



K. J. Somaiya College of Engineering, Vidyavihar, Mumbai 400077.
(A Constituent College of Somaiya Vidyavihar University.)



Fire Alarm

Submitted as a Part of PCB Workshop
FY Comps
A3 Batch

51

Meet Gala (1601012105)
Ritvik Jindal (16010121073)
Manan Ganatra (16010121053)
Aaryan Golatkar (16010121060)
Dhruv Gundecha (16010121062)
Om Ghadia (16010121057)
Devesh Jain (16010121070)


30.06.22
Project Guide

Under Guidance of
Prof. Savitri Raut

Examiners 
30.06.22

Workshop Superintendent
Date:

Principal

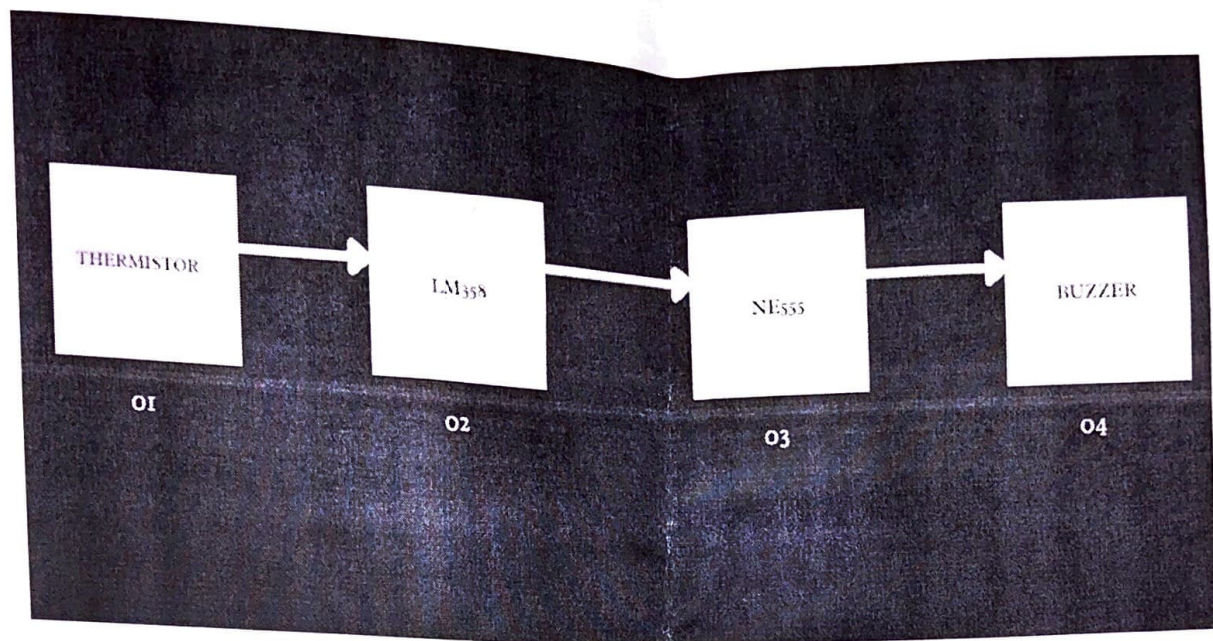


Index

- INTRODUCTION
- PROJECT OVERVIEW
- CIRCUIT DIAGRAM
- TECHNICAL DESCRIPTION
- SCHEMATIC DIAGRAM
- CIRCUIT EXPLANATION
- COMPONENTS LIST
- COMPONENTS DESCRIPTION
- PCB LAYOUT



Block Diagram





Project Overview :

A fire alarm system warns people when smoke, fire, carbon monoxide or other fire-related emergencies are detected. These alarms may be activated automatically from smoke detectors and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns. They can also be speaker strobes which sound an alarm, followed by a voice evacuation message which warns people inside the building not to use the elevators. Fire alarm sounders can be set to certain frequencies and different tones including low, medium, and high, depending on the country and manufacturer of the device

COMPONENTS

- 1-10K RESISTOR
- 1-Lm358 operational amplifier
- 1-4.7k ohms resistor(1/4 watt)
- 1-10k(ohm) potentiometer
- 1-Small buzzer(5V)
- Connecting wires
- Mini breadboards
- 5v power supply

Buzzer EB2209A (5V)

This buzzer is an active buzzer, which basically means that it will buzz at a predefined frequency (2300 ± 300 Hz) on its own even when you just apply steady DC power. If you are looking for a buzzer can produce varied tones from an oscillating input signal, then take a look at our passive buzzer.

SPECIFICATIONS:

- Longer pin is the positive pin
- Rated Voltage 5 V
- Operating Voltage 4~8 V Max Rated Current ≤ 2 mA
- Min. Sound Output at 10cm 85 dB Resonant Frequency 2300 ± 300 Hz Operating Temperature -20°C to 45°C Dimensions (Excluding Pins)
- Height 9.16 mm (0.36")
- Diameter 11.78 mm (0.46")
- Weight 1.6 g (0.057 oz)

LM358 Operational Amplifier

LM358 is a Dual Operational Amplifier (Op – Amp) IC. All the functional modes of the typical operational amplifier can be implemented using LM358 IC. In this project though, we will be using the LM358 Operational Amplifier in the Comparator Mode where the input signals on inverting and non – inverting terminals are compared and corresponding output is produced.



Thermistor

Thermistors are Temperature Dependent Resistors i.e. the resistance of a Thermistor varies according to the ambient temperature. There are two types of Thermistors: PTC Thermistor and NTC Thermistor. PTC stands for Positive Temperature Coefficient and NTC stands for Negative Temperature Coefficient. In PTC Thermistor, the resistance is directly proportional to the temperature and in NTC Thermistor, the resistance is inversely proportional to the temperature.

In this project we have used a $10\text{ K}\Omega$ Thermistor with NTC. At 250°C , the resistance of the $10\text{ K}\Omega$ Thermistor is $10\text{ K}\Omega$. Applications:

Thermistors are often selected for applications where ruggedness, reliability and stability are important. They're well suited for use in environments with extreme conditions, or where electronic noise is present. They're available in a variety of shapes: the ideal shape for a particular application depends on whether the thermistor will be surface-mounted or embedded in a system, and on the type of material being measured. They're used in the food and beverage industries, in scientific laboratories and in R&D. They are suitable for immersion in corrosive fluids, and can be used in industrial processes.

Potentiometer

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.

Mini Breadboard

This is a very small breadboard with self-adhesive backing. With 170 tie points there's just enough room to build and test simple circuits. They're also great for breaking out DIP package ICs to jumper wires.

They're useful for basic prototyping, but breadboards don't accommodate anything with two closely spaced rows of pins, such as the header on the Raspberry Pi. The Pi header needs a special breadboard adaptor to separate the pins so that they sit either side of the central notch. The same applies to many surface mount components, which have two rows of pins (known as a dual-in-line layout) and must sit over the central notch.

Resistor

A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. Resistors can also be used to provide a specific voltage for an active device such as a transistor.



Power Supply

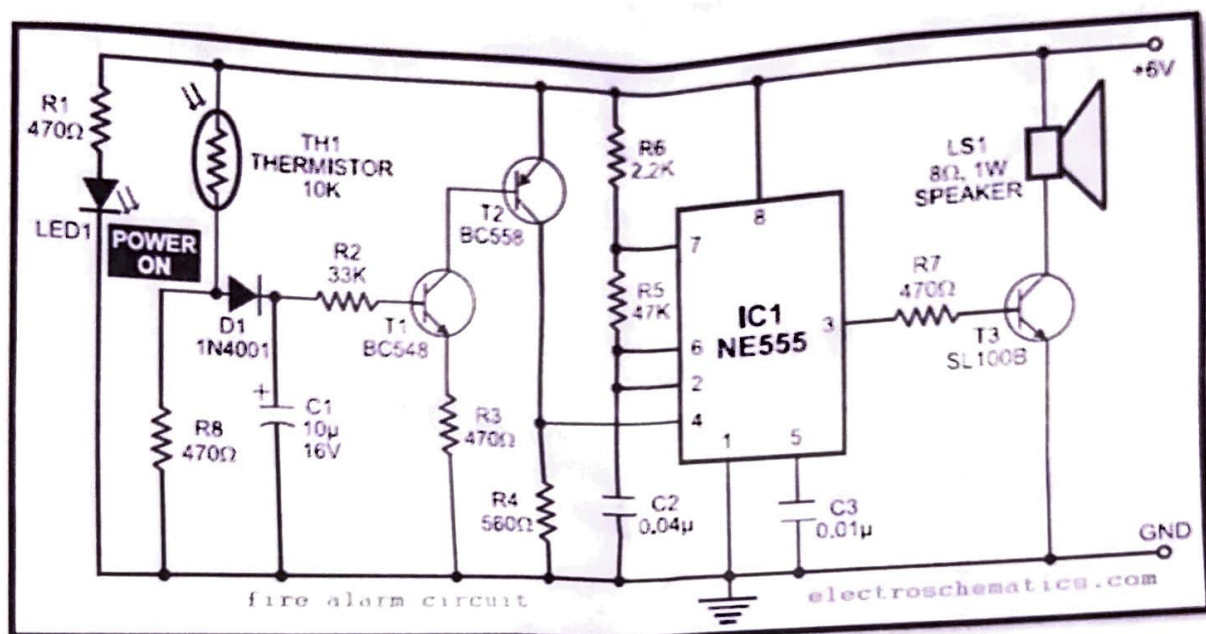
It is a device providing power to electronic equipment and sometimes designated A, B, or C according to its function of heating vacuum tube cathodes, causing a flow of electron current in plate circuits, or applying a direct voltage in grid circuits

Connecting wires

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.



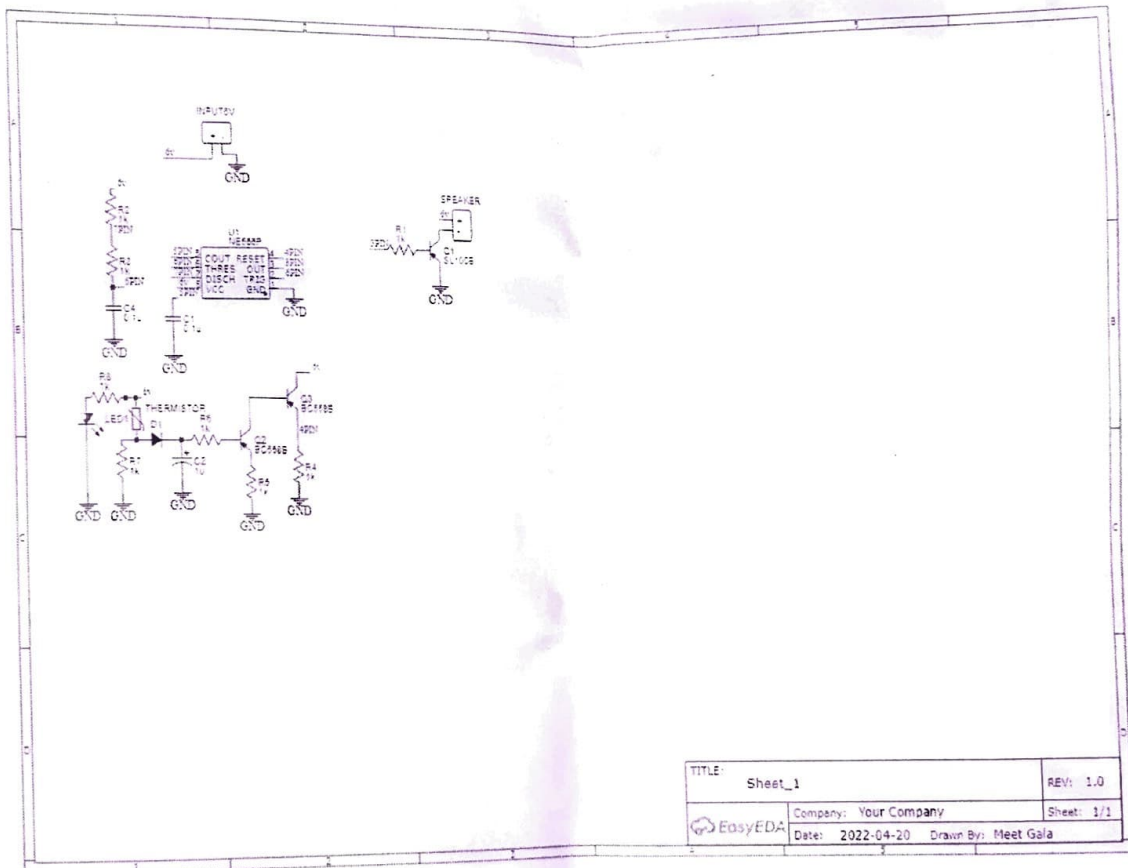
Circuit Diagram



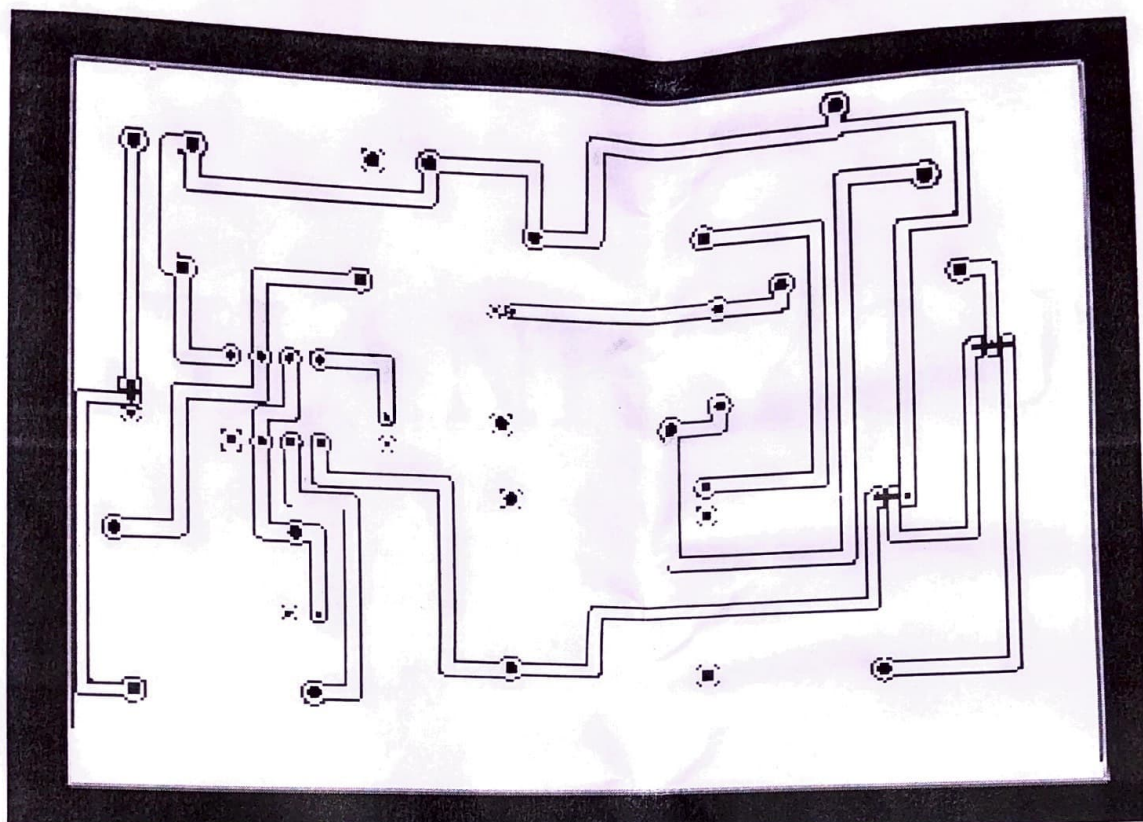
Working Action

First thing to know is that the main component in detecting the fire is the 10 K Thermistor. As we mentioned in the component description, the 10 K Thermistor used here is a NTC type Thermistor. If the temperature increases, the resistance of the Thermistor decreases. In case of fire, the temperature increases. This increase in temperature will reduce the resistance of the 10 K Thermistor. As the resistance decreases, the output of the voltage divider will increase. Since the output of the voltage divider is given to the non – inverting input of the LM358 Op – Amp, its value will become more than that of the inverting input. As a result, the output of the Op – Amp becomes high and it activates the buzzer.

PCB Schematic



PCB Top and Bottom Layer





K. J. Somaiya College of Engineering, Vidyavihar, Mumbai 400077.
(A Constituent College of Somaiya Vidyavihar University.)



THANK YOU!