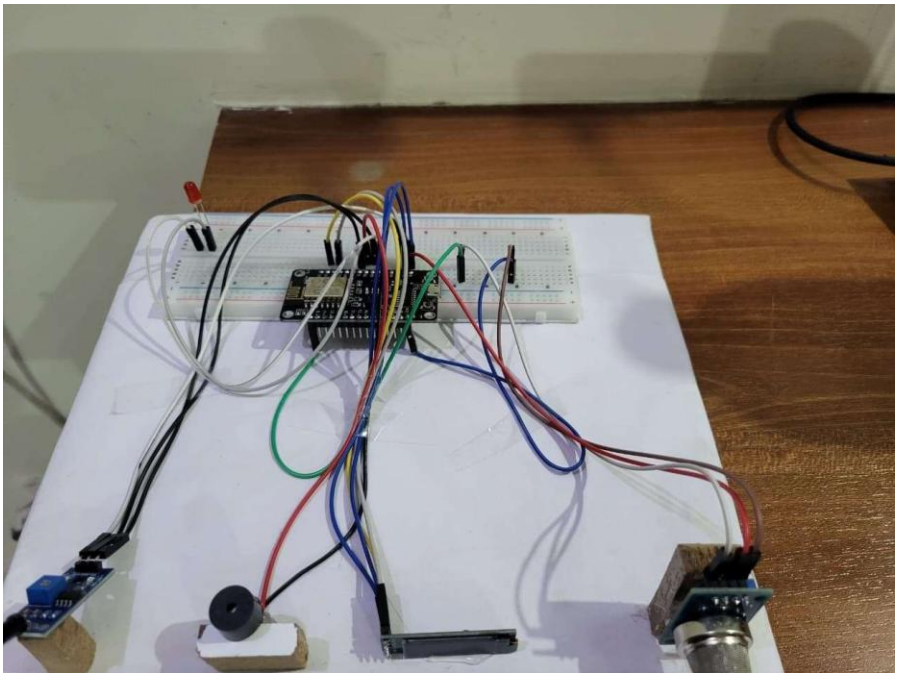
- Audible alarm system
- Activates during dangerous conditions
- Connection: D5 (GPIO14) - Digital Output

iv. **Power Management**

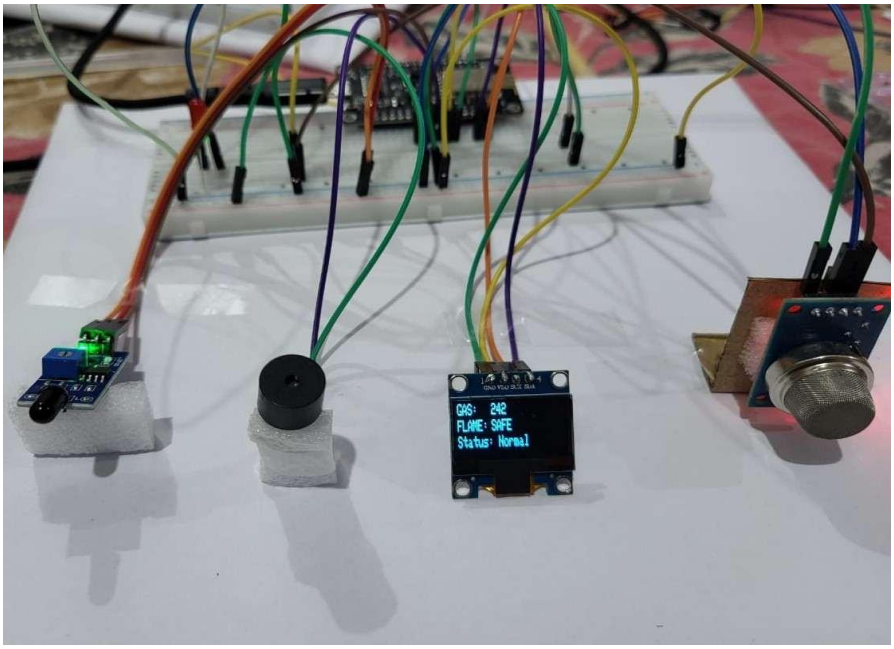
6. Working of Designed Model:

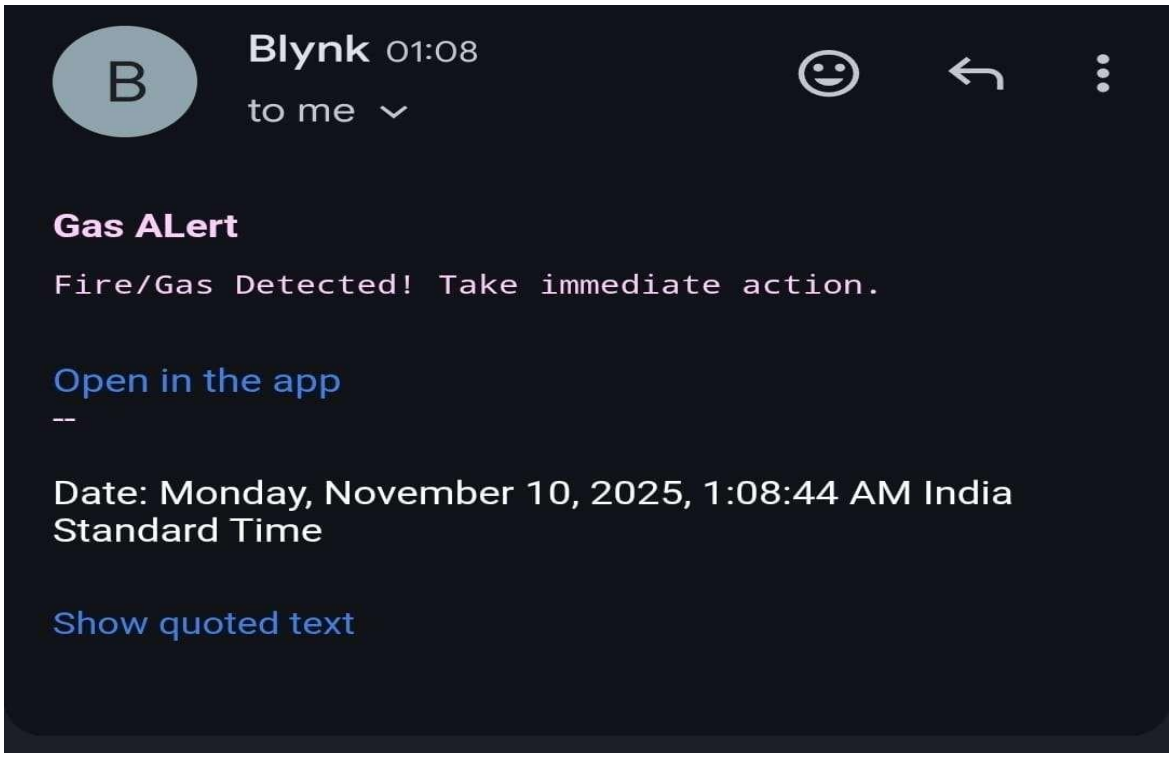
- The NodeMCU initializes all connected sensors, OLED, and Wi-Fi connection.
- The MQ2 gas sensor continuously monitors the air for smoke or gas concentration.
- The flame sensor checks for infrared light indicating fire presence.
- The OLED screen shows real-time gas values and flame status as either “SAFE” or “FIRE.”
- When the gas level crosses the threshold or a flame is detected, the buzzer and LED are turned ON, and an alert message is sent to the Blynk app.
- The system automatically resets the alert once conditions return to normal, displaying “Status: Normal” on the screen.

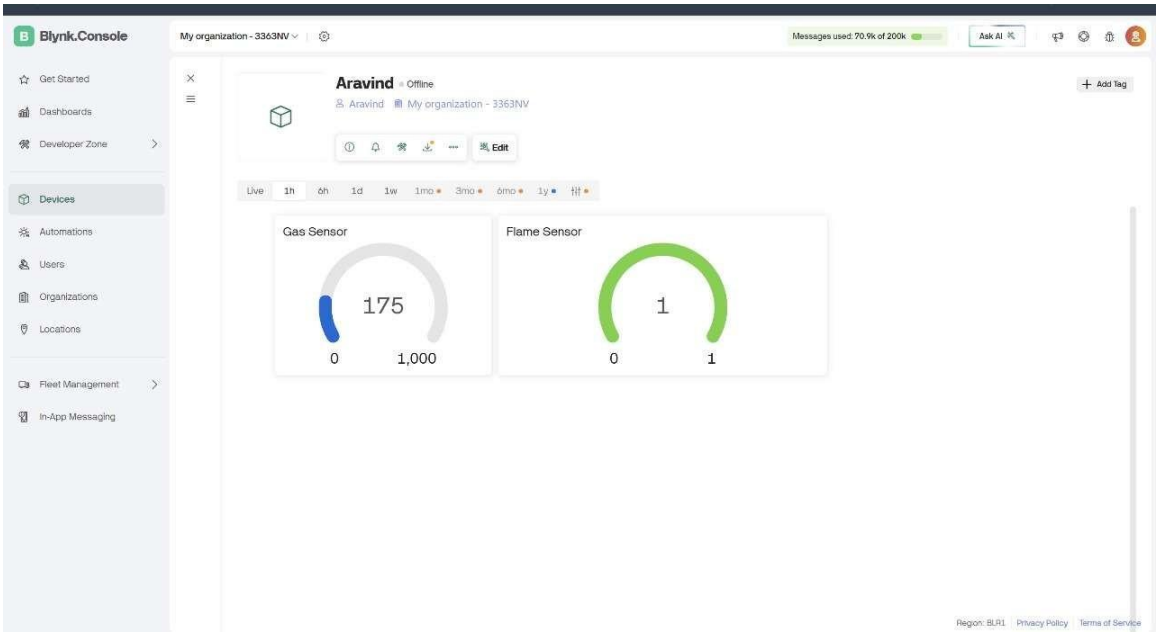
Pictures of Prototype:



Output of Deigned Model/Prototype :




B
Blynk 01:08
to me
Gas ALert
Fire/Gas Detected! Take immediate action.
Open in the app
--
Date: Monday, November 10, 2025, 1:08:44 AM India Standard Time
Show quoted text


Blynk.Console
My organization - 3363NV
Messages used: 70.9k of 200k
Ask AI
Get Started
Dashboards
Developer Zone
Devices
Automations
Users
Organizations
Locations
Fleet Management
In-App Messaging
Aravind
Offline
Aravind
My organization - 3363NV
Add Tag
Edit
Live
1h
6h
1d
1w
1mo
3mo
6mo
1y
Gas Sensor
175
0
1,000
Flame Sensor
1
0
1
Region: BLR1
Privacy Policy
Terms of Service

7. Learning outcomes (What I have learnt):

1. Learned how to interface multiple sensors with NodeMCU for IoT applications.
2. Understood Blynk platform integration for real-time monitoring and remote alerts.
3. Gained knowledge of OLED display usage for live data representation.
4. Learned the design of a practical safety monitoring IoT system using Wi-Fi-enabled microcontrollers.