Project Based Learning Report

on

Double LED Flasher

Submitted in the partial fulfillment of the requirements.
For the Project based learning in **Analog Circuits & Applications**
in
Electronics & Communication Engineering

By

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CERTIFICATE

Certified that the Project Based Learning report entitled, **"Dual LED Flasher"** is work done by

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Date: 05/10/2024

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INDEX

Chapter-1

Abstract

This project involves designing and developing a Double LED Flasher circuit that alternately flashes two LEDs. The circuit utilizes a multivibrator configuration, incorporating components such as resistors, capacitors, and transistors. The flash rate can be adjusted by modifying the resistor and capacitor values. This project demonstrates understanding of electronic circuits, voltage regulation, and timing mechanisms.

Chapter-2
Introduction

The Double LED Flasher is a basic yet fascinating electronic circuit that alternates the blinking of two LEDs using transistors, resistors, and capacitors. This simple project is based on the principle of an astable multivibrator circuit, a type of oscillator that continuously switches between two unstable states without any external triggering.

This circuit is built using two BC547 transistors, which act as electronic switches, and two electrolytic capacitors that control the timing of the alternating flashes. The project is designed on a printed circuit board (PCB) to ensure a compact and organized layout. Such a project is perfect for beginners to understand the basics of electronics, including the working of transistors, resistors, capacitors, and how they interact to create a continuous alternating output.

Chapter-3

Working Principle

The Double LED Flasher circuit is based on the principle of an astable multivibrator, a circuit that has no stable state and continuously oscillates between two states. In this design:

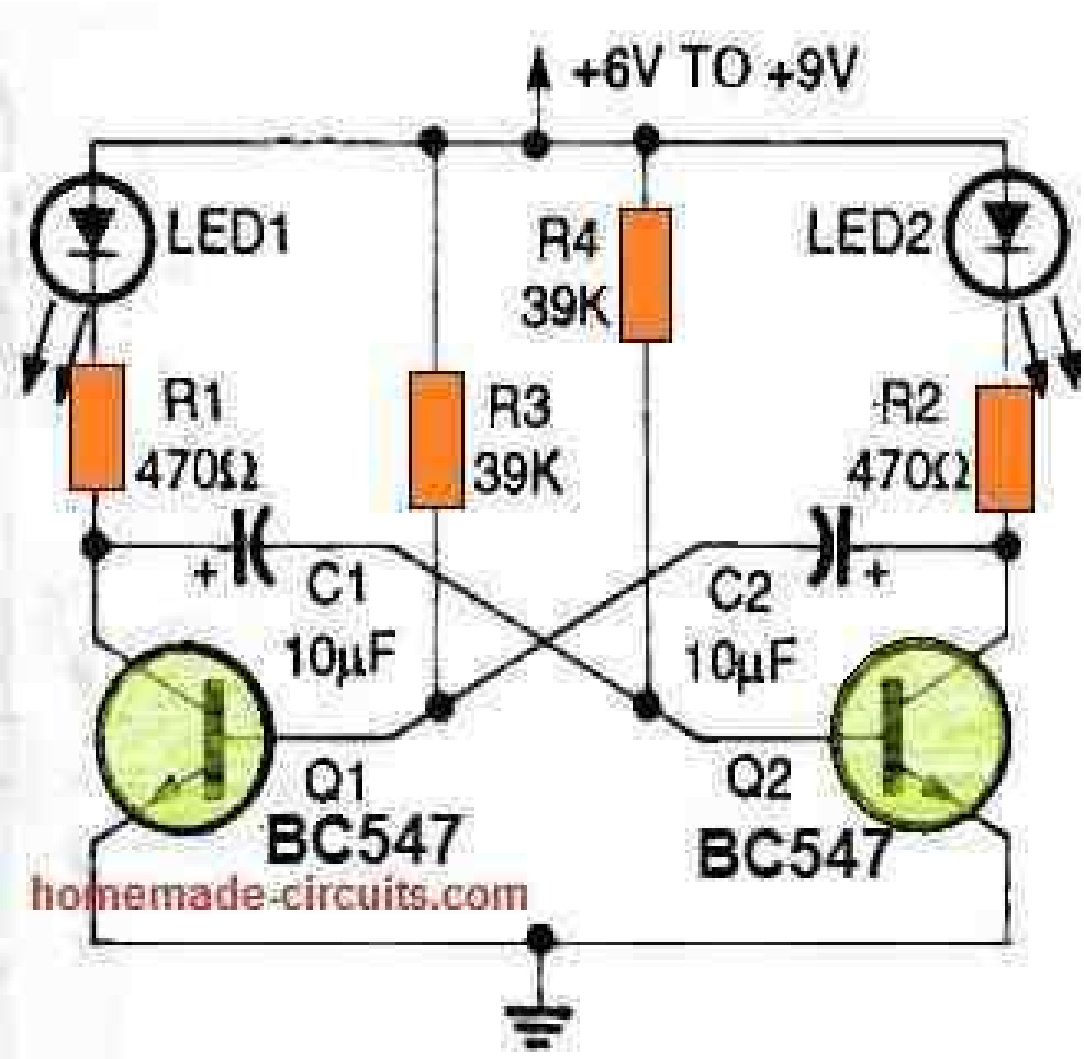
- When power is applied, one of the transistors (say Q1). turns ON, allowing current to flow through LED1, turning it ON. Meanwhile, the other transistor (Q2) remains OFF, keeping LED2 OFF.

- While Q1 is ON, the capacitor connected to Q2's base begins charging. Once the capacitor voltage reaches a certain threshold, it turns Q2 ON, which switches Q1 OFF. This turns LED1 OFF and LED2 ON.

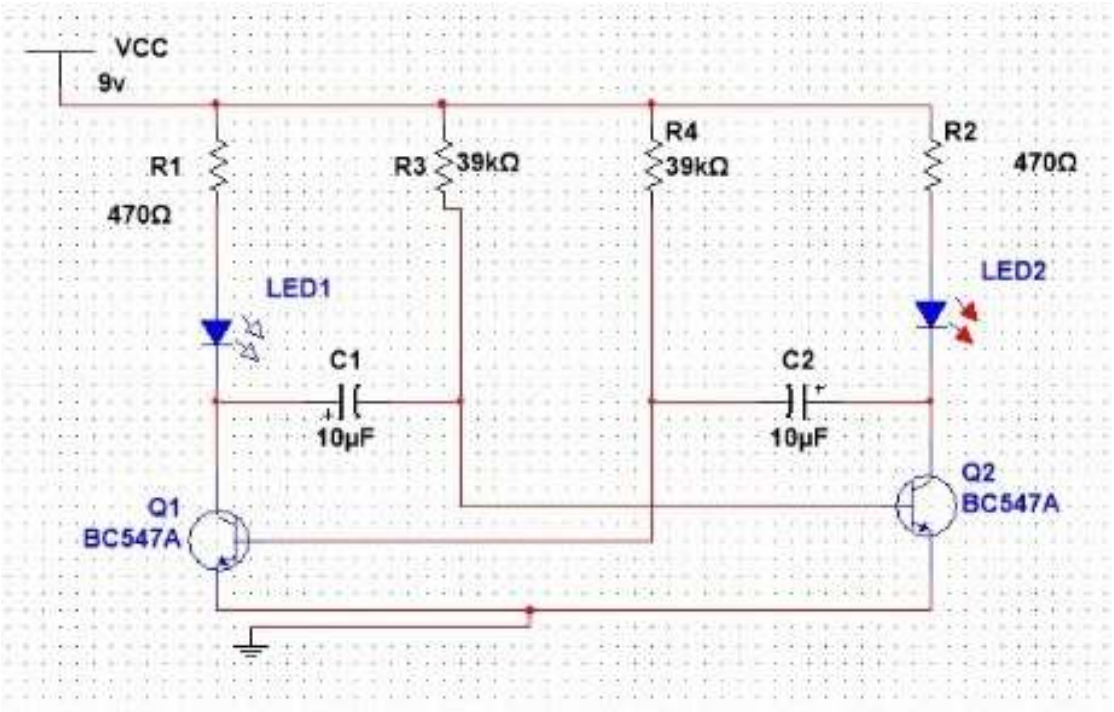
- The cycle then repeats as the capacitors alternately charge and discharge, continuously switching the transistors ON and OFF, which causes the LEDs to flash alternately.

Chapter-4

Circuit Diagram



Multisim Simulation



Chapter-5
Components Used

The circuit consists of the following components:

Two LEDs (Light Emitting Diodes):

Function: Emit light when current passes through them. In this project, the LEDs flash alternately.

Two 470-ohm Resistors:

Function: Current limiting resistors that prevent excess current from flowing through the LEDs, protecting them from damage.

Two 39-kilo-ohm Resistors:

Function: Control the base current of the transistors, playing a key role in switching the transistors ON and OFF. This helps in setting the timing of the circuit.

Two 10µF Capacitors:

Function: Store and release charge, determining the time interval for switching between the LEDs. The capacitor values influence the flashing rate.

Two BC547 NPN Transistors:

Function: Act as switches in the circuit. The transistors alternately turn the LEDs ON and OFF, creating the flashing effect.

PCB (Printed Circuit Board):

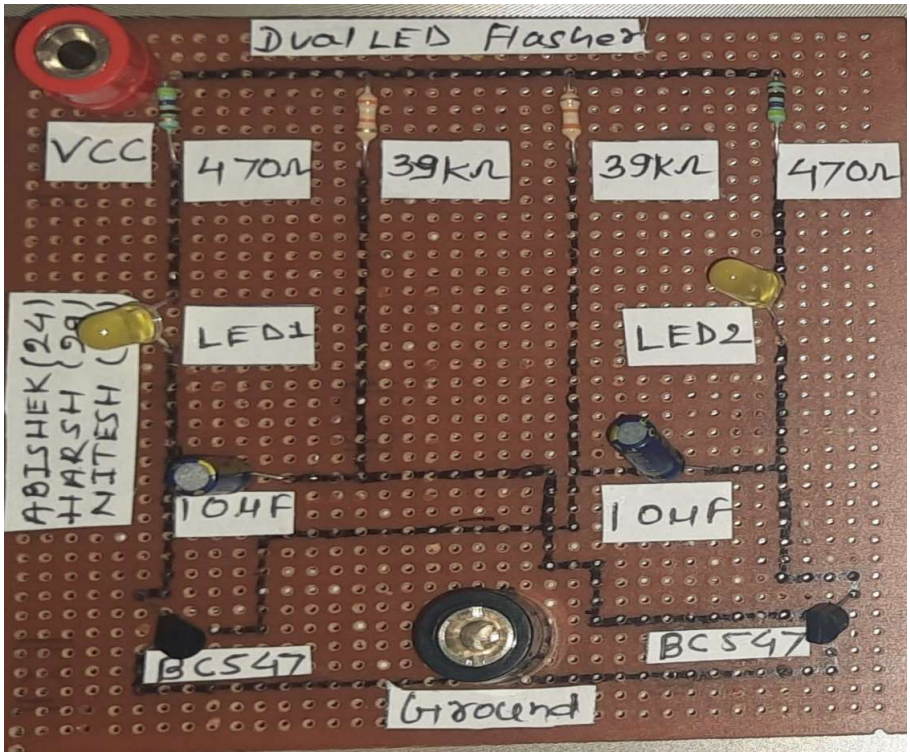
Function: Provides a platform to mount and connect the components, making the circuit compact, durable, and easy to handle.

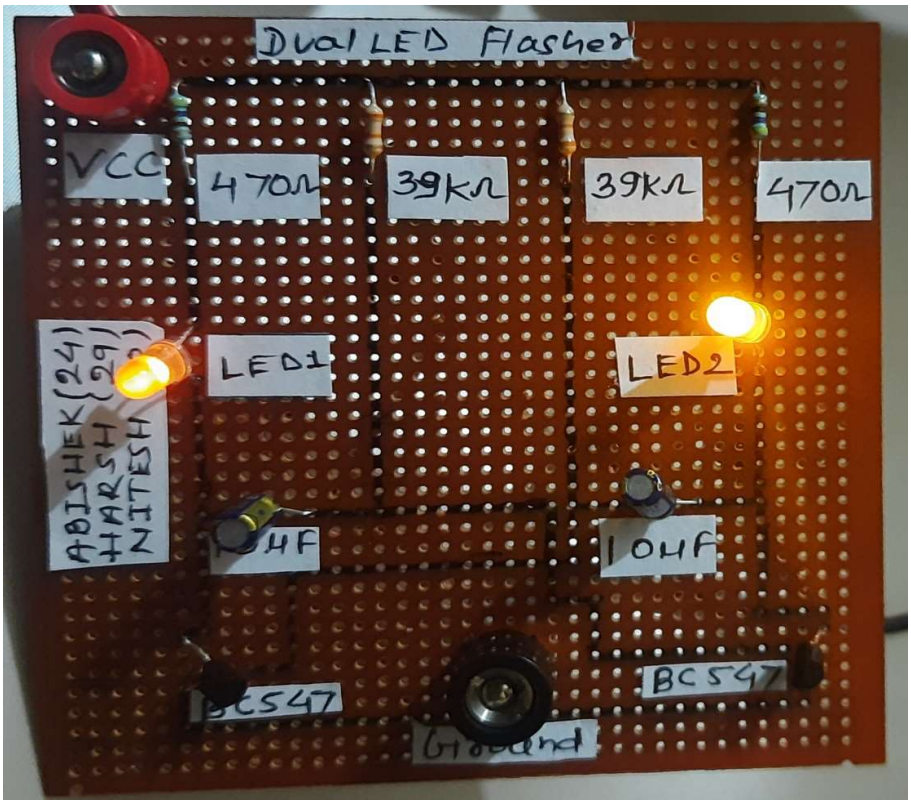
Power Supply:

Typically a 9V or 5V DC source powers the circuit.

Chapter-6

Results





Chapter-7

PBL Outcome

1. Understand electronic circuit design principles.
2. Analyze and apply multivibrator configurations.
3. Design and build a working Double LED Flasher circuit.
4. Measure and adjust the flash rate.

Course Outcomes:

This project "**3 LED Battery Level Indicator**" satisfies

Course Outcome (C0:01) which is "**Demonstrate BJT single stage amplifier, its hybrid equivalent and hybrid Models**"

as this project uses BC547 transistor

Chapter-8

Advantages

1. Simple and Inexpensive: The circuit is easy to assemble with commonly available components, making it a cost-effective project.

2. Educational: This project is ideal for beginners to learn fundamental concepts of transistor switching, timing, and feedback.

3. Adjustable Flashing Rate: By changing the values of resistors and capacitors, you can easily adjust the rate at which the LEDs flash.

Disadvantages

1. Limited Precision: Unlike IC-based circuits (such as the 555 Timer), the transistor-based flasher offers less precision in controlling the timing intervals.

2. Basic Design: The circuit is limited to simple applications and may not be suitable for more complex timing or blinking requirements.

Chapter-9

Applications

1. Indicator Lights: The alternating LED flasher can be used in simple devices requiring visual signals or indicator lights.

2. Learning Kits: This circuit is frequently used in educational kits to demonstrate the basic operation of transistors, capacitors, and resistors.

3. Toys and Decorative Lighting: This circuit can be used in toys or simple DIY projects where flashing lights are required.

4. Warning Signals: The design can be adapted for use in low-power warning signals, like hazard lights.

Chapter-10

Conclusion

The Double LED Flasher is an excellent project for beginners and hobbyists, providing hands-on experience with basic electronic components and principles. The use of transistors, capacitors, resistors, and LEDs in this simple circuit demonstrates key concepts such as switching, oscillation, and timing. By altering the component values, users can adjust the flashing speed of the LEDs, making the project both flexible and educational. With a PCB layout, the project becomes even more durable and professional, making it a versatile addition to various applications, from learning tools to simple signaling devices.

Reference

1. "Electronic Principles" by Albert Paul Malvino.
2. "The Art of Electronics" by Paul Horowitz and Winfield Hill.
3. Online resources: Electronics Tutorials, All About Circuits.