# UrbanFlow: Adaptive Traffic Signal Simulator

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**Abstract:** *Urban traffic congestion is a growing problem in modern cities due to increasing vehicle density and inefficient traffic signal systems. Traditional traffic lights operate on fixed timing schedules that do not adapt to real-time traffic conditions, leading to unnecessary delays and congestion. The UrbanFlow: Adaptive Traffic Signal Simulation project proposes a rule-based traffic control system that dynamically adjusts signal timings based on vehicle density at intersections. The system continuously monitors the number of vehicles on each road and allocates green signal duration proportionally, giving priority to heavily congested lanes. By recalculating timings after each cycle using logical conditions and scheduling algorithms, the system reduces waiting time and improves overall traffic flow. This simulation-based model provides a cost-effective and practical solution for small to medium intersections and forms a foundation for future AI-based traffic management systems.*

**Keywords***: Adaptive Traffic Control, Traffic Signal Simulation, Vehicle Density, Rule-Based System, Smart Traffic Management, Dynamic Signal Timing, Intersection Optimization*

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