

# **L<sub>ED</sub> R<sub>OULETTE</sub> C<sub>IRCUIT</sub>**

## **TEAM MEMBERS**

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## **AIM:**

To make an LED roulette circuit using 555 timer & 4017 IC on a breadboard .

## **COMPONENTS REQUIRED:**

- 555 Timer IC
- 4017 IC
- PNP Transistor (I used BC557)
- 10 LED's
- Resistors: 330R, 10K, 2 x 3.3M, 10M
- Capacitors: 1uF, 100n
- Breadboard
- Few Breadboard Connectors
- (5-12)V Power Supply

## **HOW IT WORKS:**

### **When you touch both the touch-contacts:**

When both touch contacts are simultaneously touched, a sequence of electronic events is set in motion. As a result of the initiated touch, current flows through the finger, leading to the charging of the 1uF capacitor.

During the charging process of a capacitor, the voltage at its positive terminal converges towards the positive rail voltage, while the voltage at its negative terminal approaches that of the negative rail. Given that the negative terminal of the capacitor is connected to the base of a transistor through a 10M resistor, the voltage at the base of the transistor tends to lean more towards the negative rail.

The transistor in this circuit is of the pnp type. When the voltage at its base leans towards the negative side, the transistor becomes biased and starts conducting current between its emitter and collector pins. Conversely, if the voltage at the base does not lean towards the negative side, no current flows between these pins. Therefore, the greater the negative voltage at the base of the transistor, the higher the conductivity between its emitter and collector pins.

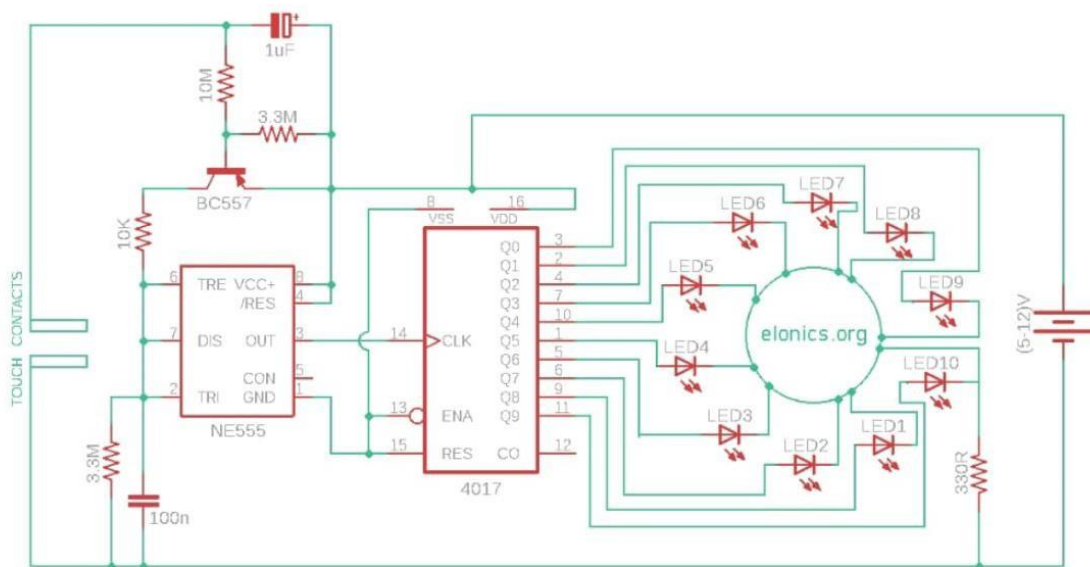
One terminal of a 100nF capacitor, located near the 555 timer IC, is connected to the negative rail, while the other terminal is connected to the positive rail via a 10K resistor and a transistor. The speed at which this 100nF capacitor can charge or discharge plays a crucial role in determining the frequency of the output square wave from the 555 timer IC. As the conductivity of the transistor increases, the 100nF capacitor can charge more quickly, resulting in an increase in the frequency of the output wave from the 555 timer IC.

The output of the 555 timer IC is linked to the clock input of the 4017 IC. Additionally, the rotational speed of the LEDs is directly proportional to the frequency of the clock input signal of the 4017 IC, which aligns with the frequency of the output wave from the 555 timer IC. Consequently, the LEDs begin to rotate at an accelerated pace.

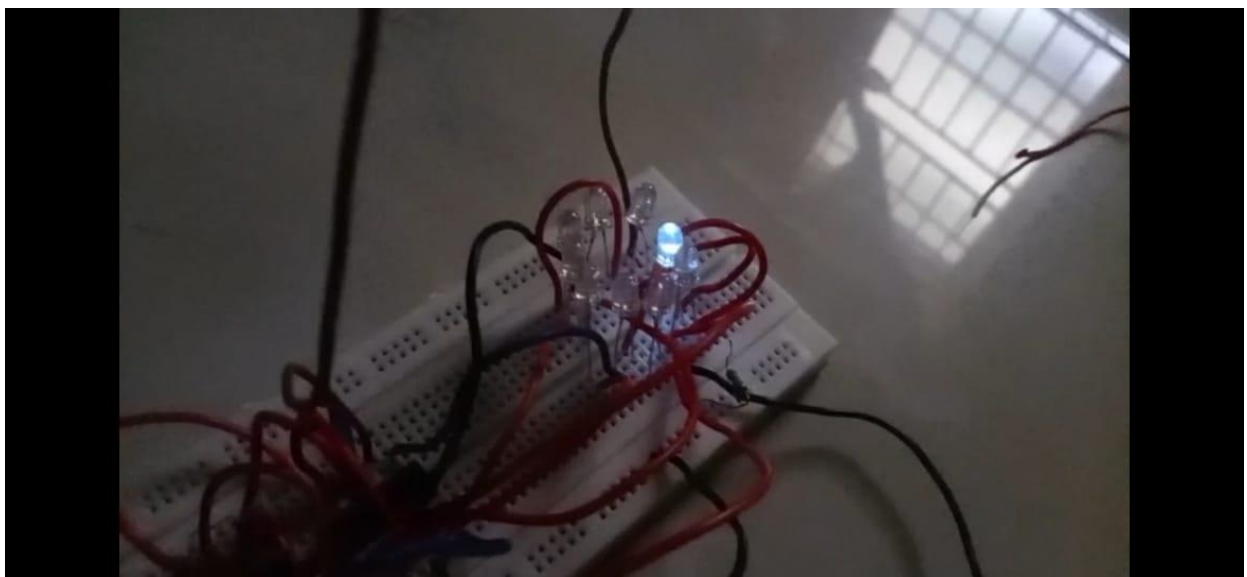
Upon the removal of the finger from the touch contacts, a different set of electronic responses unfolds. The 1uF capacitor undergoes a slow discharge process, leading to a decrease in the conductivity between the emitter and collector of the transistor.

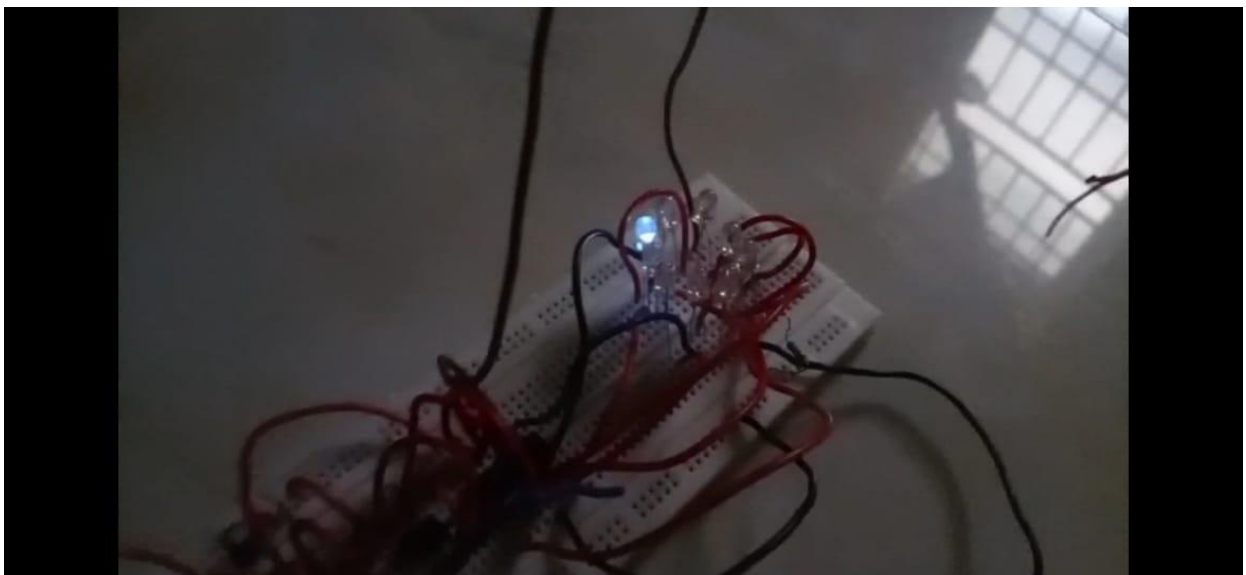
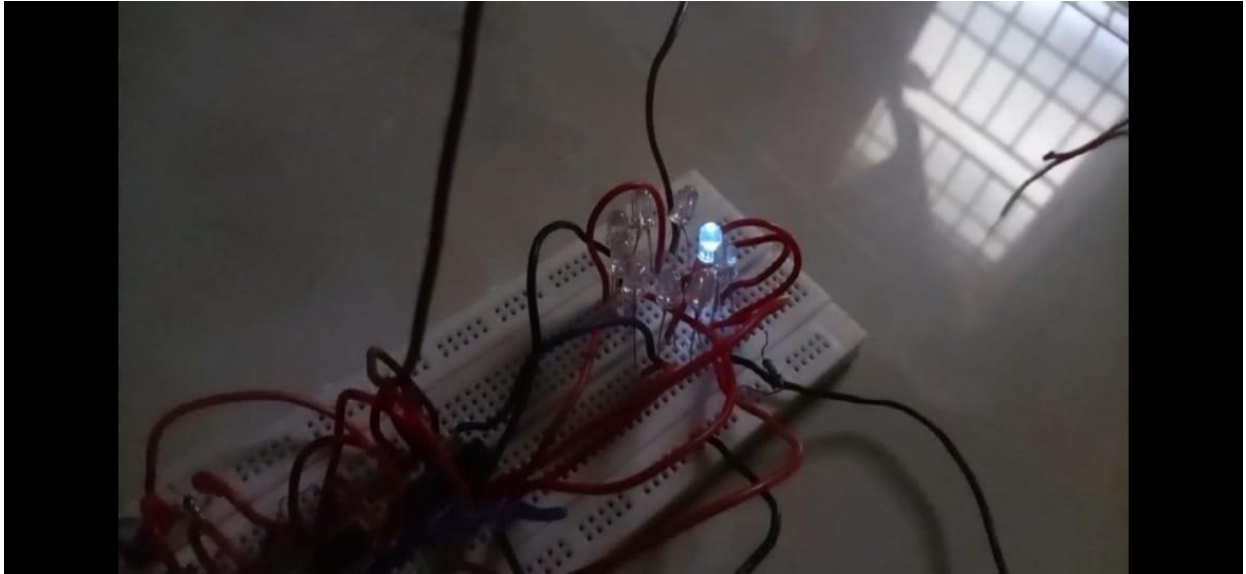
Consequently, the 100nF capacitor takes progressively more time to charge. This delay in charging time results in an increase in the frequency of the output from the 555 timer IC. Consequently, the rotational speed of the LEDs decreases, eventually leading them to come to a complete halt.

## Circuit Diagram



LED ROULETTE CIRCUIT DIAGRAM





## **APPLICATION:**

- ✓ The LED roulette circuit can be used as a visually engaging display for entertainment purposes. Here are a few potential applications:
- ✓ Game Night: Use the LED roulette as part of a game night setup. Players can interact with the circuit, and the visual spinning LEDs add a dynamic element to the gaming experience.
- ✓ Decorative Display: Incorporate the LED roulette into decorative items or displays. The rotating LED pattern can serve as an eye-catching element in parties or events.

- ✓ Educational Tool: The circuit can be used as an educational tool to demonstrate the principles of digital electronics, counters, and timing circuits.
- ✓ Interactive Art Installation: Create an interactive art installation where users can control or influence the speed or direction of the LED roulette, turning it into a participatory experience.
- ✓ Learning Electronics: For electronics enthusiasts, building and experimenting with the LED roulette circuit can be a hands-on way to learn about timers, counters, and transistor control in electronic circuits.