Title: NeuroFleetX – AI-Driven Urban Mobility Optimization System

Project Statement:

NeuroFleetX is a next-generation AI-driven platform designed to optimize urban mobility and fleet operations for rental, transport, and smart city use cases. By leveraging artificial intelligence, IoT, and geospatial data, NeuroFleetX enables real-time vehicle tracking, intelligent routing, predictive maintenance, dynamic fleet allocation, and customer-centric service models.

The system integrates machine learning models to predict traffic conditions, optimize route plans, and monitor vehicle health. It also employs advanced dashboards and mobile-first interfaces for fleet managers and end-users. Designed for scalability, NeuroFleetX can be adapted for electric vehicle (EV) fleets, ride-sharing models, or multi-modal transport networks, offering both operational efficiency and sustainable mobility solutions for modern cities.

Module 1: Authentication & Role Management

Services:

- Admin, Fleet Manager, Driver, and Customer roles
- Secure login/registration
- Role-based dashboard redirects

Steps:

1. Design login and registration screens
2. Implement Spring Security or JWT-based authentication
3. Build role-specific dashboards (Admin, Manager, Driver, Customer)

Expected Output:

- Clean login screen with dropdown role selector
- Dashboard UI tiles with metrics (Bookings, Fleet, Users)

Module 2: Fleet Inventory & Vehicle Telemetry

Services:

- Add/update vehicles
- Track real-time status (idle, in use, maintenance)
- Telemetry simulation (speed, battery, fuel, location)

Steps

1. Create vehicle CRUD system
2. Integrate dummy GPS coordinates or IoT sensor simulation
3. Add a status card for each vehicle

Expected Output:

- Grid cards showing vehicles with:
    - Location pin
    - Status chip (Available/In Use/Needs Service)
    - Battery/fuel icon with % bar

Module 3: AI Route & Load Optimization Engine

Services:

- Dynamic route suggestion using AI (shortest time vs traffic vs energy)
- Load balancing for logistics or ride requests

Steps:

1. Integrate Google Maps API or OpenStreetMap
2. Implement AI model (e.g., Dijkstra + ML-based ETA predictor)
3. Visualize route with start, stop, ETA, traffic zones

Expected Output:

- Map screen with polyline routes
- ETA cards with alternate route options (colored paths)

Module 4: Predictive Maintenance & Health Analytics

Services:

- Monitor engine, tire, fuel, battery, mileage
- Predict next maintenance date
- Alert fleet manager for action

Steps:

1. Simulate vehicle health parameters
2. Train or use predefined thresholds to trigger warnings
3. Create analytics dashboard with charts

Expected Output:

- Dashboard with:
    - Line graph (wear over time)
    - Alert table (Vehicle ID, Issue, Action Needed)

- Pie chart for maintenance status (Healthy, Due, Critical)

Module 5: Customer Booking & Smart Recommendations

Services:

- The customer selects type, location, time
- AI recommends best-fit vehicle based on past preferences
- Booking calendar with availability

Steps:

1. Build customer UI to filter/search vehicles
2. Implement recommendation engine using past data (or dummy AI logic)
3. Integrate calendar and booking summary

Expected Output:

- Booking form with:
  - Filters (Type, Seats, EV/Non-EV)
  - Recommended cards (AI badge)
  - Booking calendar with price per slot

Module 6: Admin Dashboard & Urban Mobility Insights

Services:

- View real-time fleet distribution
- Heatmaps of trip density
- Downloadable reports (CSV, PDF)

Steps:

1. Create analytics dashboard (Angular / React, Chart.js)
2. Add map-based fleet distribution heatmap
3. Include export/download buttons

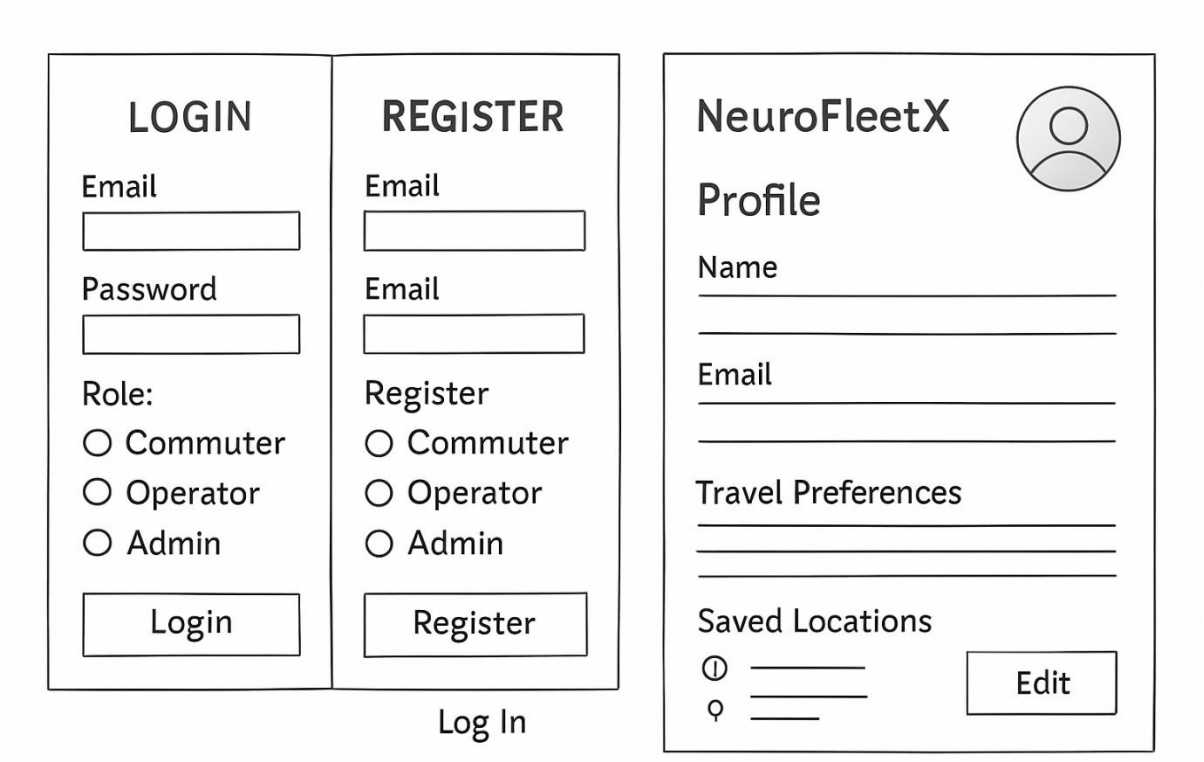
Expected Output:

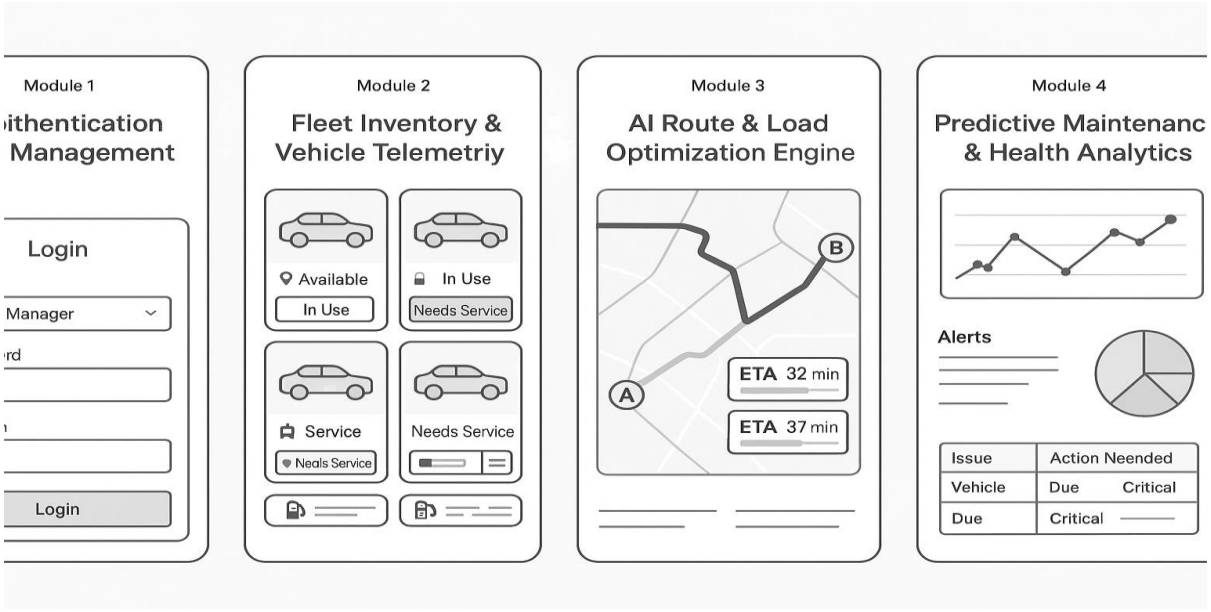
- KPI Cards: Total Fleet, Trips Today, Active Routes
- Heatmap over city layout
- Bar chart: Hourly rental activity

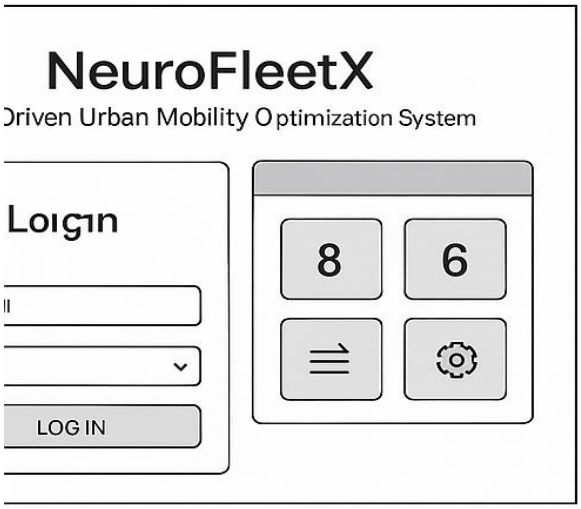
Tech Stack:

Layer	Tools /Technologies
Frontend	Angular 19 or React 19
Backend	Java Spring Boot (REST APIs)
Database	MySQL
AI Logic	Python Flask Microservice or Java ML
Maps/Location	Google Maps API / Leaflet.js
Authentication	Spring Security + JWT
Charts	Chart.js / ApexCharts / Recharts
Other APIs	Email (SMTP), WebSocket for live updates

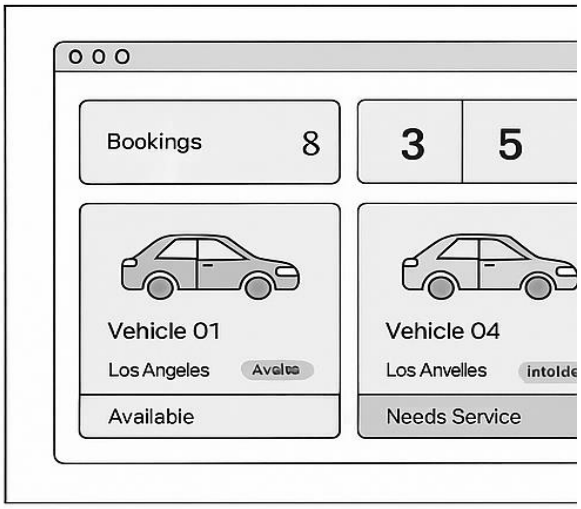
Expected outputs:







Authentification & Role Management



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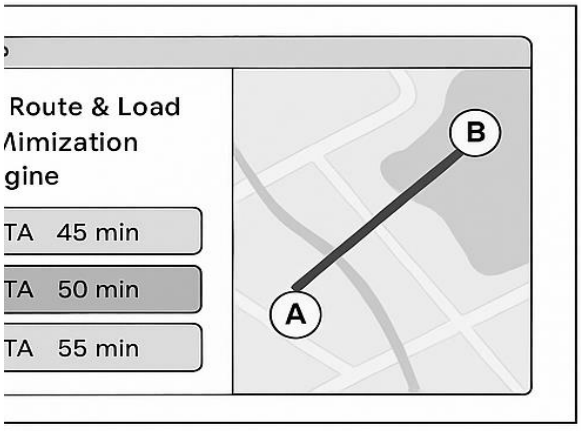
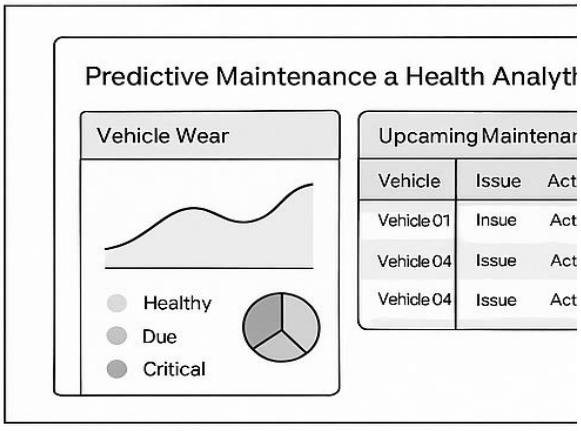


AI Route & Load Optimization Engine



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