

AI Based Adaptive Traffic Light Control System Using Real-Time Vehicle Density

Problem Statement:

Traditional traffic light systems operate on fixed timers, which often leads to inefficient traffic management and unnecessary congestion, particularly during peak hours or low-traffic conditions. Such systems fail to adapt to real-time variations in vehicle flow, causing delays, fuel wastage, and increased air pollution. With the rise of smart city initiatives, there is a strong need for intelligent traffic management solutions that can dynamically adjust to traffic density.

This project proposes an IoT-based smart traffic light system that leverages real-time vehicle density data collected through sensors and cameras. By analyzing traffic flow at each junction, the system can automatically adjust the green light duration to optimize traffic movement and reduce congestion. The integration of IoT and data-driven control ensures faster response times, minimized idle waiting, and improved fuel efficiency. Additionally, this adaptive system can help emergency vehicles move seamlessly by prioritizing their passage when detected. The proposed solution not only improves traffic efficiency but also contributes to reducing urban air pollution, enhances road safety, and supports the vision of sustainable smart mobility in modern cities.