Fire Alarm System Using Gate Logic

Digital Logic Design Project Report

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1. Objective:

To design and implement a fire detection alarm system using basic digital logic gates. The system detects a rise in temperature through a thermistor and activates a buzzer as an alarm.

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2. Components Used:

- 74LS08 IC (Quad 2-input AND Gate)
- Thermistor (NTC type)
- Buzzer
- LED (Visual indicator)
- Resistors:
    - 1kΩ
    - 10kΩ (×2)
    - 220Ω
- Capacitor: 10µF
- 9V Battery
- Breadboard and jumper wires

3. Circuit Description:

This project uses **AND gate logic** to activate an alarm when a fire is detected. The **74LS08** IC provides AND gates to logically process the input conditions.

Working Principle:

- A **thermistor** is used as a temperature sensor.
- At normal temperature, the thermistor has high resistance, resulting in a LOW signal.
- When exposed to heat (from fire), its resistance drops, producing a HIGH signal.
- Along with two other inputs (manual HIGHs), the AND gate produces a HIGH output when all three inputs are HIGH.
- The HIGH output activates the buzzer and LED as an alert.

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4. Working on the Project:

- The 9V battery powers the IC and circuit.
- Inputs X and Y are set using resistors; Z is connected to the thermistor.
- When the heat increases, Z goes HIGH.
- If X and Y are also HIGH, the AND gate output (Z) turns HIGH.
- This powers the buzzer and LED, indicating a fire.

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5. Hardware Implementation:

The circuit is assembled on a breadboard. The **74LS08** IC is placed at the center. A **thermistor** is used for detecting heat, connected with resistors and powered by a 9V battery. A **buzzer and LED** indicate the fire condition when triggered.
Your implementation matches the circuit diagram accurately and is fully functional.

6. Applications:

- Fire detection systems in homes, labs, and offices
- Educational projects on digital logic
- Cost-effective temperature alarm circuits

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7. Conclusion:

This project demonstrates how basic digital components like AND gates and thermistors can be combined to build an effective fire alarm system. It highlights practical applications of logic gates and sensor-based inputs in real-life safety devices.

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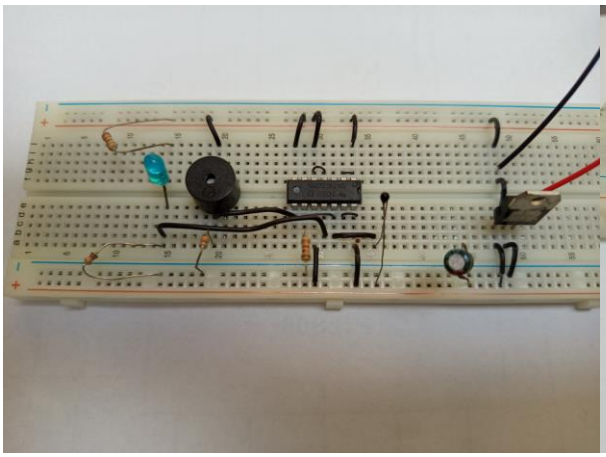
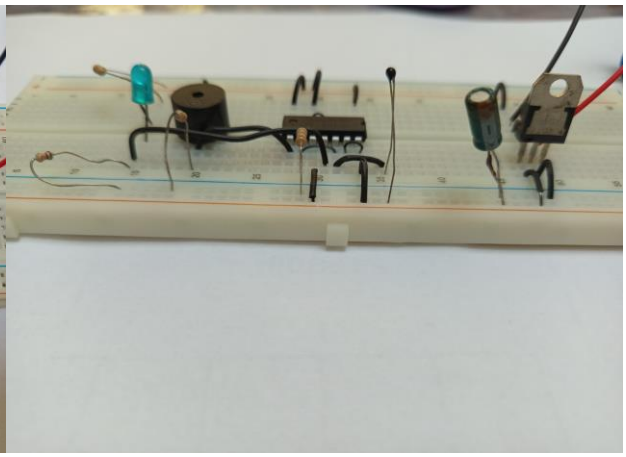
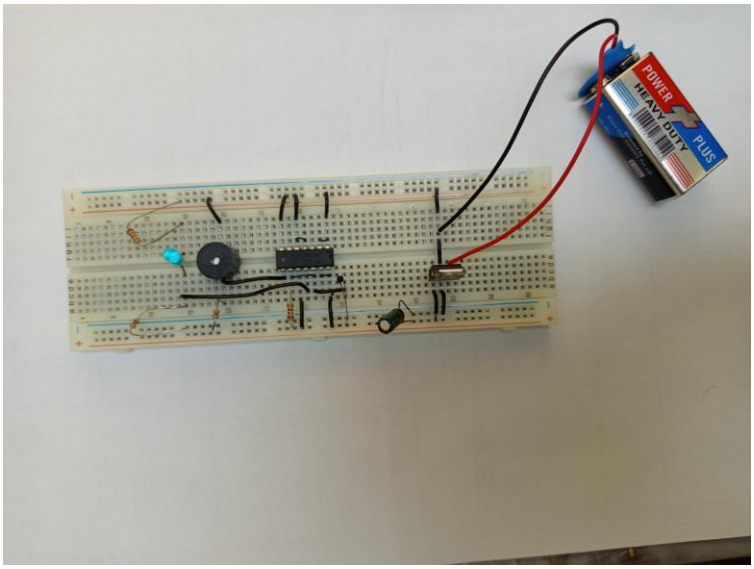
8. References:

- 74LS08 Datasheet
- Digital Logic Design Course Notes
- Practical Electronics Tutorials






POWER
HEAVY DUTY
PLUS

Fire Alarm With Gate Logic