"Fire Alarm System using Gas and Temperature Sensors"

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Introduction to Fire Alarm Systems

Fire alarm systems are essential safety devices designed to **detect fire hazards early** and provide **timely warnings** to prevent disasters. These systems use **sensors** to identify signs of fire, such as **smoke, gas, heat, or flames**, and trigger alarms to alert people in the area.

Importance of Fire Alarm Systems:

- **Early Detection:** Helps prevent fire spread by detecting danger in the initial stages.
- **Life Safety:** Warns people, allowing them to evacuate safely.
- **Property Protection:** Reduces damage to buildings and assets.
- **Integration with Other Systems:** Can be connected to sprinklers, emergency lights, and smart systems for **automatic response**.

- In this project, we are designing a **fire alarm system using gas and temperature sensors**. It detects dangerous gas leaks and rising temperatures, activating a buzzer when fire risks are detected. This system enhances **fire safety** in homes, offices, and industries. 🚨🔥

Importance of Detecting Both Smoke/Gas and Temperature

- A reliable fire detection system should monitor **multiple indicators** of fire to ensure early and accurate detection.

Why Use Both Sensors?

1. **Early Fire Detection:**
    1. **Gas sensors** detect smoke, gas leaks, or burning materials **before flames appear**.
    2. **Temperature sensors** detect rising heat, indicating fire presence even when there is no visible smoke.
2. **Improved Accuracy:**
    1. **Gas/smoke detection alone** can give false alarms due to dust, cooking fumes, or pollution.
    2. **Temperature alone** may not detect smoldering fires that produce a lot of smoke but little heat.
    3. **Combining both sensors reduces false alarms and ensures reliability.**
3. **Enhanced Safety:**
    1. Provides faster warnings in **kitchens, industries, and hazardous environments**.
    2. Helps prevent both **gas leaks** (like LPG, methane) and **overheating equipment fires**.

Overview of the Project

- This project is a **fire alarm system using a gas sensor and a temperature sensor with an Arduino Uno**. It continuously monitors the air for dangerous gas levels and checks for temperature spikes.

How It Works:

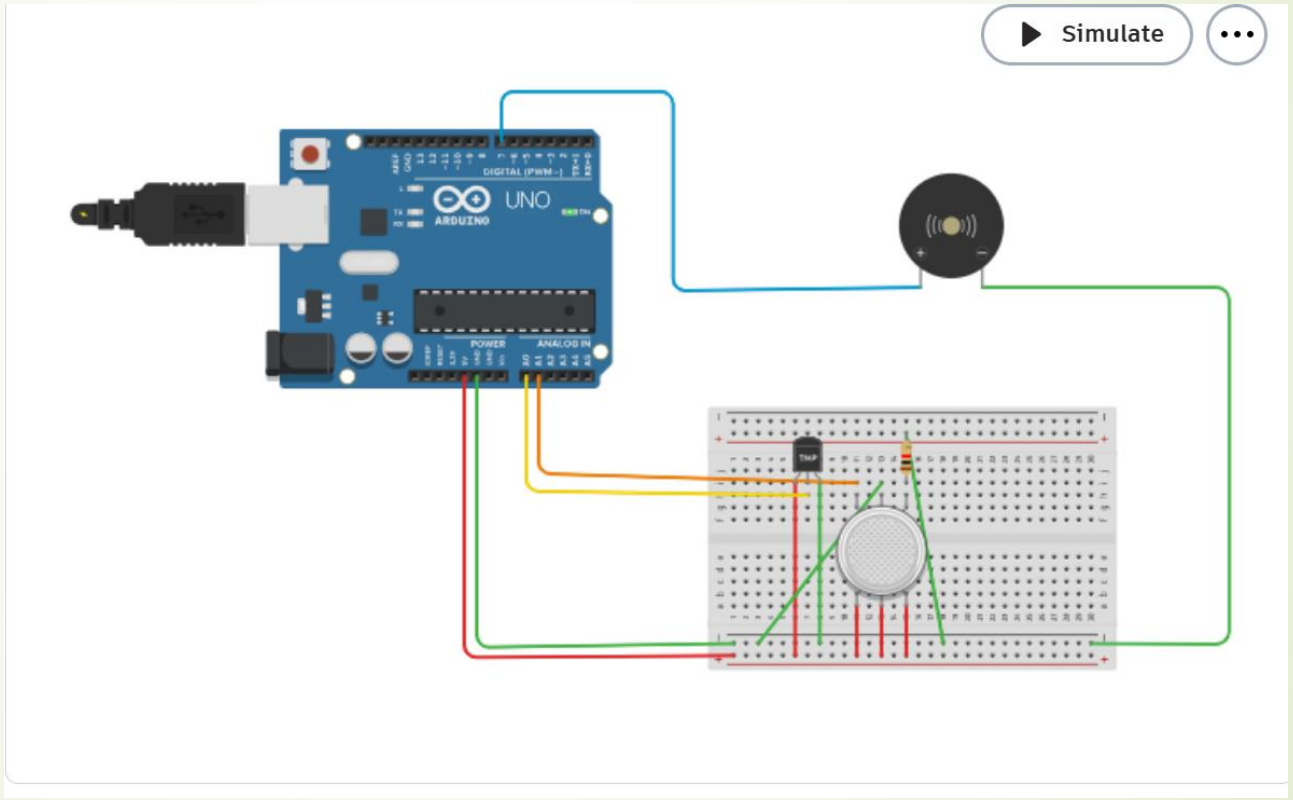
1. The **gas sensor** detects smoke, LPG, methane, or other gases.
2. The **temperature sensor** measures the ambient temperature.
3. If either gas levels or temperature exceed the set threshold, an alarm (buzzer) is activated.
4. The system also sends real-time data to the Serial Monitor for debugging and monitoring.

- This fire detection system is cost-effective, efficient, and can be enhanced with IoT integration for real-time notifications. 🚨🔥

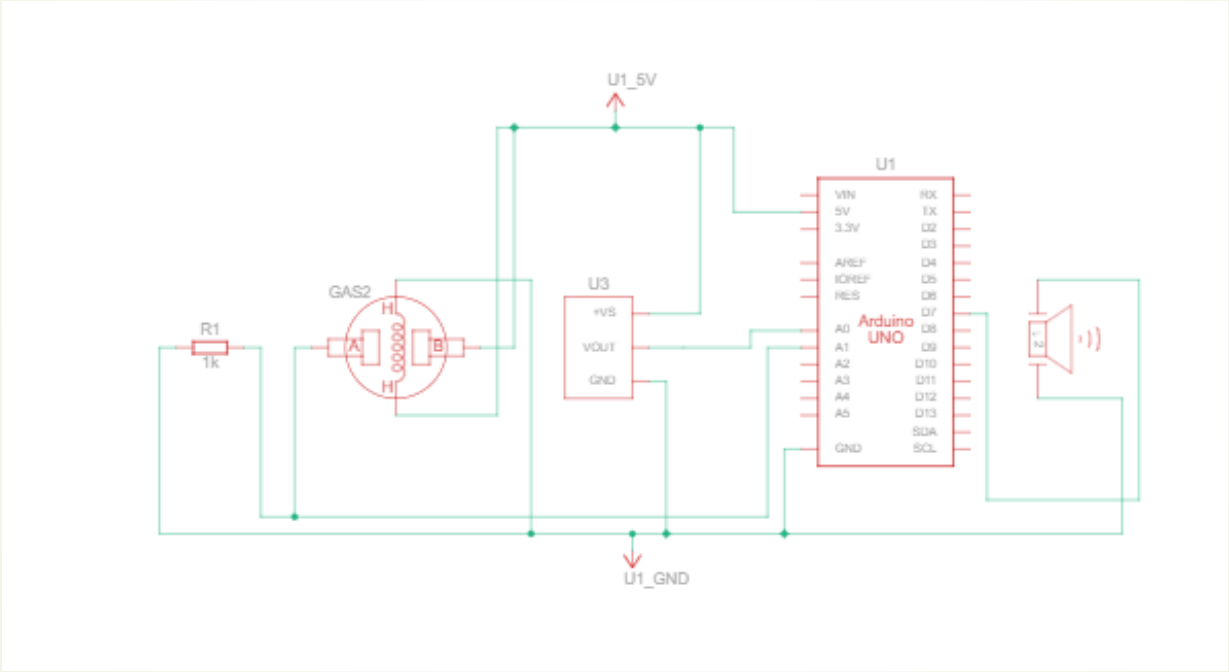
Components Used:

Name	Quantity	Component
U1	1	Arduino Uno R3
U3	1	Temperature Sensor [TMP36]
GAS2	1	Gas Sensor
PIEZO1	1	Piezo
R1	1	1 kΩ Resistor

SIMULATION MODEL:



CIRCUIT DIAGRAM:



Explanation of Implementation:

- Sensors detect gas concentration and temperature rise.
- If values exceed the threshold, Arduino activates the buzzer.
- The system provides an early warning against fire hazards.

Key Features:

✓ **Dual Detection:** Monitors both ***gas levels*** and ***temperature*** for higher accuracy.
✓ **Buzzer Alert:** Triggers an alarm when thresholds are exceeded.
✓ **Real-time Monitoring:** Displays sensor readings on the Serial Monitor.
✓ **Low-Cost & Efficient:** Ideal for homes, offices, and industries.

This system enhances **fire safety** by minimizing **false alarms** and ensuring **early detection**.

Future Scope:

- **Integration with IoT** (send alerts to mobile devices)
- **Adding an LCD Display** for real-time sensor values
- **Wireless Communication** with firefighting authorities
- Automatic Sprinkler System Activation

THANK YOU