Abstract

The **GAS Rescue Alert System** is a safety-oriented embedded project designed to detect harmful gases and provide immediate alerts to prevent accidents. Using an Arduino microcontroller, a gas sensor, and a GSM module, the system monitors the surrounding environment in real time. When gas levels exceed a predefined threshold, it triggers local alerts via a buzzer and LED, activates an exhaust fan for ventilation, and sends SMS notifications to registered contacts. This low-cost, portable solution is highly beneficial in homes, industries, and gas storage facilities to ensure early detection and quick preventive action against potential fire hazards and health risks.

Introduction

Gas leakage is one of the most common causes of domestic and industrial accidents, leading to fire outbreaks, explosions, and severe health issues. Traditional detection methods often rely on human observation, which can result in delayed responses. The **GAS Rescue Alert System** addresses this issue by combining gas sensing technology with IoT-enabled communication.

The system integrates an **MQ-series gas sensor** with an **Arduino microcontroller** to continuously monitor gas concentration levels. In case of abnormal gas detection, the device not only provides **immediate local warnings** but also communicates with external parties through a **GSM module**. Additionally, the system can control appliances such as an **exhaust fan** to reduce gas concentration.

This project highlights the application of **embedded systems, IoT, and automation** in developing practical safety solutions that are affordable, reliable, and easily deployable for public use.

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⚡ Features

- Real-time gas leakage detection.

- Buzzer and LED alerts for immediate warning.

- GSM module sends SMS alerts to registered contacts.

- Automatic exhaust fan activation for ventilation.

- Low-cost, portable, and easy to implement.

⚡ Components Used

- Arduino Uno / Nano

- Gas Sensor (MQ-2 / MQ-135)

- GSM Module (SIM800L / SIM900)

- Buzzer & LED

- Relay Module + Exhaust Fan

- Power Supply

⚡ Working Principle

1. The gas sensor continuously monitors air quality.

2. If gas concentration exceeds the **safe threshold**:

- Buzzer and LED are activated.

- An SMS alert is sent via GSM module.

- Exhaust fan is turned on to reduce gas levels.

3. Alerts ensure users take quick preventive response

⚡ Applications

- Residential kitchens

- Gas storage facilities
- Industrial plants
- CNG/LPG vehicles

⚡ Sample Code

```
 #include <SoftwareSerial.h>
int gasSensor = A0;     // MQ-2 Sensor
connected to A0 int buzzer = 8;        //
Buzzer pin int led = 7;          // LED pin int
fan = 9;          // Relay/Fan pin

SoftwareSerial gsm(2, 3); // RX, TX for GSM Module

void setup() {
pinMode(buzzer,OUTP);
pinMode(led, OUTPUT);
pinMode(fan, OUTPUT);
```

```
Serial.begin(9600);
gsm.begin(9600);
}

void loop() {   int gasValue =
analogRead(gasSensor);

  if (gasValue > 400) { // Threshold
value
digitalWrite(buzzer, HIGH);
 digitalWrite(led, HIGH);
digitalWrite(fan, HIGH);
 Serial.println("Gas Leakage Detected!");
  sendSMS("   Gas Leakage Detected! Take Immediate Action.");
   delay(5000);
  } else {
digitalWrite(buzer,
LOW);
digitalWrite(led,
```

```
LOW);
digitalWrite(fan,
LOW);
 }
}

void sendSMS(String msg) {   gsm.println("AT+CMGF=1");
delay(1000);   gsm.println("AT+CMGS=\"+91XXXXXXXXXX\"");
// Replace with your number   delay(1000);   gsm.print(msg);
delay(1000);

 gsm.write(26); // Ctrl+Z to send SMS
delay(5000);
}
```

Conclusion

The GAS Rescue Alert System demonstrates how embedded systems and IoT can be effectively applied to create life-saving safety solutions. By integrating an Arduino, gas sensor, and GSM module, the project ensures early detection of hazardous gas leaks and provides instant alerts through both local alarms and remote communication. The addition of an automatic exhaust fan control further enhances safety by reducing gas concentration in critical situations.

This low-cost, portable system is easy to implement in homes, industries, and vehicles, making it a practical and impactful project for society. With future enhancements such as IoT cloud integration and AI-based risk prediction, the system can be scaled into a more advanced and reliable smart safety solution.