

Hardware design & development of a fire alarm circuit in crowded places

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Abstract

This paper gives the brief design of the hardware model & its development of a fire alarm circuit in crowded places is presented in brief. 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). The work presented here is the mini-project work of the second sem students of Electronics & Communication Engineering Department of Dayananda Sagar College of Engg., Bangalore.

Keywords – Fire, Alarm, Detection, Put-off, Buzzer, Sound, Sensor.

1. Introduction

In our day-to-day life, we typically use several electronic appliances such as calling bell, TV remote, automatic outdoor lights, automatic door opening systems, fire alarm systems, etc [1]-[4]. These electronic home appliances are designed using various electronics projects that include sensor-based circuits, microcontroller-based circuits, embedded circuits, communication based projects and so on. In this article, let us discuss about simple fire alarm circuit using thermistor. The most essential electronic device at home or industry or any other place where there is a chance of fire accident is a fire alarm circuit. The fire alarm circuit can be defined as an electronic circuit used for identifying fire accident and alert. Thus, by using the fire alarm circuit, we can avoid financial loss and also save people from dangerous fire accidents [5]-[8]. Safety and health are two important parameters that humans should always take care of. These two things are necessary for doing any work anywhere, either workplace, or homes, or streets; safety matters. A safe workplace reduces injury and illness expenses, increases productivity and quality. To put it another way, safety is beneficial to the company. Safety comes with precautions. And that's why people are installing alarms on every level of industries, home, industries, etc. One of those alarms is the fire alarm, to immediately protect surroundings from fire [9]-[12]. Thus, this article discusses the fire alarm circuit diagram. Fig. 1 gives

the fire indication & observation by the human being whereas the Fig. 2 gives the problem statement & how to solve the defined problem [13]-[16].

2. Photographic Views



Fig. 1 : Fire indication & observation by the human being

3. Literature survey

A number of researchers, engineers, authors, students, faculties across the globe have worked on the fire alarm detection circuit. Here follows a brief review of the some of the base papers which we have followed and compared in the form of a table with their advantages & lacunas [17]-[20].

4. Scope, problem statement and objective

In this section, the scope of the paper, how the problem statement was defined and the objectives are presented in a concised manner in the form of bullet points [21]-[24].

- In big cities, the problem is associated with the space and high installation cost of fire alarms.
- Therefore, these are not affordable for middle class.
- So, we have designed a fire alarm system that all people can use. It will detect the fire and alerts the residents.
- Therefore, we have designed our problem statement as fire alarm circuit.
- It requires a less installation space.

5. Aim & Objectives

Here, the main aim & the objectives of the project work are presented [25]-[28]

- 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.
- The objective of this work is to construct a device that will detect the fire by monitoring environmental changes associated with combustion.

6. Methodology

The methodology is presented in this section [29]-[30].

- 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 enclosed area).

7. Photographs



Fig. 2 : Photographic view of the developed electronic circuitry for fire detecting using bread board

8. Results & Discussions

In this section, the results & discussions of the mini-project work is presented in a nutshell. It provides 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. A circuit is designed that will detect the fire by monitoring environmental changes associated with combustion. The Fig. 3 gives the designed electronic circuit diagram for the detection of the fire alarm, whereas the Fig. 4 gives the photographic view of the developed electronic circuitry for fire detecting using the bread board. Similarly, the Fig. 5 gives the basic components used in the development of the electronic fire alarm detection circuit, whereas the Fig. 6 gives the fire alarm detection symbols & hardware utilized. The experimental results shows the effectiveness of the methodology that was developed by the mini-project team.

9. Conclusion & Future Work

The hardware design & development of a fire alarm circuit in crowded places was presented in this paper. Here, the electronic circuitry was designed or different types of applications. Hence electronic circuits can be designed for the fire-based alarms and they provide very high efficiency and can be used for the security reasons. Early fire detection is best achieved by the installation and maintenance of fire detection equipment in all rooms and areas of the house or building. To overcome disadvantages and looking for implementation of automatic fire detection is one of the outcomes of the paper.

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