

Project Presentation of Exploratory Project (EP)

On

Traffic Light Control System

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INTRODUCTION

- Rapid urbanization has led to increased traffic congestion.
- Traditional traffic signals operate on fixed timing mechanisms.
- Fixed timers do not adapt to changing traffic conditions.
- Inefficient traffic control results in delays, fuel wastage, and pollution.
- This project simulates a **smart traffic signal system** using Java.

PROBLEM STATEMENT



- Existing traffic signal systems lack adaptability.
- Fixed-time signals fail during peak traffic hours.
- Emergency vehicle movement is not prioritized.
- Many educational models lack real-time visualization.



Problem Statement:

To design a traffic signal control system simulation that dynamically adjusts signal timing based on traffic density and supports an emergency mode.

OBJECTIVE

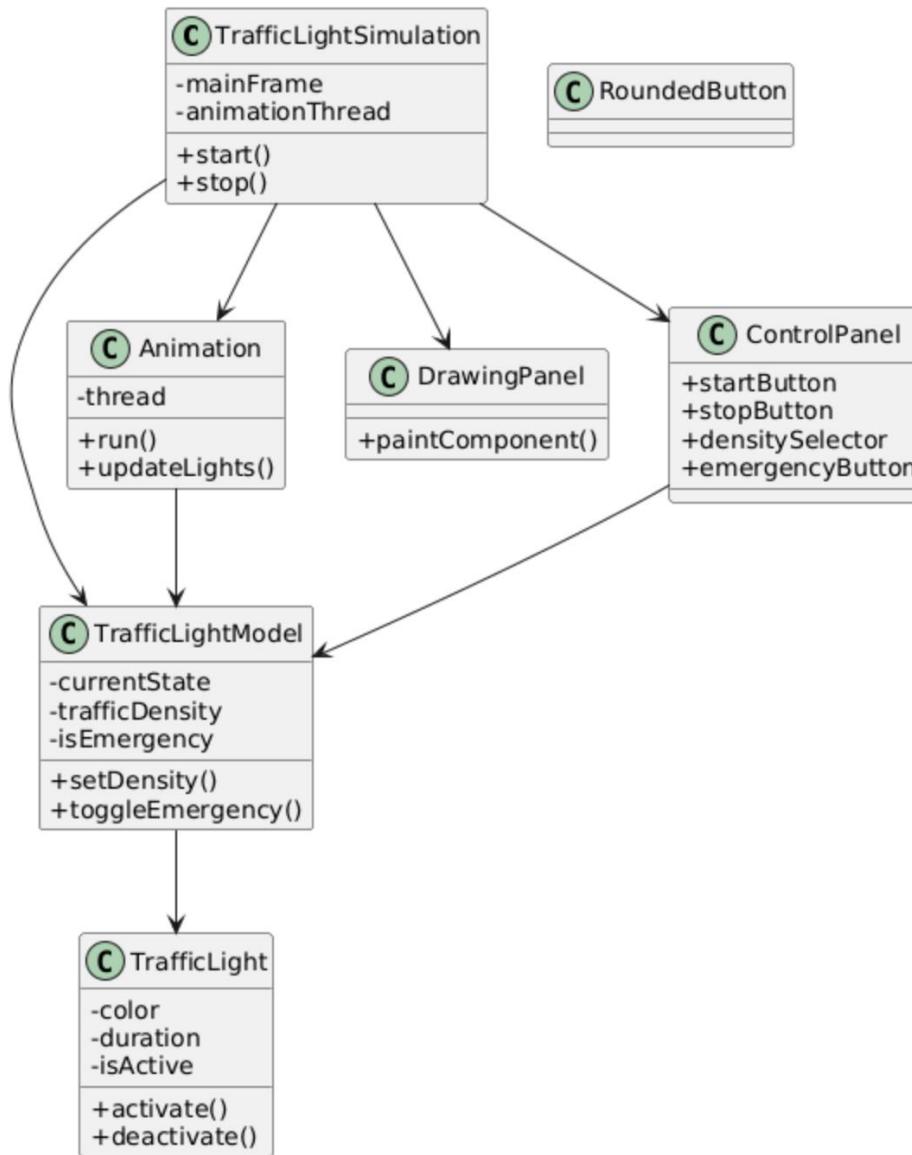


This project aims to:

- To design a graphical traffic signal simulation using Java Swing.
- To implement red, yellow, and green signal transitions.
- To introduce traffic density-based signal timing.
- To include an emergency mode for special situations.
- To apply object-oriented programming concepts.
- To ensure smooth animation using multithreading.



UML Diagram



TOOLS & TECHNOLOGIES

- **Programming Language:** Java
- **Framework:** Java Swing
- **Libraries:** Java AWT, Multithreading
- **IDE:** Visual Studio Code
- **Platform:** Cross-platform (Windows / Linux / macOS)



RESULTS

- Successfully simulates three traffic signals (Red, Yellow, Green).
- Countdown timer works accurately.
- Green signal duration changes with traffic density.
- Emergency mode activates blinking yellow signal.
- User interface remains responsive.
- System runs smoothly without errors.



CONCLUSION

- The project demonstrates a realistic traffic signal simulation.
- Density-based control improves efficiency over fixed-time systems.
- Emergency mode enhances real-world applicability.
- Object-oriented design ensures clean and maintainable code.
- The system is suitable for learning and demonstration purposes.

