



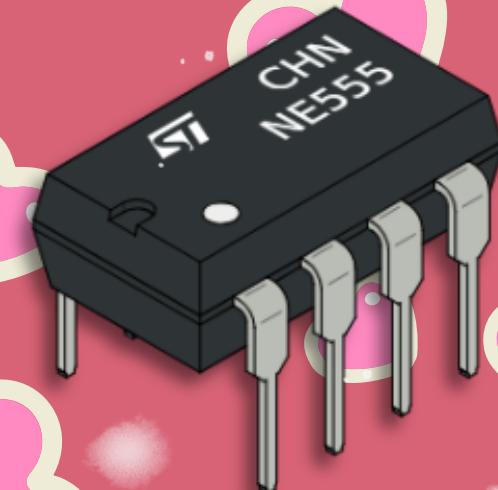
## What does a 555 Timer Do?

A 555 timer is a versatile IC used to create accurate timing pulses, delays, oscillators, and simple memory functions.

In simple circuits, these chips are used to control an led blinking, like the one here.



# DANCING LIGHTS w/ 555 Timer

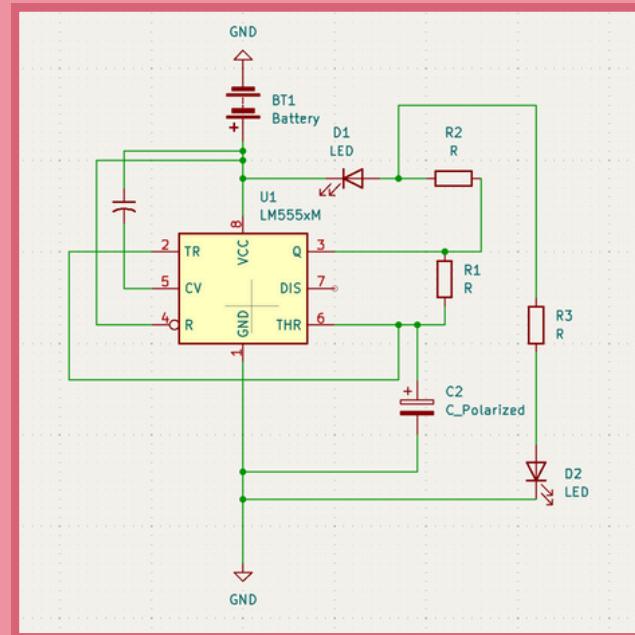


# COMPONENTS

- 555 Timer IC
- 1-2 K $\Omega$  Resistors
- LEDs
- 100  $\mu$ F  $\geq$  Capacitor
- Battery
- Wire
- Breadboard
- (# of LED needs #+1 Resistors)



# SCHEMATIC



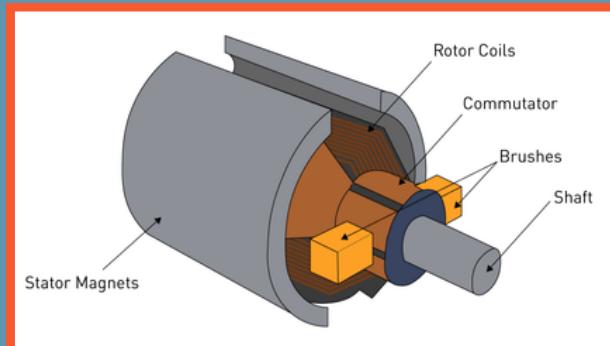
# PIN-OUT

GND 1	8 VCC
Trigger 2	7 Discharge
Output 3	6 Threshold
Reset 4	5 CV

PIN 1	GND	
PIN 2	TRIGGER	Detects a LOW signal (below $\frac{1}{3}$ Vcc) to begin timing cycle
PIN 3	OUTPUT	
PIN 4	RESET	Pull LOW to reset timer manually. Otherwise, HIGH.
PIN 5	Control Voltage	Smoothens Voltage
PIN 6	THRESHOLD	Ends the timing cycle when capacitor voltage reaches $\frac{2}{3}$ Vcc
PIN 7	Discharge	Discharges timing capacitor when output goes LOW
PIN 8	VCC	15V - 5V



## INSIDE A MOTOR



**Rotor Coils:** The rotating piece in the motor. It turns whenever the magnetic field from the alternating current interacts with the magnetic field from the stator magnets.

**Commutator:** A rotating conductor piece that helps to reverse the direction of current each half-turn in the rotor coils.

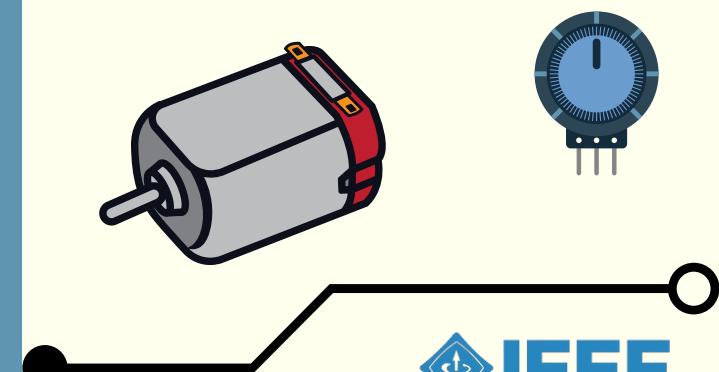
**Brushes:** Helps to bring current from the power supply to the commutator and then to the rotor coils.

**Shaft:** A rod that helps to transfer the rotational energy to the fan.

**Stator Magnets:** Produce a magnetic field.

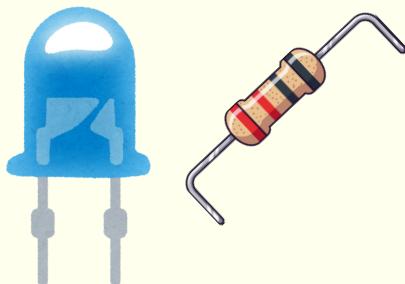
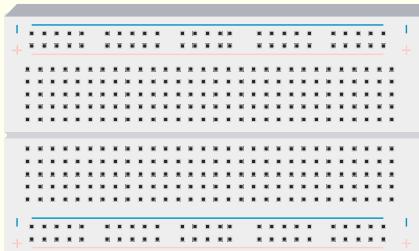
# MOTOR FAN

w/ POTENTIOMETER AND SWITCH

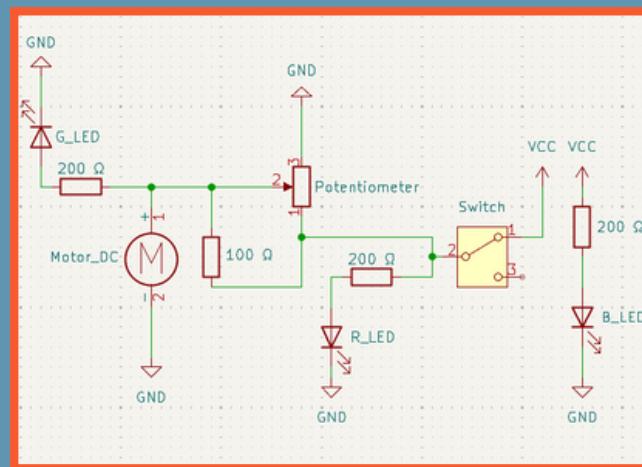


# MATERIALS

- 1 Motor
- 4 Resistors
  - 1 [100 Ω]
  - 3 [200 Ω]
- 1 Potentiometer
- 1 Switch
- 3 LEDs
  - 1 Green, 1 Blue,  
1 Red
- Power Supply



# SCHEMATIC



# MAXWELL'S EQUATIONS

**Faraday's Law of Electromagnetic Induction**

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

**Meaning:** A changing magnetic field induces an electric field (and hence, an emf).

**In a motor:** This is the key law — the magnetic field from the stator magnets induces voltages (emf) in the rotor windings, producing current and torque.

**Ampère-Maxwell Law**

$$\nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \epsilon_0 \frac{\partial \mathbf{E}}{\partial t}$$

**Meaning:** Magnetic fields are generated by electric currents and by changing electric fields.

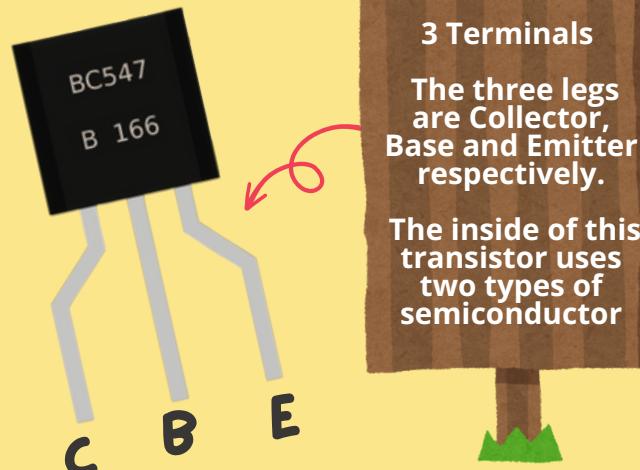
**In a motor:** The current in the rotor coils creates the magnetic field that interacts with the stator magnets — producing torque or rotational energy.



# BC547 TRANSISTOR

It is a bipolar junction transistor and an NPN Transistor.

The transistor is widely used for switching and amplification purposes. This transistor can only handle a small input voltage and current.



## HOW WILL THE BC547 BE USED IN THIS PROJECT?

- The BC547 amplifies the microphone's signal.
- It also controls the LEDs, turning them on and off according to sound intensity.

This is what makes the LEDs light up in sync with the music.



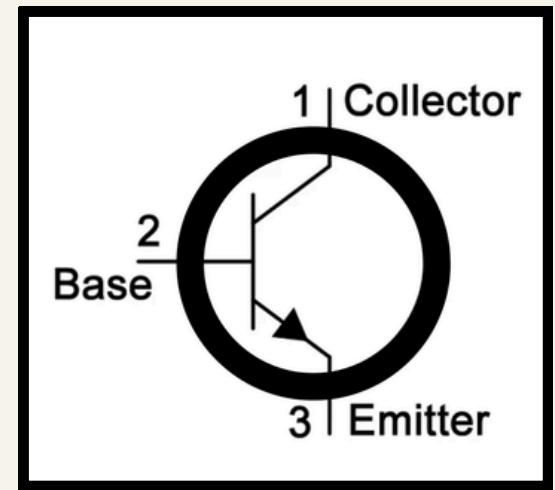
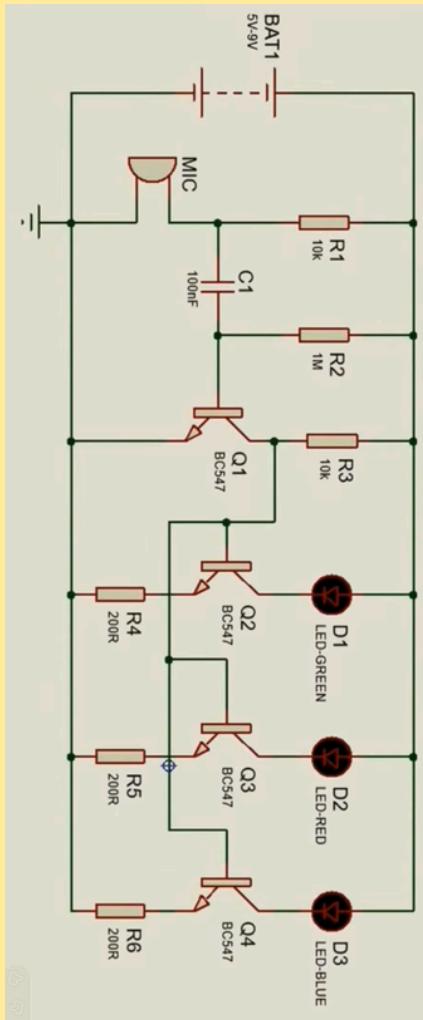


## MATERIALS

- MICROPHONE
- 100 NF CAPACITOR
- LEDS
- RESISTORS:
  - 10K
  - 220 OHMS
  - 1M
- 9V BATTERY
- BC547 TRANSISTOR



## SCHEMATIC



Pin Number	PinName	Description
1	Collector	Current flow
2	Base	Controlling the operation
3	Emitter	Current drain



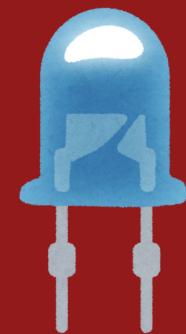
*See You Next Year!*



*Workshop.  
Party.*



**OR**



*Choose  
Your Own  
Output*

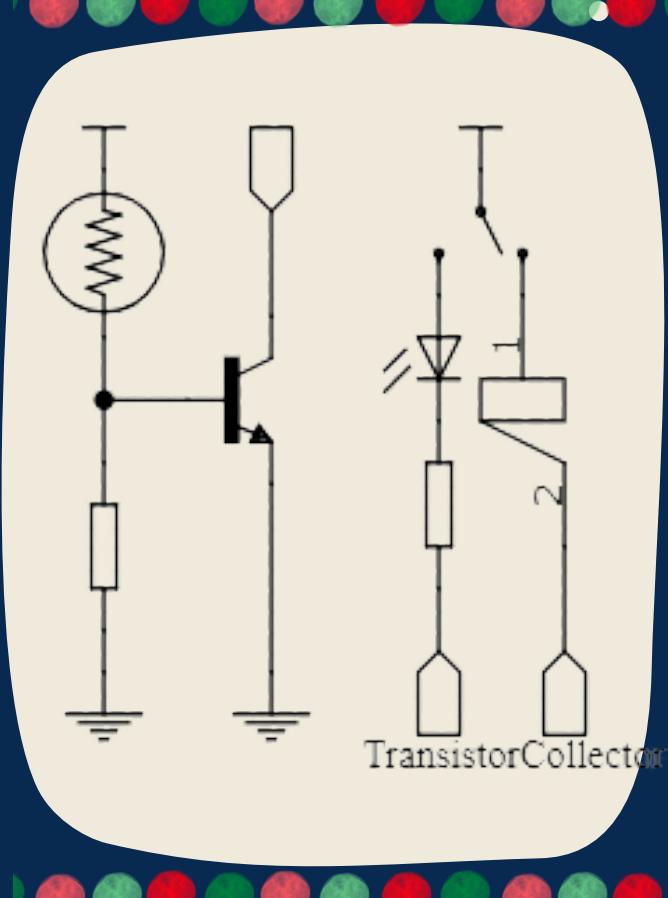
# Gather Your Components



- 2 1K resistors.
- 1 LED.
- 1 buzzer.
- 1 switch.
- 1 NPN transistor.
- 1 photoresistor.
- Wires
- Power supply.



# Put it Together



# Double-Check Your Connections!



Thanks

