FIRE SAFETY ALARM SECURITY SYSTEM

Submitted By:

I.D NUMBER	STUDENT NAME
19101495	Rayhan Zaman Rafee

Sec-1, CSE-474

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Meem Arafat Manab

ABSTRACT

Fire Alarm Circuit is a simple circuit that detects the fire and activates the Siren Sound or Buzzer. Fire Alarm Circuits are very important devices to detect fire in the right time and prevent any damage to people or property.

Fire Alarm Circuits and Smoke Sensors are a part of the security systems which help in detecting or preventing damage. Installing Fire Alarm Systems and Smoke Sensors in commercial buildings like offices, movie theatres, shopping malls and other public places is compulsory.

There are many expensive and sophisticated Fire Alarm Circuit in the form of stand-alone devices, but we have designed five very simple Fire Alarm Circuits using common components like Thermistor, LM358, Germanium Diode, LM341 and NE555.

This is a very simple alarm circuit using Thermistor, LM358 Operational – Amplifier and a Buzzer. The primary purpose of fire alarm system is to provide an early warning of fire so that people can be. evacuated & immediate action can be taken to stop or eliminate of the fire effect as soon as possible. Alarm can be. triggered by using detectors or by manual call point (Remotely).

INTRODUCTION

A fire alarm system has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. 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. Most fire alarm systems in Europe sound like a siren with alternating frequencies.

They are usually actuated by means of physical interaction, such as pulling a lever or breaking glass. Automatically actuated devices can take many forms intended to respond to any number of detectable physical changes associated with fire: convicted thermal energy; heat detector, products of combustion; smoke detector, radiant energy; flame detector, combustion gases; fire gas detector, and release of extinguishing agents; water-flow detector. The newest innovations can use cameras and computer algorithms to analyze the visible effects of fire and movement in applications inappropriate for or hostile to other detection methods.

TYPES OF TEMPERATURE DETECTING SENSORS

1. Resistance temperature detectors (RTDs)
2. Thermocouples
3. Thermistors
4. Infrared sensors
5. Semiconductor sensors

PRINCIPLE OR METHODOLOGY

The fire alarm working principle is based on thermistor used in the fire alarm circuit. This fire alarm circuit is used to identify and indicate an increase in temperature beyond certain value (temperature of an enclosed area). All Fire Alarm Systems essentially operate on the same principle. If a detector detects smoke or heat, or someone operates a break glass unit, then alarm sounders operate to warn others in the building that there may be a fire and to evacuate. A thermistor is an inexpensive and easily obtainable temperature sensitive resistor, thermistor working principle is it's resistance depends upon the temperature. When temperature changes, the resistance of the thermistor changes in a predictable way. The benefits of using a thermistor is accuracy and stability.

COMPONENTS REQUIRED

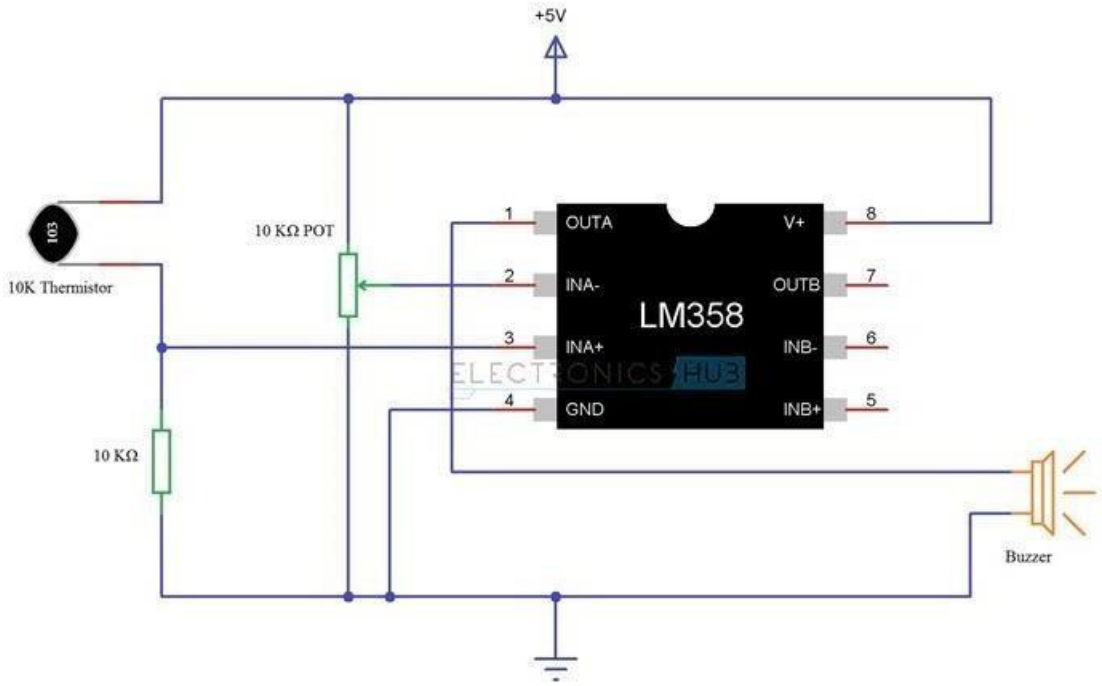
1. 10k Thermistor 1
2. LM358 Operational Amplifier (Op-Amp) 1
3. 4.7k ohm resistor (1/4 watt) 1
4. 10k ohm potentiometer 1
5. Small Buzzer (5v buzzer) 1
6. Connecting wires
7. Mini bread board
8. 5v power supply

CIRCUIT DIAGRAM

The circuit diagram of this simple Fire Alarm Project is shown in the following image.

Pins 8 and 4 of the LM358 IC i.e. V+ and GND are connected to +5V and GND respectively.

WORKING



CIRCUIT DESIGN

The design of the Fire Alarm Circuit with Siren Sound is very simple. First, connect the 10 KΩ Potentiometer to the inverting terminal of the LM358 Op - Amp. One end of the POT is connected to +5V, another end is connected to GND and the wiper terminal is connected to Pin 2 of Op - Amp.

We will now make a potential divider using 10 K Thermistor and 10 KΩ Resistor. The output of this potential divider i.e. the junction point is connected to the non – inverting input of the LM358 Operational Amplifier.

We have chosen a small, 5V buzzer in this project to make the alarm or siren sound. So, connect the output of the LM358 Op - amp to the 5V Buzzer directly.

We will now see the working of the simple Fire Alarm Circuit. 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.

ADVANTAGES

- Low cost

- Reliable
- Fast response
- Circuit can be easily constructed
- High level security
- Easy to design
- Easy to modify
- Low power consumption
- Early warning benefits
- Can easily be installed anywhere in commercial buildings
- Early warning is essential to effective fire safety because fires can occur at any time any place
- Detection distance
- Speed of response
- Sensitivity
- Range of applications
- Portable

DISADVANTAGES

- False alarm
- Blinded by thick smoke
- Senses near range heat

CONCLUTION

Thus, we conclude from this fire alarm is used for safety and emergency purpose. This is not only use in houses but also in any type of buildings.

REFERENCES

1. https://www.electronicshub.org/simple-fire-alarm-circuit/#Circuit_Design
2. https://www.youtube.com/watch?v=cgsB6VmNGXo