Model Traffic Light System Using 555 Timer IC

Abstract

This project presents a simple yet effective simulation of a traffic light system using basic electronic components and two 555 timer ICs. The red, yellow, and green LEDs are controlled using timing circuits to replicate real-world traffic signal behaviour.

Objective

To design and simulate a model traffic signal circuit using 555 Timer ICs, capable of operating Red, Yellow, and Green LEDs in a fixed sequential pattern.

Working Principle

- IC1 alternates between the Red and Green LEDs based on RC timing components.
- IC2 provides a brief pulse to the Yellow LED between transitions.
- The overall flow mimics a standard 4-phase traffic light cycle.

Timing Cycle

Phase	LED Active	Signal Type
T1	Red	Stop
T2	Yellow	Transition Warning
T3	Green	Go
T4	Yellow	Transition Warning

Components Required

- 2 555 Timer ICs
- 1 Red LED
- 1 Yellow LED
- 1 Green LED
- Resistors:
- 100k
- 68k

- 3 330
- Capacitors: 2 100F
- Breadboard & Jump Wires
- 9V Battery/Power Supply

Circuit Design

Description:

- IC1: Connected in astable mode to control alternating states (Red & Green).
- IC2: Generates short pulse to blink Yellow LED briefly during transitions.
- Capacitor-Resistor pairs define delay intervals for realistic light durations.

Real-World Relevance

This simple circuit introduces the fundamentals of:

- Timer-based automation
- Traffic signal logic
- Sequential LED control

It can be extended using microcontrollers for real-time adaptive traffic systems.

Conclusion

The model successfully replicates a basic traffic light using just analog components. The project helps in understanding timer circuits and sequential control without requiring programming or complex systems.