



GITAM

(DEEMED TO BE UNIVERSITY)

TITLE: PCB WORKSHOP REPORT

Subtitle: ANALOG AND DIGITAL CIRCUITS

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FLIP FLOP LED USING TRANSISTOR(ANALOG CIRCUIT):

Flip flop LED using Transistor:

Overview:

A flip-flop LED circuit using transistors is a fundamental digital electronics project that demonstrates the principle of a bistable multivibrator. This circuit alternately switches between two states, causing two LEDs to blink in an alternating fashion. Here's a comprehensive overview of the design, simulation, and implementation process.

Components:

- 1. NPN Transistors:** 2 (e.g., 2N2222)
- 2. Resistors:** 6 (two $10k\Omega$, two $1k\Omega$, and two 470Ω)
- 3. Capacitors:** 2 ($10\mu F$)
- 4. LEDs:** 2 (Red and Green)
- 5. Power Supply:** 5V DC
- 6. Breadboard and connecting wires:** (for hardware implementation)

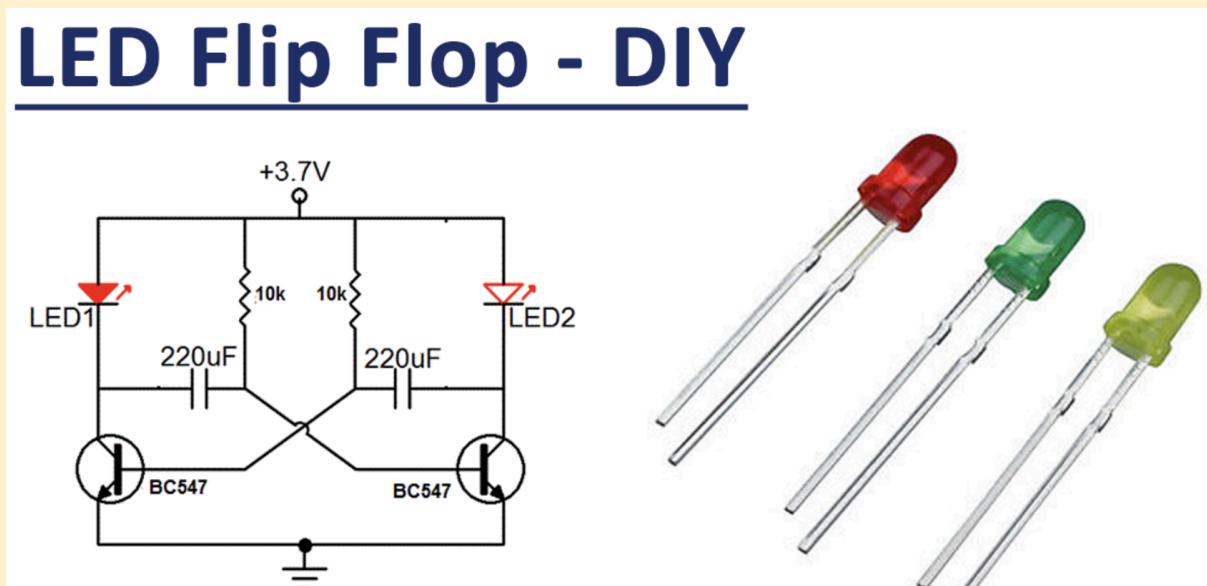
Circuit Design:

- 1. Transistor Configuration:** Use two NPN transistors in a cross-coupled configuration where the collector of each transistor is connected to the base of the other through a capacitor.
- 2. Resistors and Capacitors:**
 - **Base Resistors:** $10k\Omega$ resistors are used to provide base current to each transistor.
 - **Collector Resistors:** $1k\Omega$ resistors are used to limit the current through each transistor.
 - **Capacitors:** $10\mu F$ capacitors are used to couple the collector of each transistor to the base of the other.
- 3. LEDs:** Each LED is connected to the collector of a transistor, with a 470Ω resistor in series to limit the current.

Circuit Connections:

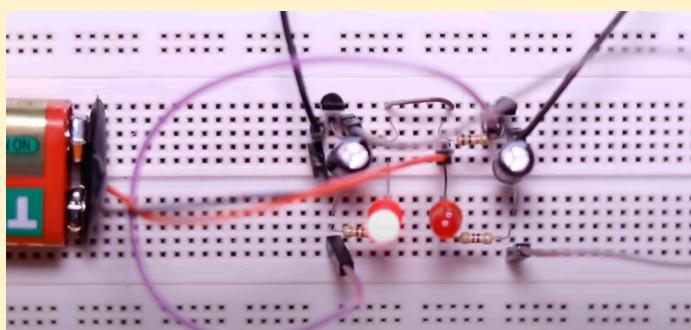
- **Power Supply:** 5V DC is supplied to the circuit.
- **NPN Transistors:**
 - Emitters connected to ground.
 - Collectors connected to LEDs and resistors.
- **Capacitors:** Connected between the collector of one transistor and the base of the other.
- **LEDs:** Connected in series with resistors to the collectors of the transistors.

CIRCUIT DIAGRAM:



Hardware Implementation on Breadboard:

1. **Assemble the Circuit:** Following the schematic, place and connect components on the breadboard.
2. **Power Up:** Connect the circuit to a 5V power supply.
3. **Testing:** Observe the alternating blinking of the LEDs.

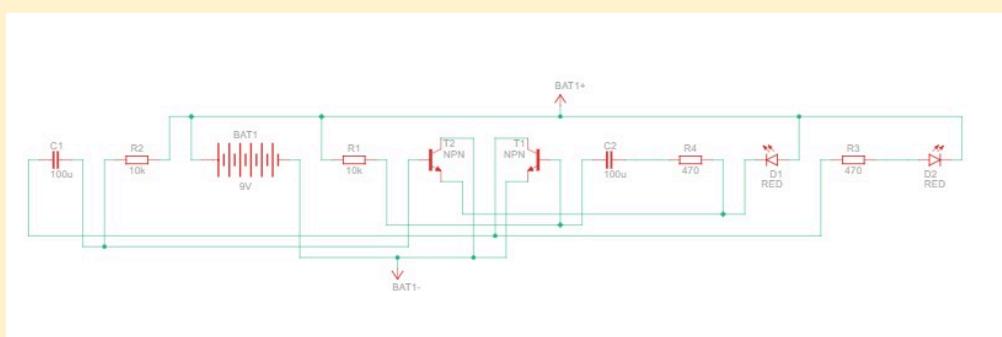
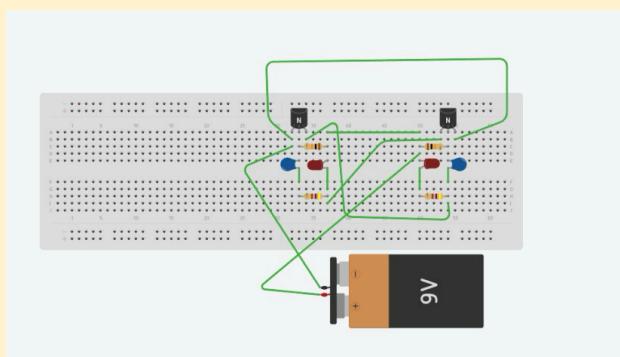


Simulation in Tinkercad:

- Step 1:** Set Up Tinkercad
- Step 2:** Add Components
- Step 3:** Design the Circuit
- Step 4:** Simulation

OUTPUT:

Name	Quantity	Component
T1 T2	2	NPN Transistor (BJT)
R1 R2	2	10 kΩ Resistor
C1 C2	2	100 uF Capacitor
R3 R4	2	470 Ω Resistor
D1 D2	2	Red LED
BAT1	1	9V Battery



Simulation in EasyEDA:

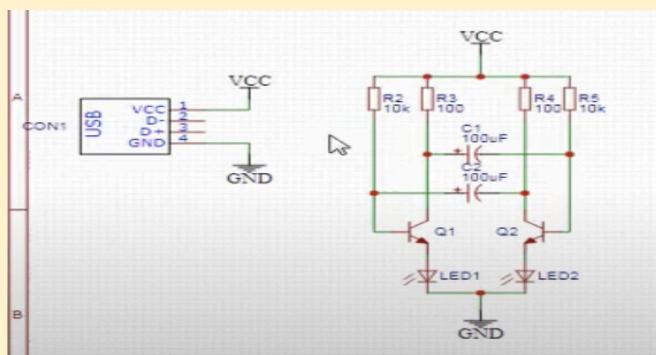
- 1. Create a New Project:** Start a new project in EasyEDA.
- 2. Place Components:** Add transistors, resistors, capacitors, LEDs, and power supply to the schematic.
- 3. Wire the Circuit:** Connect the components as per the design.

4. Set Up Simulation:

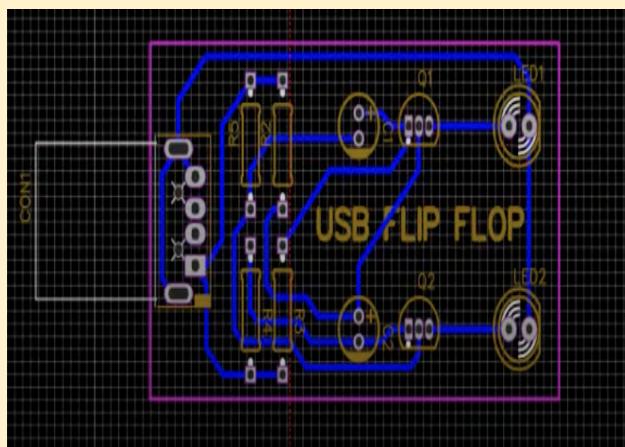
- Define the power supply.
- Run the simulation for a sufficient time to observe the flip-flop action

5. Observe Behavior: Ensure LEDs blink alternately.

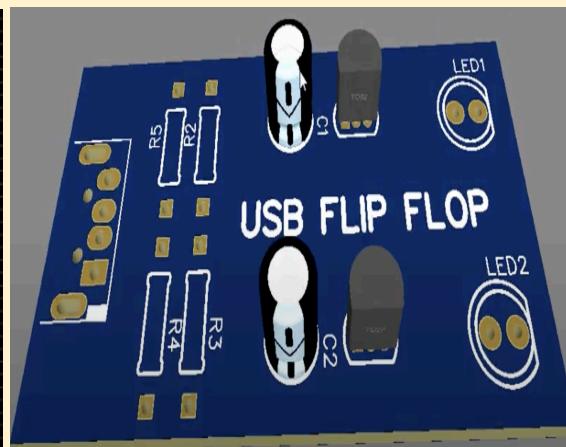
OUTPUTS:



2D VIEW:



3D VIEW:



CONCLUSION:

Simulating a flip-flop LED circuit using transistors in Tinkercad, Hardware and EasyEDA showcases how transistors can be configured to create a simple bistable multivibrator circuit, causing LEDs to blink alternately.