The University of Azad Jammu and Kashmir, Muzaffarabad

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Subject	Computer Architecture & Logic Design
Project Topic	Fire Alarm System

Lab Report: Fire Alarm System

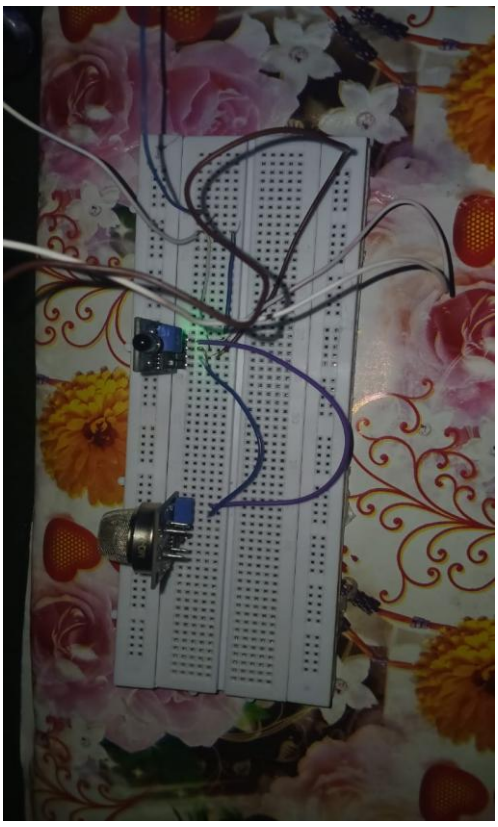
Objective

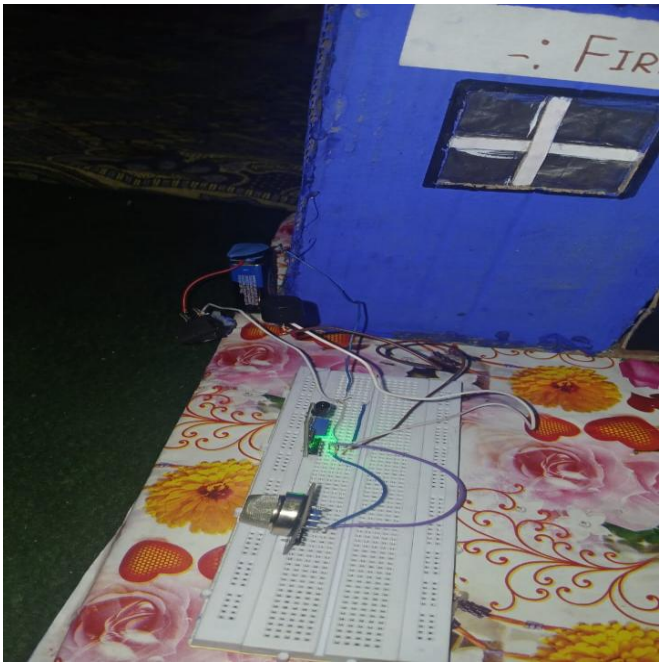
The objective of this experiment was to design and implement a basic **fire alarm system** using simple electronic components. The system is intended to detect smoke or fire and immediately alert through a buzzer.

Apparatus / Components Used

- **Battery (DC 9V / 12V)** – to provide power supply.
- **Breadboard** – for building the circuit without soldering.
- **IR Sensor** – to detect fire or flame by sensing infrared radiation.
- **Smoke Detector Sensor (MQ-2/MQ-135)** – to detect smoke in the environment.
- **Buzzer** – for audio alarm output.
- **Switch** – to turn the system ON/OFF.
- **Connecting Wires** – to establish connections between components.

Circuit Diagram





Theory

A fire alarm system is designed to sense the presence of **fire indicators** (smoke, gas, or infrared light from flames). In this project:

- The **IR sensor** detects the heat/flame by sensing infrared radiation.
- The **smoke detector** senses the concentration of smoke particles in the air.
- If either sensor detects abnormal conditions, the circuit is triggered.
- The **buzzer** produces a loud sound to alert nearby people.
- The **switch** is used as a control to turn the system ON or OFF.

Procedure

1. Place all components on the **breadboard**.
2. Connect the **battery** to the power rails of the breadboard.
3. Connect the **switch** in series with the battery to control power.
4. Attach the **IR sensor** and **smoke detector** outputs to the input pins of the buzzer circuit.
5. Ensure the sensors share a **common ground** with the battery.
6. Connect the **buzzer** to the output such that it receives current when a sensor detects fire/smoke.
7. Connect all parts with **jumper wires** carefully.
8. Power ON the circuit using the switch.
9. Test the system by bringing smoke (e.g., from a matchstick) near the sensor and/or flame near the IR sensor.

Observations

- When no fire or smoke was present, the buzzer remained **OFF**.
- On detecting smoke, the smoke sensor output triggered the buzzer.

- On sensing flame/heat (infrared radiation), the IR sensor activated the buzzer.
- The system responded immediately and produced a loud alarm.

Result

A **working fire alarm system** was successfully built and tested using a battery, IR sensor, smoke detector, switch, buzzer, and breadboard connections. The buzzer activated when smoke or fire was detected, proving the system can provide an early warning in case of fire hazards.

Applications

- Home and office fire alarm systems.
- Industrial safety monitoring.
- Laboratories and storage areas with flammable materials.

Conclusion

The experiment demonstrated the successful design of a low-cost and effective **fire alarm system**. Using simple electronic components, the system was able to reliably detect fire or smoke and produce an alarm, showing the importance of electronics in safety applications.