NeuroFleetX: AI-Powered Bus Fleet Manager

1. NeuroFleetX is an AI-powered intelligent platform designed to modernize and optimize urban bus transport systems.
2. Aims to solve challenges such as:
   -Inefficient route planning
   -Poor real-time visibility
   -Traffic delays & unpredictable ETAs
   -Manual scheduling and low operational efficiency
3. Integrates IoT (GPS), AI/ML, MongoDB, and real-time dashboards into one unified ecosystem.
4. Ensures better safety, improved service quality, and optimized fleet operations for public transportation.

CORE CHALLENGES

1. Real-Time Operational Challenges
2. Scheduling & Planning Issues
3. Traffic & Road Challenges
4. Passenger Experience Challenges
5. Data & System Challenges

NeuroFleetX solves these challenges through AI-driven insights, automated workflows, and high-frequency data collection.

NeuroFleetX System Features

1. Live Bus Tracking
2. Route&Bus stop mapping
3. Seat Availability Tracking
4. Online Ticket Booking System
5. AI-Based route optimization
6. ETA Prediction System
7. Passenger Demand Forecasting
8. Data Security &Role based access

FUNCTIONAL AND NON FUNCTIONAL REQUIREMENTS

Functional requirements:

1)Bus&Fleet Management
2)Route & Stop Managemnet
3)Real-Time Tracking
4)Trip Scheduling
5)Ticket&Seat Management
6)Alerts&Notifications
7)AI/ML module functions
8)Admin Dashboard

Non Functional Requirements:

1)Performance
2)Scalability
3)Reliability
4)Security
5)Maintainability
6)Usability

Technology Infrastructure

Frontend

- React.js – UI component-based architecture
- TailwindCSS – Utility-first modern styling
- Mapbox GL JS
- Websockets
- Zustand
- Axios
- react-qr-code
- JWT Authentication
- Vite

Backend

- Node.js + Express.js – API server
- WebSocket / Socket.IO – Real-time GPS streaming
- Mongoose – MongoDB object modeling
- Axios – AI microservice calls
- JWT – Secure authentication

Database

- MongoDB – Scalable NoSQL DB
- GeoJSON indexes for route & stop mapping
- Collections: buses, routes, stops, tickets, liveTracking, aiPredictions, etc

AI/ML Engine

- Python + FastAPI – AI microservice
- Scikit-Learn, TensorFlow – Model training
- Pandas, NumPy – Data preprocessing
- Geospatial computations

DevOps

- Docker – containerized deployment
- GitHub Actions – CI/CD
- Swagger – API documentation
- Postman – API testing

High-Level System Overview