

AI-Based Smart Traffic Management System

Urban congestion in Indian cities is worsened by fixed-timer traffic signals that allocate green time blindly, starving congested lanes while empty ones idle. This project implements an AI-based adaptive traffic management system: a YOLOv8 detector counts vehicles per lane — classified into cars, bikes, buses, and trucks — from intersection camera feeds, and a density-proportional control algorithm dynamically retimes signal phases each cycle, bounded by fairness guards. An emergency-vehicle priority module preempts normal phasing to open a green corridor, and a real-time IoT dashboard visualizes the junction state, per-lane counts, and throughput metrics.

The system is evaluated in a 4-way junction simulation comparing fixed-timer baselines against AI-timed control across light, medium, and saturated traffic scenarios, reporting average wait time and throughput improvements. Detection performance is measured on Indian traffic video with precision/recall per vehicle class, and failure modes (night, rain, occlusion) are documented with mitigations. The architecture separates perception (YOLO), control (density algorithm), and presentation (dashboard) cleanly, giving students three defensible viva layers. Built-to-order with source code, tuned model weights, sample traffic videos, full project report, presentation PPT, and viva Q&A; support, this project merges computer vision, control logic, and smart-city narrative — a modern, demo-rich final-year submission with no current seller competition.