



# BUBT

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BANGLADESH UNIVERSITY OF  
BUSINESS AND TECHNOLOGY

## **PROJECT REPORT**

### **ON**

*Fire Alarm Detector*

**Group: 04**

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## Introduction

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 ,Resistor, LM358 operational amplifier ,preset and buzzer.

We will see all these circuit, their circuit diagrams, components required for each circuit and the working of the individual circuit in the following sections.

## Objective

The objective is to warn the occupants of the building early enough to ensure that all are able to exit the building before escape routes become impassable. The primary motivation for fire alarm system requirements in building and fire codes is to provide early notification to building occupants and to notify the fire service so it can respond to the fire.

## Component required

1. 10k Thermistor
2. LM358 Operational Amplifier (Op-Amp)
3. 10k resistor
4. 10k preset
5. Small Buzzer

6. Connecting wires
7. Mini bread board
8. 9v battery

## Component Description

### **10K Thermistor:**

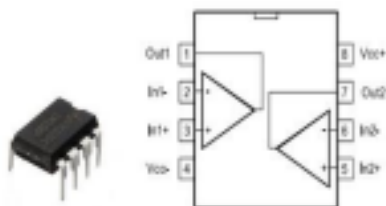
Thermistors are Temperature Dependent Resistors i.e. the resistance of a Thermistor varies according to the ambient temperature. There are two types of Thermistors: PTC Thermistor and NTC Thermistor. PTC stands for Positive Temperature Coefficient and NTC stands for Negative Temperature Coefficient. 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 K $\Omega$  Thermistor with NTC. At 25<sup>0</sup>C, the resistance of the 10 K $\Omega$  Thermistor is 10 K $\Omega$ . The following image shows the 10K Thermistor used in this project.



### **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.



### **Resistor:**

A Resistor is an electrical device that resists the flow of electrical current. It is a passive device used to control, or impede the flow of, electric current in an electric circuit by providing resistance.



#### **Preset:**

A preset is a three legged electronic component which can be made to offer varying resistance in a circuit. The resistance is varied by adjusting the rotary control over it. The adjustment can be done by using a small screw driver or a similar tool.



#### **Small buzzer:**

The buzzer consists of an outside case with two pins to attach it to power and ground. ... When current is applied to the buzzer it causes the ceramic disk to contract or expand. Changing the This then causes the surrounding disc to vibrate. That's the sound that you hear.



#### **Connecting wires:**

These are used to connect the components in the circuit.

These are used to allow current through them.

These are made up of copper, since copper is a good conductor of



electricity.

### **Mini bread board:**

Breadboards are designed to work with through-hole electronic components. These components have long metal leads that are designed to be inserted through holes in a printed circuit board

This board is divided into 4 parts, the 1<sup>st</sup> and 4<sup>th</sup> part slots are connected horizontally whereas 2<sup>nd</sup> and 3<sup>rd</sup> part slots are connected vertically.

The mini breadboard has 400 slots.

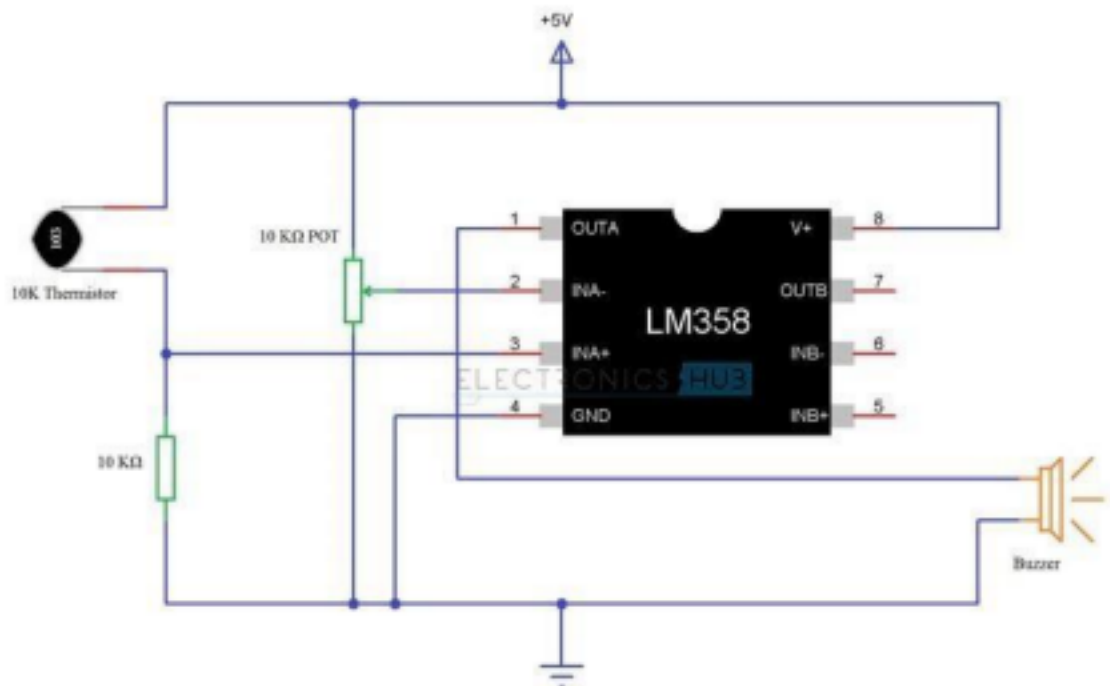


### **Battery:**

For this we used a 9v battery.

## **Circuit diagram**

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



## Methodology

The fire alarm working principle is based on thermistor used in the fire alarm circuit. The fire alarm circuit is used to identify and indicate an increase in temperature beyond certain value (temperature of enclosed area) all fire alarm systems essentially operate on the same principle of a detector detects heat then 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 its resistance depends upon the temperature. When temperature change in a predictable way. The benefits of using a thermistor is accuracy and stability.

## Working

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(fire) only
- Uses continuous power supply

## Conclusion

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.