

**DEPARTMENT OF
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
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SEMESTER III
ARTIFICIAL INTELLIGENCE LABORATORY
MINI PROJECT REVIEW**

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PROBLEM STATEMENT

1. Urban traffic congestion is a major challenge causing delays, fuel waste, and pollution. Traditional fixed-time traffic lights fail to adapt to fluctuating vehicle densities, leading to inefficiency and long waiting times. Therefore, there is a need for an Intelligent Traffic Signal System that uses AI-based logic to analyze real-time traffic conditions and dynamically adjust signal timings, ensuring smoother traffic flow and reduced congestion.

THEORETICAL BACKGROUND

- Intelligent Traffic Signal Systems use AI-based logic to analyze simulated traffic data such as vehicle count and waiting time to adjust signal timings dynamically.

Traditional fixed-time systems are inefficient under varying traffic conditions. In contrast, simulation-based AI models show improved flow using adaptive algorithms.

The Rule-Based Adaptive Algorithm is chosen as it is simple, transparent, and effective for software-based simulation without hardware. It works by giving the green signal to the direction with the highest vehicle count, then cycles through Green → Yellow → Red.

Example: If North=8, East=3, South=2, West=5 → Green is given to North first.
This method ensures smoother traffic flow and demonstrates AI's role in smart traffic control.

IMPLEMENTATION AND CODE

List	Git-hub Repository Links
Implementation of Code Link	https://github.com/yogarajan07/AI_based_traffic_detection_system
Word Document Report Link	https://github.com/yogarajan07/AI_based_traffic_detection_system
PPT Link	https://github.com/yogarajan07/AI_based_traffic_detection_system

OUTPUT AND RESULTS

Traffic Signal Control

Vehicle-based or Standard timed modes

Reset

Mode Selection

Vehicle-Based

Standard Timed

Vehicle-Based Mode:
Green light stays until all vehicles clear.

Controls

Start

Pause

Yellow (s) 3Release (s) 0.6

Set vehicles per direction

North

-0+

East

-0+

South

-0+

West

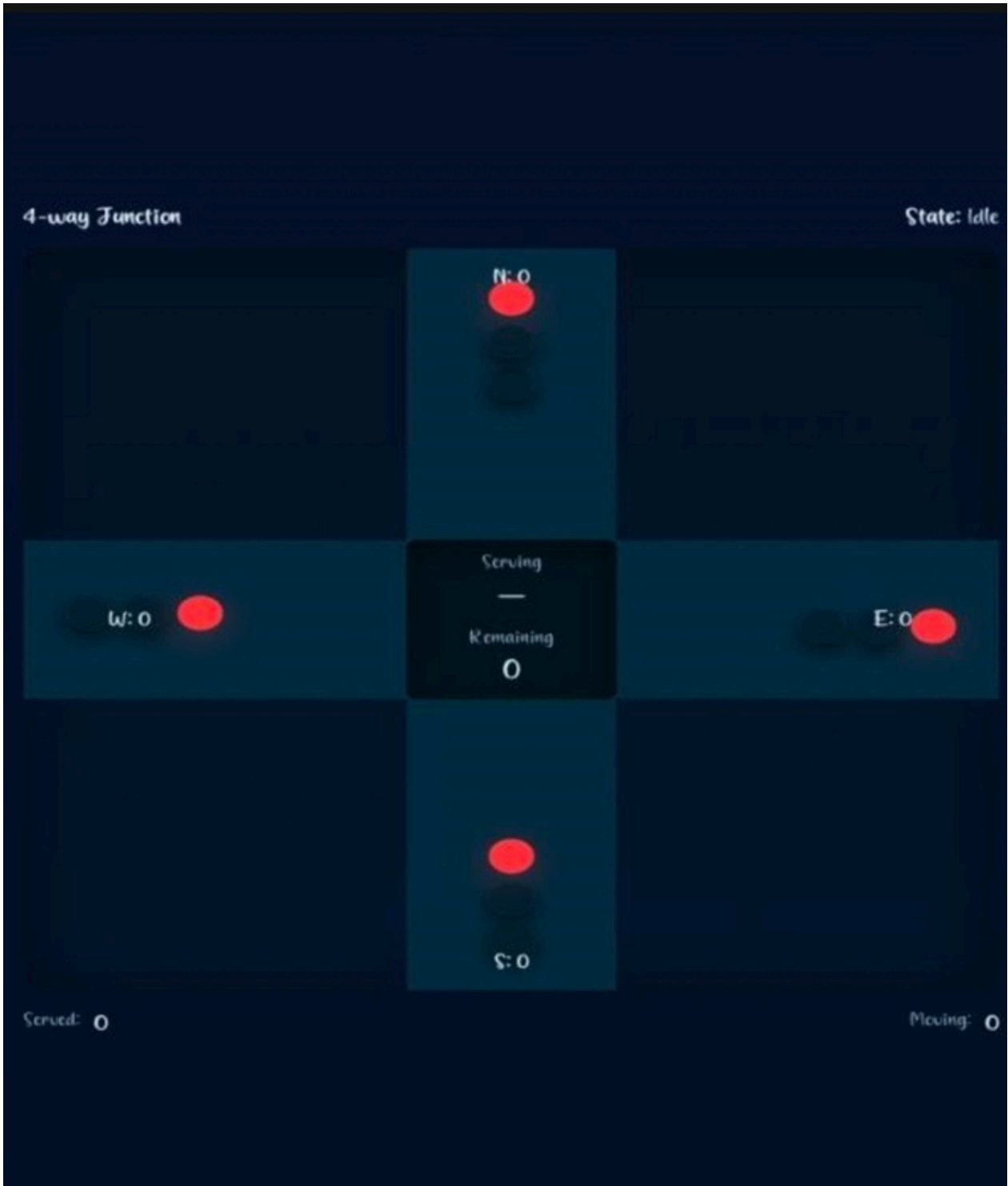
-0+

Test 1

Test 2

Heavy

Logs



OUTPUT AND RESULTS

The screenshots show a software-based Intelligent Traffic Signal Simulator with two modes — Vehicle-Based and Standard Timed.

Users can set the number of vehicles for each direction (North, East, South, West) and control the signal timing using Start, Pause, and time settings.

The second image displays a 4-way junction where signals change dynamically based on vehicle count, showing which direction is currently served.

OUTPUT AND RESULTS

Future Enhancements:

- 1. Add real-time traffic data integration.**
- 2. Implement AI or machine learning for automatic timing.**
- 3. Include emergency vehicle priority.**
- 4. Extend to multi-junction control.**
- 5. Add traffic analytics and reports.**

REFERENCES

- 1. P. Singh and R. Sharma (2023) – “Intelligent Traffic Light Control Using Artificial Intelligence,” International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 9, Issue 4.**
- 2. A. Kumar and M. Bansal (2024) – “AI-Based Traffic Flow Optimization in Smart Cities,” Journal of Intelligent Transportation Systems, Springer.**
- 3. S. Gupta et al. (2022) – “Dynamic Traffic Signal Management System Using IoT and Machine Learning,” IEEE Access, Vol. 10, pp. 45123–45131.**
- 4. ChatGPT (OpenAI, 2025) – Used as a language model assistant for preparing the theoretical background, literature summary, and algorithm explanation for the mini project report titled “Intelligent Traffic Light Controller for Dynamic and Unknown Environments.”**