

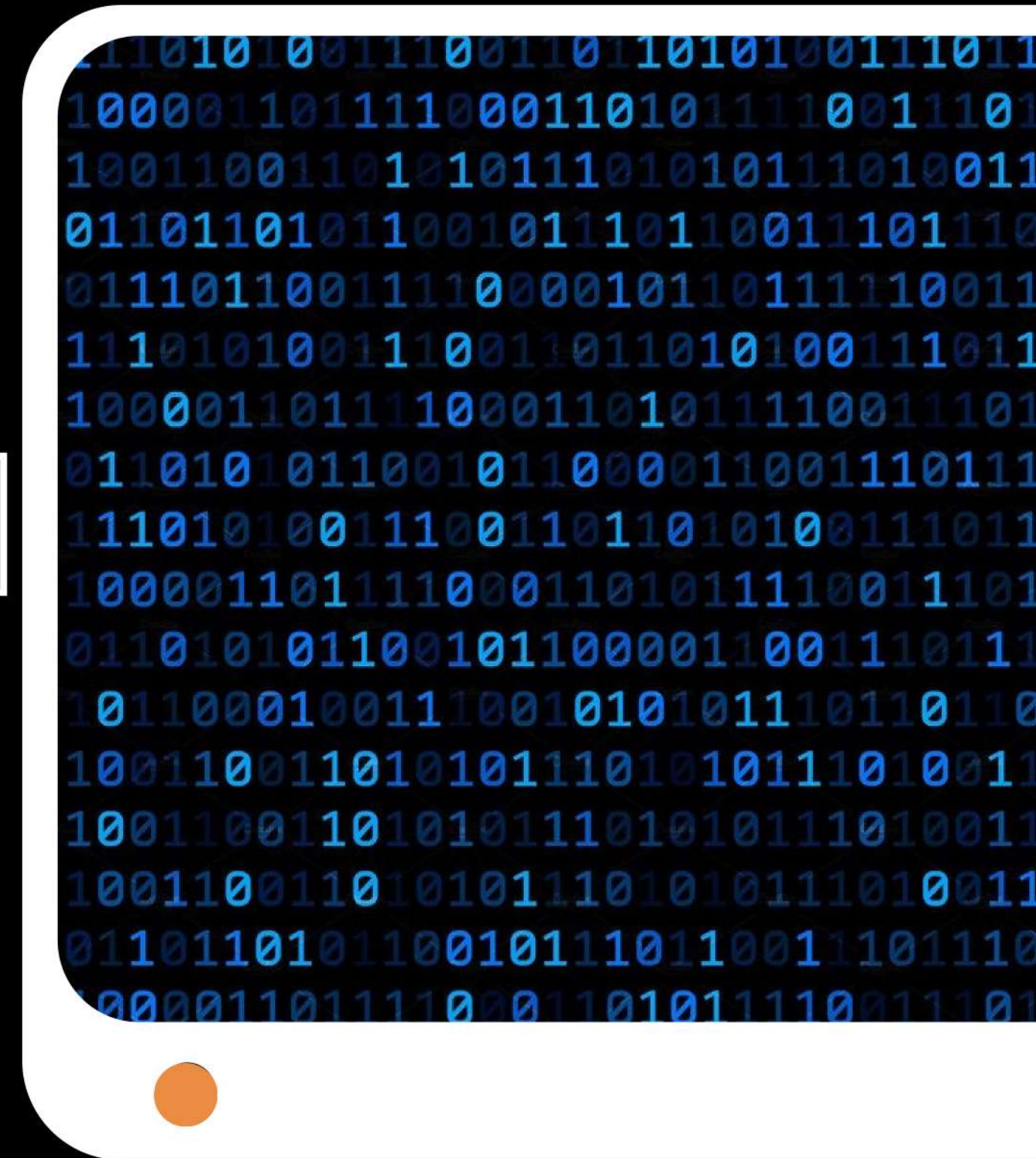


[HTTPS://GITHUB.COM/TOKYORCHID/GPS-TOLL-SIMULATION-USING-PYTHON](https://github.com/tokyorchid/gps-toll-simulation-using-python)

# GPS BASED TOLL SIMULATION *using python*

Real-time GPS-based toll simulation for Indian highways. Visualizes vehicle movement, calculates tolls dynamically, and provides interactive mapping. Developed by Lehar Tolani using Python and web technologies to analyze traffic flow and toll systems efficiency.

SRM Institute of Science and Technology | 2024







**Lehar Tolani**

@Tokyorchid

**CREATOR**

# INTRODUCTION



The Real-time GPS-based Toll Simulation for Indian Highways addresses the critical need for efficient management of road infrastructure in today's fast-paced world. This project provides a dynamic simulation of vehicle movement and toll collection across major Indian routes, offering valuable insights for urban development and economic growth strategies.

Developed using Python for backend processing and web technologies for frontend visualization, this simulation creates an interactive platform to visualize traffic flow and calculate tolls in real-time. It allows for the analysis of traffic patterns, toll system efficiency, and potential optimization of toll placement and pricing strategies. The project demonstrates the application of modern technology in solving complex transportation and infrastructure challenges.



# OBJECTIVES

The primary goal of this project is to create a versatile tool for analyzing and optimizing highway toll systems. By simulating various scenarios, the program aims to provide valuable data for infrastructure planning and policy-making.



## First Objective

Scenario Analysis: Enable testing of different toll gate placements and pricing strategies to evaluate their impact.



## Second Objective

Data-Driven Decision Making: Generate comprehensive reports on traffic flow and revenue to support informed policy decisions.



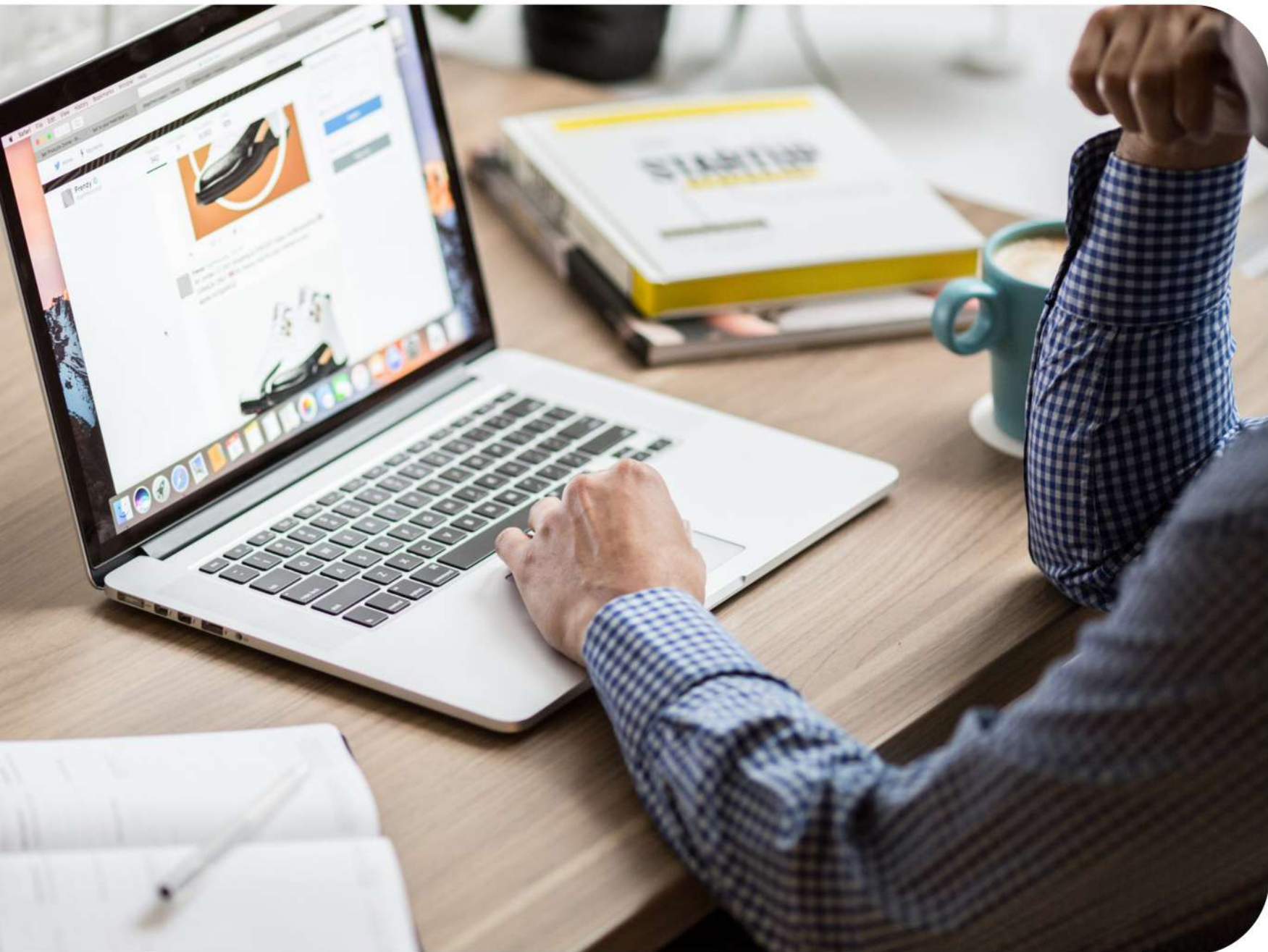
## Third Objective

Scalability and Adaptability: Develop a flexible system that can be easily modified to simulate different regions or incorporate new variables.





# FEATURES OFFERED



## Real-time Vehicle Simulation

- Generates vehicles with random types and routes
- Updates vehicle positions dynamically on the map



## Interactive Map Interface

- Displays vehicles, toll gates, and routes on a dark mode map
- Allows users to click on vehicles for detailed information

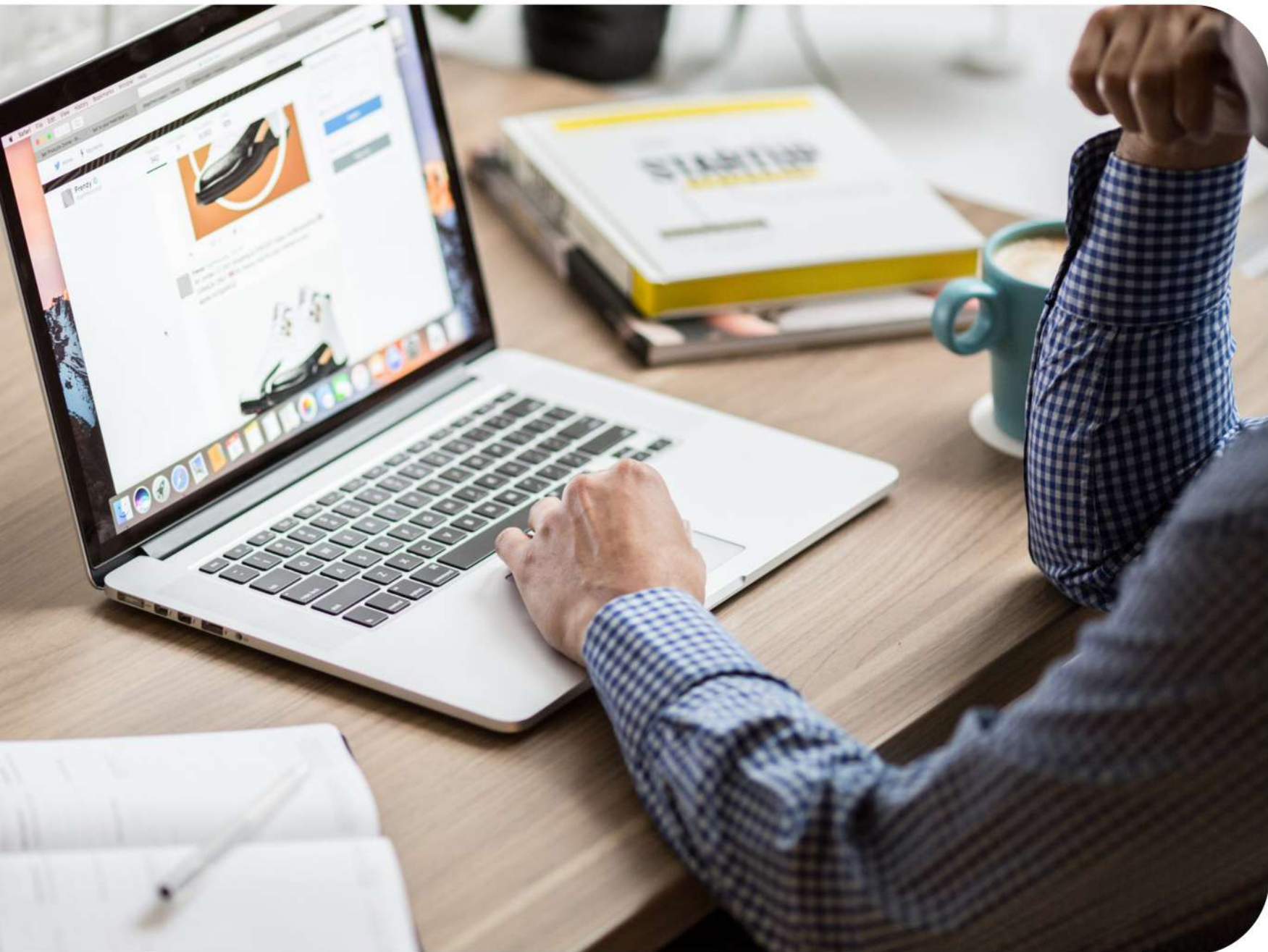


## Dynamic Toll Calculation

- Computes toll charges based on vehicle type and distance traveled
- Updates total charges for each vehicle in real-time



# FEATURES OFFERED



## **Customizable Route and Toll Gate System**

- Allows easy modification of routes and toll gate locations
- Supports different pricing structures for various vehicle types



## **Responsive Design**

- Adapts to different screen sizes for desktop and mobile viewing



## **Live Event Logging**

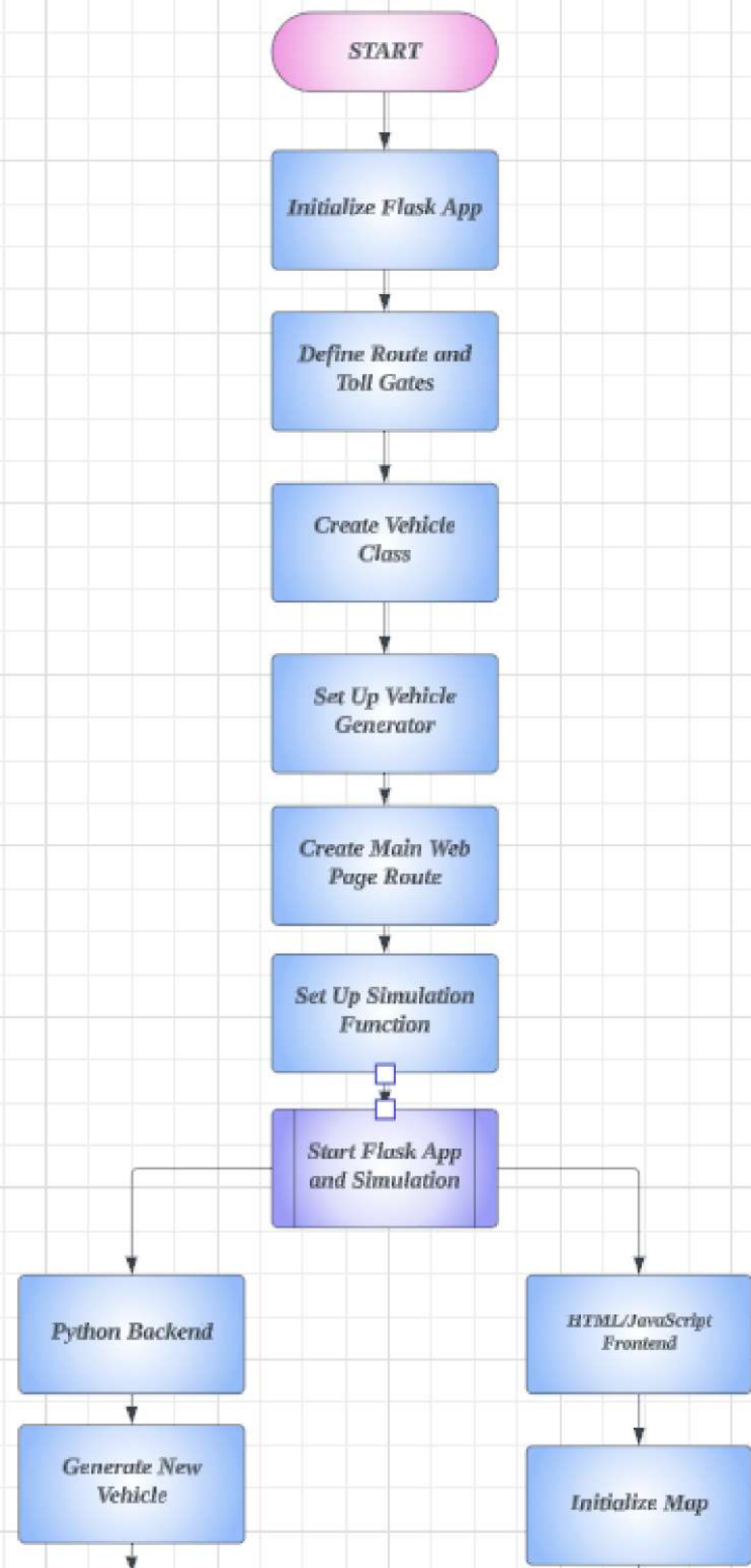
- Records and displays toll transactions as they occur
- Shows vehicle details, toll gate passed, and amount paid



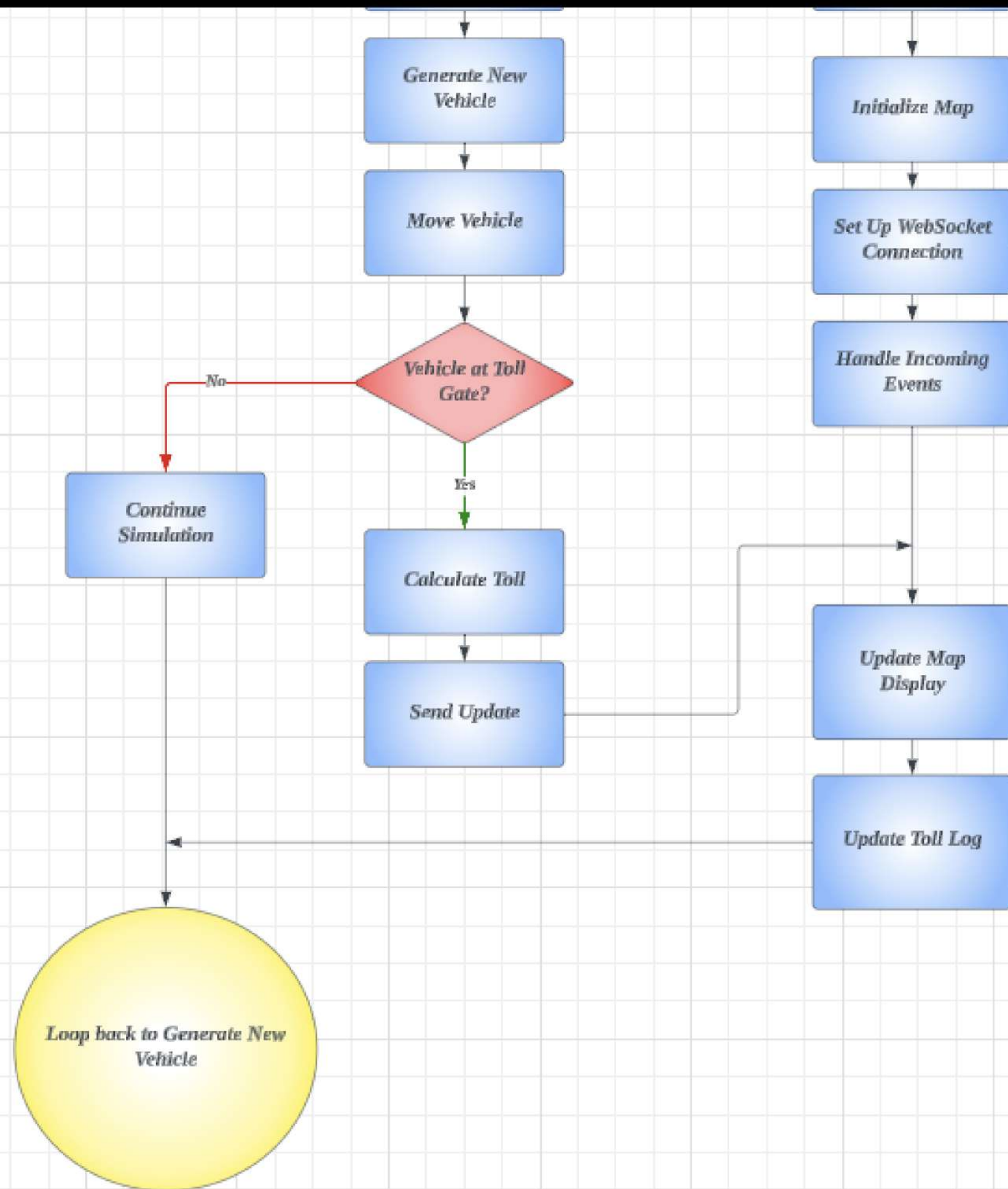
## **Continuous Simulation**

- Runs indefinitely, continuously generating new vehicles and events
- Provides a constant stream of data for analysis





FLOWCHART  
FLOWCHART



FLOWCHART  
FLOWCHART



# TECHNOLOGIES USED



## Flask

Web framework for creating the application server



## Flask-SocketIO

Extension for Flask that adds WebSocket support



## SimPy

Discrete-event simulation library for modeling vehicle movement



## GeoPy

Library for geocoding and distance calculations



## Random

Built-in module for generating random numbers and selections



## JSON

Built-in module for JSON encoding and decoding



## Time

Built-in module for time-related functions



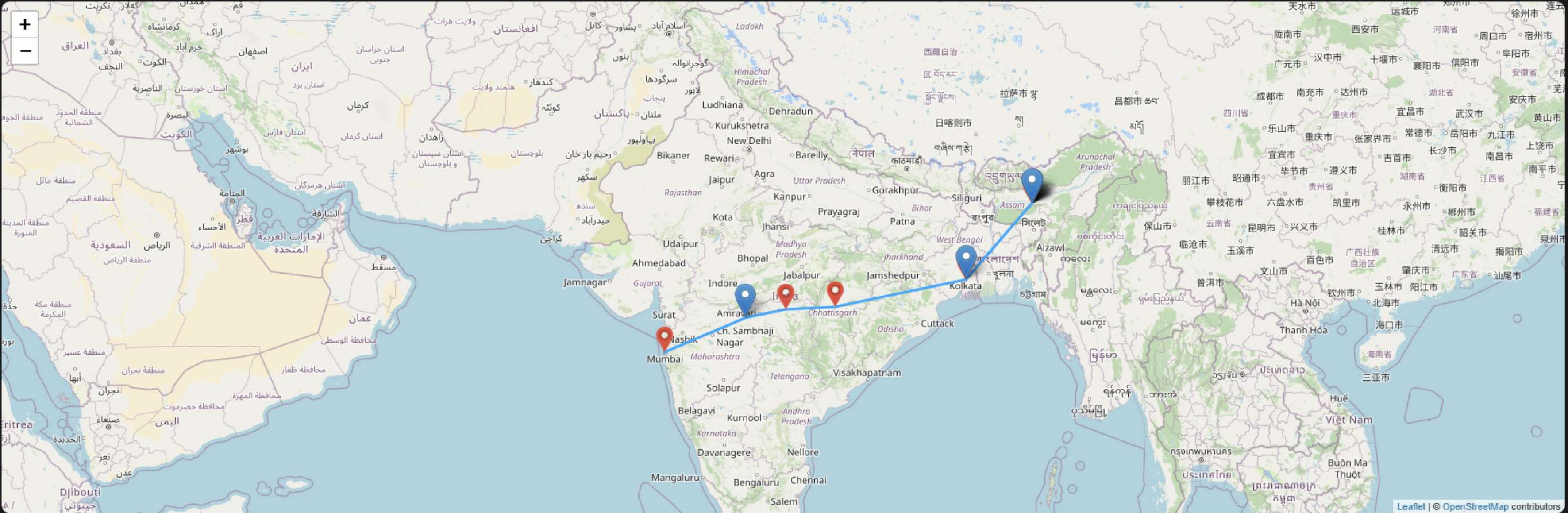
## Warnings & URLLib3

Built-in module for issuing warning messages and HTTP client library (used for disabling warnings)



# OUTPUT

## India Toll Simulation by Lehar Tolani



Vehicle 15 (bus) paid ₹330 at Kolkata Toll (Total: ₹330)  
Route: Raipur to Guwahati

Vehicle 14 (truck) paid ₹210 at Guwahati Toll (Total: ₹210)  
Route: Kolkata to Guwahati

Vehicle 12 (truck) paid ₹210 at Guwahati Toll (Total: ₹1120)  
Route: Amravati to Dispur

Vehicle 12 (truck) paid ₹210 at Guwahati Toll (Total: ₹910)  
Route: Amravati to Dispur

Vehicle 12 (truck) paid ₹230 at Kolkata Toll (Total: ₹700)



# CONCLUSION



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In conclusion, this GPS-based toll simulation project for Indian highways demonstrates the power of combining modern web technologies with data simulation to address real-world transportation challenges. By leveraging Python's robust libraries and Flask's flexible framework, along with interactive front-end technologies like Leaflet.js, the system provides a comprehensive tool for analyzing traffic flow and toll collection dynamics. The simulation's ability to generate real-time data, visualize vehicle movements, and calculate toll charges offers valuable insights for infrastructure planning, policy-making, and revenue optimization. While the current implementation focuses on a specific route across India, the modular design allows for easy adaptation to different regions or scenarios. As transportation networks continue to evolve, tools like this simulation will play an increasingly crucial role in shaping efficient, cost-effective, and user-friendly highway systems. Future enhancements could include integration with real-time traffic data, more sophisticated routing algorithms, or expanded analytics capabilities, further increasing its utility for transportation planners and policymakers. Ultimately, this project serves as a stepping stone towards more data-driven, technologically advanced approaches to managing and improving our vital transportation infrastructure.



# THANK *you*



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