TRAFFIC LIGHT CONTROL SYSTEM

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INTRODUCTION

I am doing a Traffic Light Control System project, which is an imitation of how actual traffic lights work. The system consists of three states: Red (stop), Green (go), and Yellow (caution). Each state remains active for a particular amount of time, such as 10 seconds for Red, 7 seconds for Green, and 3 seconds for Yellow, etc. I am utilizing a TrafficLight class to control these states. The program initializes at Red, waits for the timer, then becomes Green, then Yellow, and lastly Red, looping back. This is a constant loop, similar to actual traffic lights. I am applying Python's time.sleep() to mimic the delays, and it illustrates how loops, conditionals, etc., may be employed to represent real-world systems.

METHODOLOGY

To solve the Traffic Light Control System problem,I followed this methodology:

1. Define States and Durations:I identified the traffic light states (Red, Yellow, Green) and their respective durations.
2. Create a Class:I used a `TrafficLight` class to encapsulate the system's behavior, including the current state and methods to change states.
3. Initialize State:Then I started with the default state (e.g., Red).
4. Implement State Transitions:Then I used a loop to cycle through states. Check the current state, wait for the specified duration, and transition to the next state.
5. Simulate Time Delays:After that I used `time.sleep()` to simulate the duration of each state.
6. Run the System:At last, I started the loop to continuously cycle through the states, creating a realistic traffic light simulation.

CODE

```
import time

RED = 'RED'
YELLOW = 'YELLOW'
GREEN = 'GREEN'

RED_DURATION = 10
YELLOW_DURATION = 3
GREEN_DURATION = 7

class TrafficLight:
    def __init__(self):
        self.current_state = RED

    def change_state(self, new_state):
        self.current_state = new_state
        print(f"Traffic light changed to {self.current_state}")

    def run(self):
        while True:
            if self.current_state == RED:
                print(f"Waiting at {self.current_state} light for {RED_DURATION} seconds...")
                time.sleep(RED_DURATION)
                self.change_state(GREEN)

            elif self.current_state == GREEN:
                print(f"Waiting at {self.current_state} light for {GREEN_DURATION} seconds...")
                time.sleep(GREEN_DURATION)
                self.change_state(YELLOW)

            elif self.current_state == YELLOW:
                print(f"Waiting at {self.current_state} light for {YELLOW_DURATION} seconds...")
                time.sleep(YELLOW_DURATION)
                self.change_state(RED)

if __name__ == "__main__":
    traffic_light = TrafficLight()
    print("Starting Traffic Light Control System...")
    traffic_light.run()
```

RESULT

```
Starting Traffic Light Control System:
Waiting at RED light for 10 seconds.
Traffic light changed to GREEN
Waiting at GREEN light for 7 seconds.
Traffic light changed to YELLOW
Waiting at YELLOW light for 3 seconds.
Traffic light changed to RED
Waiting at RED light for 10 seconds.
Traffic light changed to GREEN
Waiting at GREEN light for 7 seconds.
Traffic light changed to YELLOW
Waiting at YELLOW light for 3 seconds.
Traffic light changed to RED
Waiting at RED light for 10 seconds.
Traffic light changed to GREEN
Waiting at GREEN light for 7 seconds.
Traffic light changed to YELLOW
Waiting at YELLOW light for 3 seconds.
Traffic light changed to RED
Waiting at RED light for 10 seconds.
```

REFERENCE

1. Python Official Documentation
2. GeeksForGeeks - Python Programing examples
3. Real Python