

Fire Alarm System Prototype

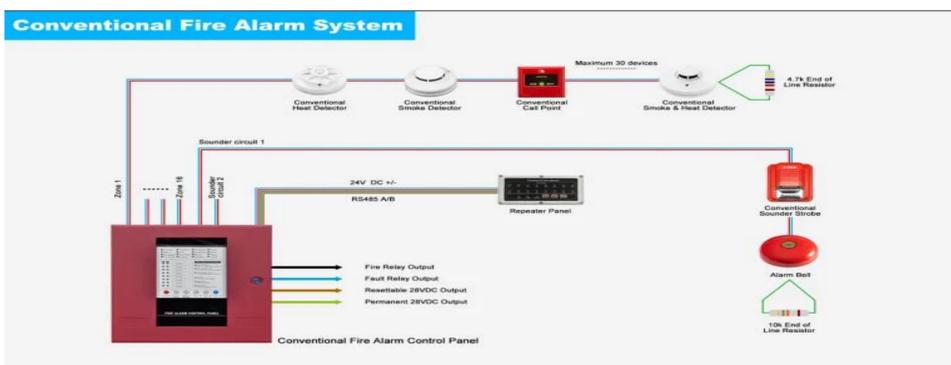
Introduction

This project aims to implement a practical prototype of an automatic Fire Alarm System. The system is based on a microcontroller as the main control unit. It focuses on early fire detection using sensors. The system automatically activates alarm and response mechanisms. It simulates real fire alarm systems used in buildings.

Objectives

- 1- Detect smoke or gases using specialized sensors.
- 2- Process sensor data using a control unit.
- 3- Activate an automatic alarm and response system when a fire occurs.
- 4- Simulate a Sprinkler System.
- 5- Simulate a Smoke Extraction System.
- 6- Provide backup power for emergency situations.

System Overview



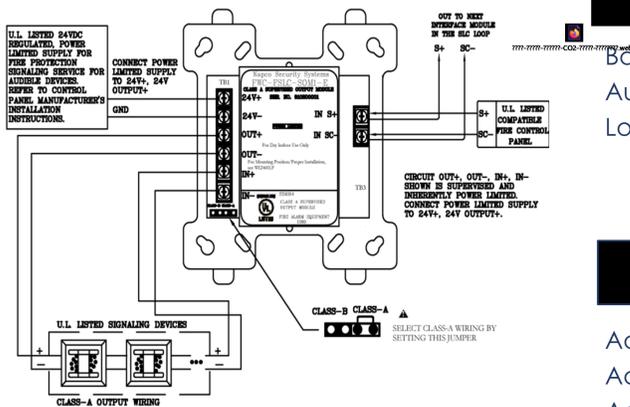
Fire Alarm System

Project Description

The project is a practical prototype of a Fire Alarm System.

It is based on a microcontroller. The goal is to simulate early fire detection.

The system also simulates automatic response to fire incidents.



System Concept



- 1- The system uses smoke and gas sensors connected to a microcontroller.
- 2- In normal conditions, the system works in Monitoring Mode.
- 3- When the smoke level exceeds a predefined threshold value.
- 4- The system automatically triggers the response actions.

Implemented Components

- 1- Mechanical structure of the prototype was designed.
- 2- Smoke and gas sensors were installed.
- 3- The microcontroller was programmed to analyze readings.
- 4- A Relay Module was used to control external loads.
- 5- Red LED works as a visual alarm.
- 6- Fan simulates the smoke extraction system.
- 7- Water pump simulates the sprinkler system.
- 8- Backup battery simulates emergency power.



Operating Mechanism

- 1- Sensor reads the smoke level.
- 2- Microcontroller compares it with the reference value.
- 3- If the threshold is exceeded.
- 4- The microcontroller sends a signal to the relay.
- 5- The relay activates the pump, fan, and alarm.



Current Project Status

Basic system successfully implemented. Automatic response tested. Loads verified and operating correctly

Remaining Work (Final Phase)

- Add Buzzer / Siren (audible alarm).
- Add LCD display to show system status (Normal – Fire – Gas Level).
- Add Manual Call Point for manual activation.
- Organize wiring inside a professional enclosure box.
- Perform accurate sensor calibration to reduce False Alarms.
- The next phase aims to upgrade the prototype toward an industrial-level system.

Supervisor and Team

Supervisor by: Dr.Eng.Abdelaziz Ismail Dr.Eng.Consultant/Ehab Gafar
Team Members:

- 1- Mohamed Omer Abosreia
- 2- Ibrahim Mahmoud
- 3- Gamal Maher
- 4- Mahamed Amir
- 5- Saad Eldin
- 6- Seif Ehab
- 7- Hassan Tamer
- 8- Ahmed Abdulaziz

