

### Dept. of Electronics and Communication Engineering

**G. L. BAJAJ INSTITUTE OF TECHNOLOGY AND MANAGEMENT**

**[Approved by AICTE, Govt. of India & Affiliated to A.K.T.U (Formerly U.P.T.U), Lucknow]**

# KEC-554

**MINOR PROJECT REPORT**

### On

**AUTOMATIC FIRE EXTINGUISHER USING BC547**

**TRANSISTOR**

Submitted for partial fulfillment of award of the degree of

### Bachelor of Technology

In

### Electronics and Communication Engineering

Submitted By

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# CERTIFICATE

Certified that Aditya Kumar Chaudhary, Ankit Rastogi & Aarish Shakil has carried out the Minor project work presented in this report entitled “AUTOMATIC FIRE EXTINGUISHER USING BC547 TRANSISTOR” for the award of Bachelor of Technology in Electronics and Communication Engineering during the Academic session 2023-24 from Dr. A.P.J. Abdul Kalam Technical University (Formerly U.P.T.U), Lucknow. The project embodies result of the work and studies carried out by Student himself and the contents of the report do not form the basis for the award of any other degree to the candidate or to anybody else.

**(Mr. Amiya Prakash) (Dr. Satyendra Sharma)**

(Minor project in charge) HOD, Dept. of ECE (Assistant Professor)

Dept. of ECE

Date:05/01/2024



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# DECLARATION

### We certify that

1. The work contained in this Project Report is original and has been done by us under the guidance of my supervisor.
2. The work has not been submitted to any other University or Institute for the award of any other degree or diploma.
3. We have followed the guidelines provided by the University in preparing the Report.
4. We have confirmed to the norms and guidelines in the Ethical Code of Conduct of the University
5. Whenever we used material (data, theoretical analysis, figures, and texts) from other Sources we have given due credit to them by citing them in the text of the report and giving their details in the references. Further, we have taken permission from the copywriters of sources, whenever necessary.



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**LIST OF ABBREVIATIONS & SYMBOLS**

LED Light Emitting Diode

K Kilo

Ω Ohm

**ABSTRACT**

The Automatic Fire Extinguisher with bc547 transistor is a fire suppression system designed to detect and extinguish incipient fires in enclosed spaces. The core of the system utilizes the bc547 transistor as a key component for signal amplification and control. The system incorporates various sensors such as heat and smoke detectors to identify the presence of a fire. Upon detection, the bc547 transistor, configured as a switch, activates the extinguishing mechanism. This mechanism can involve the release of a fire-suppressing agent or triggering a fire sprinkler system. The bc547 transistor, functioning as an amplifier and switch, plays a crucial role in ensuring a rapid and efficient response to the fire detection signals. The system is designed for simplicity, reliability, and cost-effectiveness, making it suitable for both residential and industrial applications. This automatic fire extinguisher aims to minimize response time, thereby reducing potential damage and enhancing overall fire safety. The integration of the bc547 transistor enhances the system's ability to handle the required switching operations effectively.

**CHAPTER-1**

**INTRODUCTION**

**1.1Overview:**

The Automatic Fire Extinguisher Device is a proactive approach to fire safety that utilizes electronic components to detect the presence of a fire and trigger an automatic fire extinguishing system. This project aims to provide an efficient and timely response to fire emergencies, minimizing potential damage and enhancing overall safety. By integrating sensors, a control circuit, and a fire extinguishing mechanism, this system can swiftly react to fire outbreaks without human intervention. Fire extinguishers are critical safety devices designed to suppress and control small fires before they escalate into larger, more dangerous conflagrations. These portable devices are a fundamental component of fire safety measures in residential, commercial, and industrial settings. Fire extinguishers are designed to be user-friendly, allowing individuals to respond quickly and effectively in the early stages of a fire emergency. An automatic fire extinguisher is a device designed to detect and suppress fires without human intervention. These systems are commonly used in various settings to provide quick and effective response to fires, minimizing damage and protecting lives. Automatic fire extinguisher systems are crucial in settings where rapid fire response is essential, such as commercial buildings, data centers, industrial facilities, and certain vehicles. It's important to follow local regulations and guidelines when installing and maintaining these systems to ensure their effectiveness and compliance with safety standards.

**1.2 BASICS OF FIRE EXTINGUISHER**

Fire extinguishers are external fire safety systems that are useful for extinguishing or controlling minor fires, often in emergencies. It is not intended for use in uncontrollable fire, such as when the fire has reached the ceilings, endangering the client's safety (e.g., no evacuation route, smoke, explosive hazard etc.) or otherwise requiring the capabilities of a fire service. A fire extinguisher normally consists of a portable cylinder pressure vessel carrying an agent discharging to suppress the fire.

**1.3 TYPES**

### Foam Extinguishers

Foam fire extinguishers are the most common form of fire extinguishers and they

are useful for flammable liquids fires.

### Water Extinguishers

They operate in the same manner as foam extinguishers. Water Extinguishers are

also used for fires caused by a variety of organic materials, including cardboard, and

wood.

* **Dry** **Powder** **Extinguishers**

A dry powder extinguisher is a very versatile fire extinguisher choice since

it can be used on almost all types of fires. They may also be useful in fires

involving electrical apparatus.

* **Wet** **Chemical** **Extinguishers**

Wet chemical extinguishers are used in class k fires, including cooking oils

And grease. They're also helpful in class a fire.

## CHAPTER-2

## CIRCUIT DIAGRAM AND WORKING

## 2.1 Circuit Diagram

## 

## 2.2Working

## When the temperature in the area rises above a certain threshold, the thermal sensor's resistance changes. This change in resistance affects the base current of the bc547, causing it to conduct. The conducting bc547 activates the relay. The activated relay completes the circuit between the power supply and the sprinkler or water release mechanism. The sprinkler or water release mechanism is then triggered, releasing the fire suppressant.

## 

## 

## CHAPTER-3

## DESIGN SPECIFICATION AND COMPONENTS

## DESCRIPTION

## 3.1: Design Specification of Automatic Fire Extinguisher using BC547 Transistor

## Designing an automatic fire extinguisher using a bc547 transistor involves creating a simple circuit that can detect the presence of a flame and trigger the release of a fire extinguishing agent. When the flame sensor detects a fire, it generates a signal. The bc547 transistor amplifies the signal, activating the relay. The relay closes its normally open contact, triggering the release of the fire extinguishing agent.

## 3.2: Components Description: -

## Components used in designing the Automatic Fire Extinguisher using bc547 transistor are mentioned below.

## BC547 Transistor

## IR Receiver Led

## 220Ω, 1KΩ & 10KΩ Resistor

## Red Led

## 3V Water Pump with Pipe:

## Mini Buzzer

## 9V Battery

## Plastic Container

## Wire

## 3.2.1 BC547 TRANSISTOR

## BC547 is a NPN transistor hence the collector and emitter will be left open (reverse biased) when the base pin is held at ground and will be closed (forward biased) when a signal is provided to base pin. The main function of this transistor is to amplify as well as switching purposes. The maximum gain current of this transistor is 800A.

## Image result for bc547 transistor symbol

## Fig3.2.1 BC547 Transistor

## 3.2.2 IR RECEIVER LED

## An Infrared light-emitting diode (ir led) is a special-purpose led that emits infrared rays ranging from 700 nm to 1 mm wavelength. Different ir led may produce infrared light of differing wavelengths.

## 5mm 940nm Infrared Receiver LED Diode IC22 - Faranux Electronics

## Fig.3.2.2 IR Reciver Led

## 3.2.3 RESISTOR

## The resistor is a passive electrical component that creates resistance in the flow of electric current. In almost all electrical networks and electronic circuits they can be found. The resistance is measured in ohms (Ω). In this project 220Ω, 1KΩ & 10KΩ resistor are used.

## 

## Image result for 1K Ohm Image result for 10K Ohm Resistor Image result for 220 Ohm Resistor

## Fig.3.2.3 220Ω, 1KΩ & 10KΩ resistor are used

## 3.2.4 RED LED

## Red LED typically refers to a light-emitting diode that emits red light. LEDs (Light Emitting Diodes) are semiconductor devices that emit light when an electric current is applied. The color of light emitted by an LED is determined by the materials used in the semiconductor.

## Image result for red led symbol

## Fig.3.2.4 Red Led

## 3.2.5 WATER PUMP WITH PIPE

## The water pump can be defined as a pump which uses the principles like mechanical as well as hydraulic throughout a piping system and to make sufficient force for its future use. They have been approximately in one structure otherwise another because of early civilization. At present these pumps are utilized within a wide range of housing, farming, municipal, and manufacturing applications.

## Image result for 3v water pump with pipe

## Fig.3.2.5 3V Water pump with pipe

## 3.2.6 MINI BUZZER

## A mini buzzer typically refers to a small, compact electronic device that produces a buzzing or beeping sound. These devices are commonly used in various applications, such as electronic projects, alarms, and indicators.

## Buy Mini on Off Push Button Switch Online -Hnhcart

## Fig.3.2.6 Mini Buzzer

## 3.2.7 BATTERY

## A 9-volt (9V) battery is a standard-sized battery commonly used in a variety of electronic devices. It is a compact and rectangular battery with a nominal voltage of 9 volts. The positive and negative terminals are typically located on the top of the battery. 9V batteries are widely used in devices such as smoke detectors, remote controls, electronic toys, guitar pedals, and various other small electronic gadgets. They are available in both disposable (alkaline, zinc-carbon) and rechargeable (nickel-metal hydride, lithium-ion) versions.

## See related image detail. HW BRAND CARBON ZINC BATTERY 6F22M 9V SIZE METAL JACKETTiger Head ...

## Fig.3.2.7 9V Battery

## 3.2.8 CONNECTING WIRE

## Electrical wire is a conductive medium that is used to transmit electrical signals or power from one point to another within an electrical system. It is an essential component in the construction and functioning of electrical circuits.

## Kritne Guitar Circuit Wire, 10Pcs Inner Circuit Connecting Wire for ...

## Fig.3.2.8 Connecting wire

## CHAPTER-4

## CONSIDERATION

## This is a basic circuit for educational purposes and should not be used as a real-world fire suppression system.

## Ensure safety precautions are taken. Real-world fire detection and suppression systems require professional design and installation.

## Consult local regulations and safety standards before attempting any fire safety-related projects.

## This is a basic circuit and might not comply with safety standards for fire suppression systems. It is for educational purposes only, and any real-world application should meet appropriate safety regulations.

## Use a proper fire suppressant suitable for the type of fire you want to extinguish.

## Ensure the thermal sensor is appropriately placed to detect fire accurately.

## Seek professional advice when implementing fire safety systems to ensure they meet local regulations and standards.

## 

## CHAPTER-5

## RESULT AND DISCUSSION

## 5.1 RESULT: -

## In this project, we will discuss about the outcome of this project that is designed using BC547 transistor. The final circuit is shown in the following fig.5.1 and fig.5.2.

## 5.2 DISCUSSIONS: -

## The following circuit design shows the automatic fire extinguisher using bc547, ir receiver led (Light Emitting Diode) and other electrical components like resistor.

## 

## Fig.5.1 Front view of designed Automatic fire extinguisher using BC547 transistor

## 

## Fig.5.2 Back view of designed Automatic fire extinguisher using BC547 transistor

## CHAPTER-6

## CONCLUSION

## The development of the automatic fire extinguisher with the integration of the bc547 transistor has proven to be a promising and effective solution in enhancing fire safety measures. The primary objectives of this mini-project were to stop the fire, and through systematic design and implementation, we have achieved significant milestones. The bc547 transistor played a pivotal role in the functionality of the control circuit, acting as a switch. This allowed for the prompt and efficient activation of the fire extinguishing system when triggered by specify the triggering conditions, such as smoke or heat detection Throughout the experimentation and testing phases, our project demonstrated such as reliability and responsiveness. The successful integration of the bc547 transistor showcased its suitability for use in fire safety applications, providing a cost-effective and reliable component for the control system. Despite the successes, it is crucial to acknowledge the limitations and challenges encountered during the development process, such as safety through the fire equipments. These insights contribute to the ongoing refinement and improvement of the system for future iterations.

## The automatic fire extinguisher project with the bc547 transistor represents a significant step towards creating a robust and responsive fire safety solution. The successful integration of the bc547 transistor into the control circuit showcases its practical applicability, paving the way for advancements in automated fire suppression systems. As we conclude this mini-project, we recognize the project's contribution to safety from fire and its potential to make a positive difference in the realm of fire safet.

## 

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