Infosys Springboard Virtual Internship 6.0 Completion Report

Team Details

Batch Number: Batch-4

Start date: 13-Oct-2025

Name: Soumyajit Rout

Internship Duration: 8 Weeks

1. Project Title

NeuroFleetX – Smart Fleet Management System.

2. Project Objective

The objective of this project is to develop a **Smart Fleet Management System** that digitizes vehicle booking, monitoring, and management. The system enables fleet managers and customers to efficiently track, book, and manage vehicles in real time, reducing manual effort and increasing operational accuracy.

3. Project description in detail

The **NeuroFleetX** project is a **Smart Fleet Management System** built using the **MVC (Model–View–Controller)** architecture to streamline vehicle management, route optimization, and operational analytics for fleet-based organizations.

This web-based application connects **Admins**, **Fleet Managers**, **Drivers**, and **Customers** on a single platform, providing real-time insights into vehicle status, bookings, and performance. The system ensures efficient vehicle utilization, reduces downtime, and enhances decision-making through intelligent data processing.

The architecture is divided into three main layers:

- **Model:** Built with **Spring Boot** and **MySQL**, handling data, business logic, and persistence.
- **View:** Designed using **React.js**, offering an interactive, responsive, and user-friendly interface.
- **Controller:** Managed through **Spring Boot REST APIs**, which connect frontend and backend modules for seamless data flow.

The project is structured into six modules:

1. **Authentication & Role Management** – Secure login and access control for Admin, Fleet Manager, Driver, and Customer.
2. **Fleet Inventory & Vehicle Telemetry** – Real-time tracking of vehicles, inventory management, and telemetry data visualization.
3. **AI Route & Load Optimization Engine** – Smart algorithms to plan optimal routes and vehicle loading.
4. **Predictive Maintenance & Health Analytics** – Predict maintenance schedules and detect potential faults using analytics.
5. **Customer Booking & Smart Recommendations** – Allow customers to book vehicles with intelligent suggestions based on usage patterns.
6. **Admin Dashboard & Urban Mobility Insights** – Comprehensive analytics and reports for monitoring fleet performance and mobility trends.

Technologies Used:

- **Frontend:** React.js, HTML, CSS, JavaScript, Tailwind CSS
- **Backend:** Spring Boot (Java)
- **Database:** MySQL
- **Architecture:** MVC Model
- **Tools:** GitHub, Postman, IntelliJ IDEA, VS Code

Impact:
The system helps transportation and logistics companies automate their operations, monitor fleet health in real time, and make data-driven decisions. It improves efficiency, safety, and customer satisfaction by integrating technology with modern fleet management practices.

4. Timeline Overview

Week	Activities Planned	Activities Completed
Week 1	Start Module 1 – Design login & registration UI	Completed Sign In & Sign Up frontend pages
Week 2	Implement authentication backend & role management	Completed JWT authentication & role-based access
Week 3	Start Module 2 – Design vehicle & telemetry database	Database created, APIs for vehicle inventory completed
Week 4	Build telemetry & fleet dashboard	Completed telemetry UI & integrated real-time data

Week 5	Start Module 3 – Research route & load optimization	Designed AI optimization logic & data flow
Week 6	Implement route & load optimization engine	Fully implemented optimization engine & tested routes
Week 7	Start Module 4 & 5 – Predictive maintenance + booking system	Completed maintenance analytics & customer booking system
Week 8	Complete Module 6 – Admin dashboard, final testing & documentation	Completed Admin Dashboard, testing, and compiled final report

5a. Key Milestones

Milestone	Description	Date Achieved
Project Kickoff	Team formation, project selection, and understanding requirements. Initial setup of GitHub repository and environment.	Week 1
Prototype/First Draft	Completion of **Module 1: Authentication & Role Management** with working login and role-based access system.	Week 2
Mid-Term Review	Completion of Modules 2 & 3 – Fleet Inventory + Optimization Engine	Week 4
Final Submission	Completion of Modules 4, 5 & 6 + Testing + Documentation	Week 8
Presentation	Final demonstration of NeuroFleetX system	Week 8

5b. Project execution details

The project is being executed following a **module-based agile development approach**, where each milestone is completed within a two-week sprint. The team divided responsibilities among members for frontend, backend, database, and documentation tasks to ensure smooth collaboration and consistent progress.

Planning & Setup:
During the initial phase, the team finalized the project scope, identified the six core modules, and designed the overall system architecture using the **MVC (Model-View-Controller)** model. The **GitHub repository** was created for version control, and development environments were configured using **VS Code** and **IntelliJ IDEA**.

Backend Development:
The backend was developed using **Spring Boot**, implementing RESTful APIs to handle authentication, vehicle data, and telemetry information.

The database schema was created in **MySQL**, and connectivity was established through **Spring Data JPA**.

Frontend Development:
The frontend was built using **React.js**, **HTML**, **CSS**, **JavaScript**, and **Bootstrap** to ensure a modern and responsive interface.
UI components were designed for **login**, **registration**, **dashboard**, and **vehicle listing**, providing smooth interaction with backend APIs.

Module 1 – Authentication & Role Management (Completed):
This module focused on secure user authentication and role-based access for **Admin**, **Fleet Manager**, **Driver**, and **Customer** roles.
JWT-based authentication and validation were successfully implemented and tested through REST APIs.

Module 2 – Fleet Inventory & Vehicle Telemetry (Ongoing):
Currently, the team is developing the **Fleet Inventory & Vehicle Telemetry** module.
Database tables for vehicles and telemetry data have been designed, and REST APIs for vehicle management are being integrated with the frontend dashboard to visualize fleet data in real time.

Module 3 – AI Route & Load Optimization Engine (Completed):
In this module, AI-based logic was implemented to calculate optimal vehicle routes and load distribution. The system analyzes distance, load capacity, and delivery locations to recommend the most efficient route. Sample data was tested to validate accuracy.

Module 4 – Predictive Maintenance & Health Analytics (Completed):
This module focused on analyzing vehicle health and predicting maintenance schedules. Vehicle telemetry data was used to identify patterns and generate alerts for potential failures or service requirements.

Module 5 – Customer Booking & Smart Recommendations (Completed):
A complete booking flow was built for customers to request vehicles. The system uses AI recommendations to suggest the best vehicle, estimated cost, distance, and delivery time.

Module 6 – Admin Dashboard & Urban Mobility Insights (Completed):
A powerful admin dashboard was created to display insights such as total bookings, vehicle health status, route performance, and fleet utilization. Charts and analytics were integrated for better decision-making.

Final Phase – Integration, Testing & Deployment:

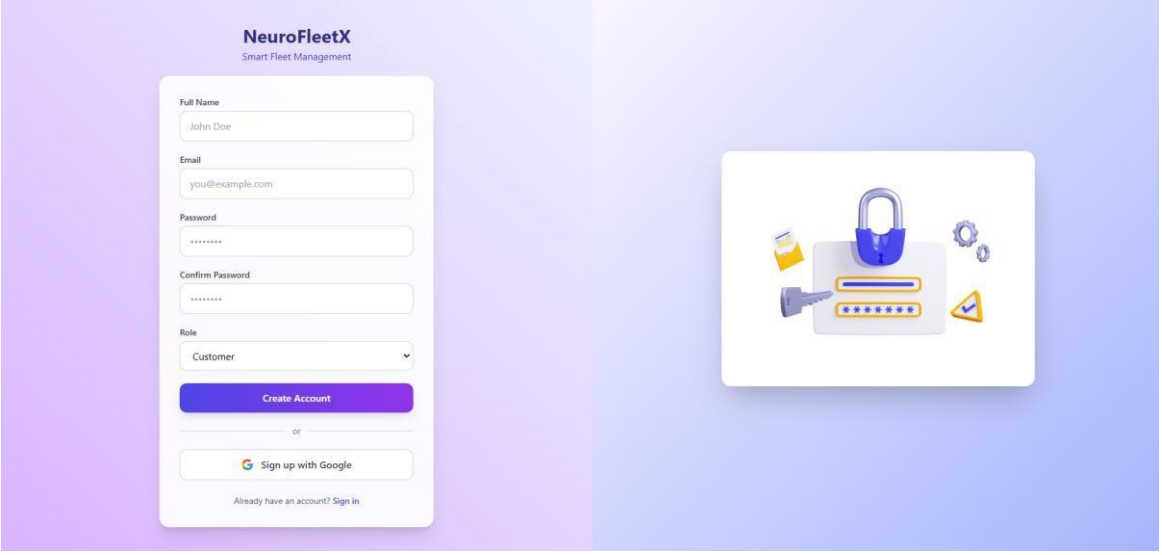
All modules were fully integrated, tested with Postman and React, and debugged for consistent behavior. The final system was documented and prepared for demonstration.

6. Snapshots / Screenshots

Module 1: Authentication & Role Management

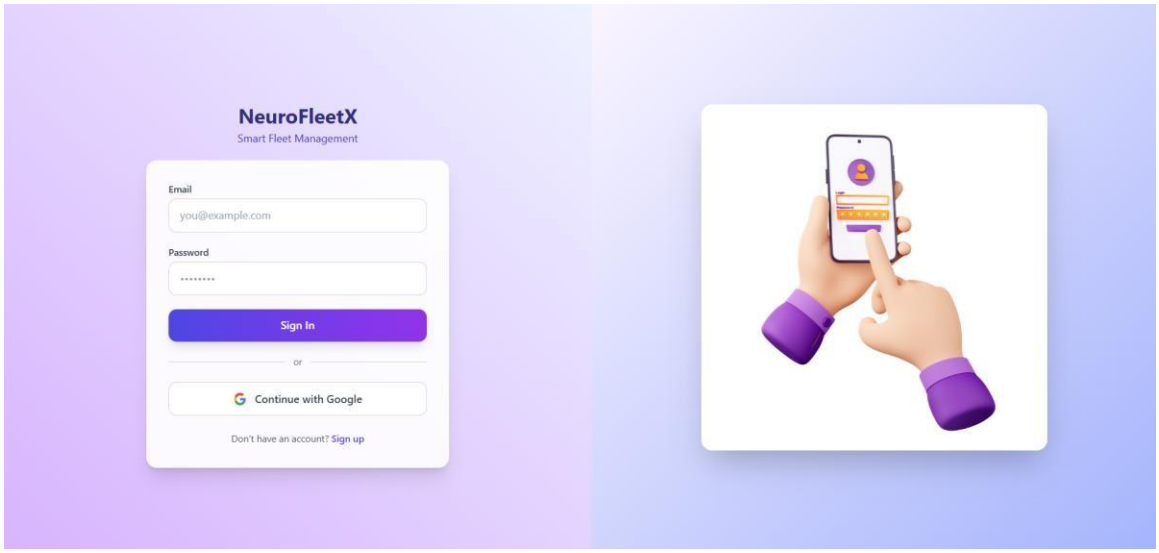
1. Sign Up Page

This page allows new users to create an account by providing their full name, email, password, confirming password, and selecting a user role (Customer, Driver, Fleet Manager, Admin).



2. Sign In Page

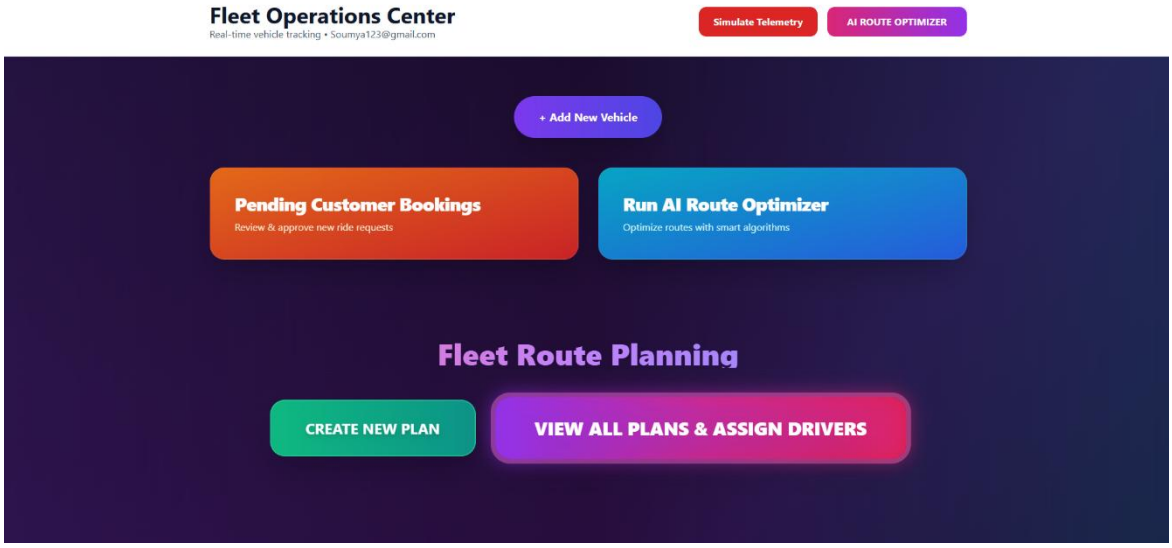
This page enables registered users to securely log into the system. It also includes a “Sign in with Google” feature for faster authentication.



Module 2: Fleet Inventory & Vehicle Telemetry

5. Fleet Manager Dashboard

The Fleet Manager Dashboard provides a centralized view of all vehicles, drivers, and ongoing bookings. It allows the fleet manager to monitor vehicle availability, track telemetry data, assign drivers, approve customer bookings, and handle operational tasks efficiently. Real-time updates help improve decision-making and streamline fleet operations.

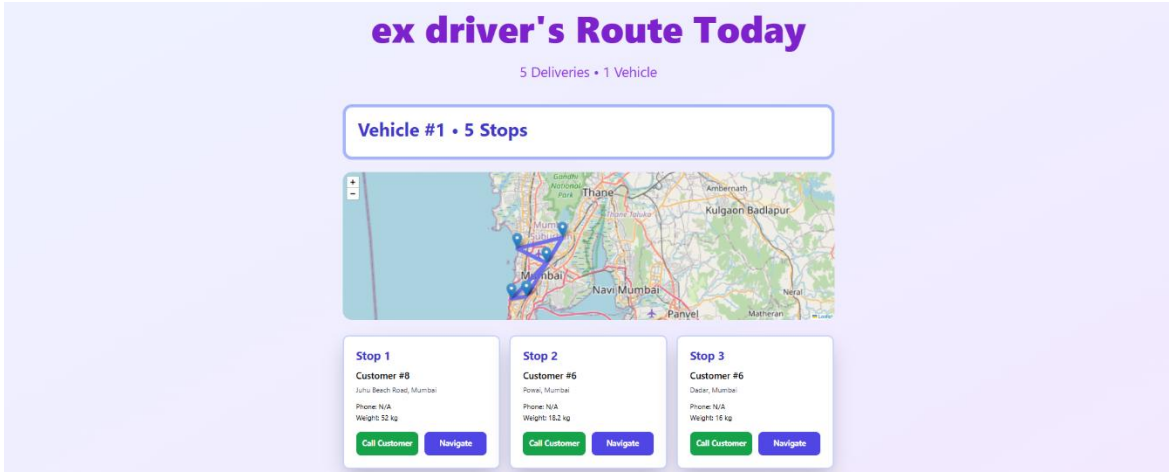


Module 3: AI Route & Load Optimization Engine

Module 4: Predictive Maintenance & Health Analytics

4. Driver Dashboard

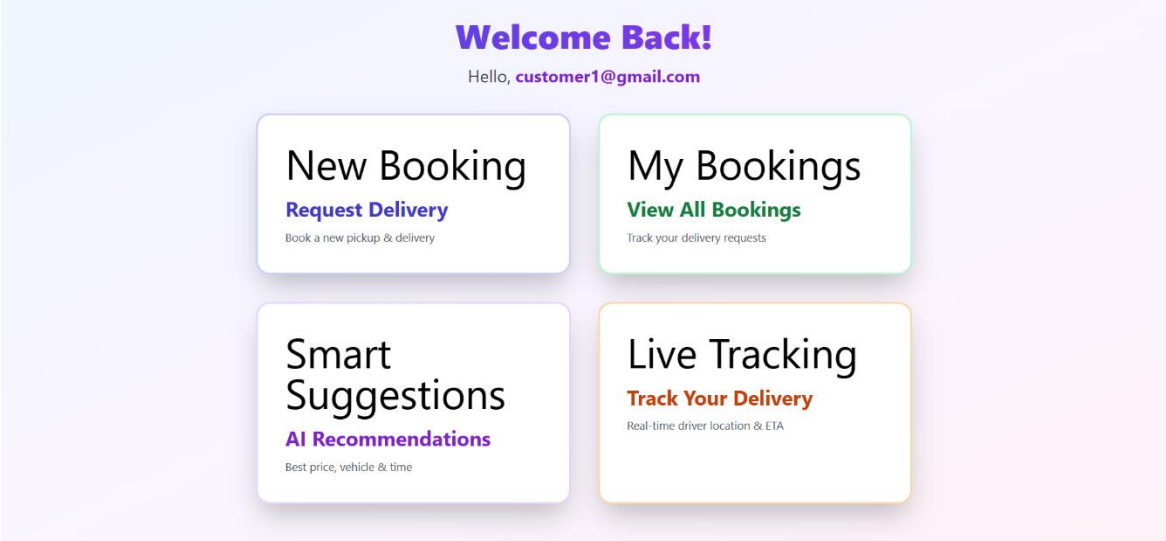
The Driver Dashboard displays assigned trips, vehicle details, route information, and real-time updates. Drivers can accept jobs, view optimized routes, and update delivery status directly from this interface.



Module 5: Customer Booking & Smart Recommendations

3. Customer Dashboard

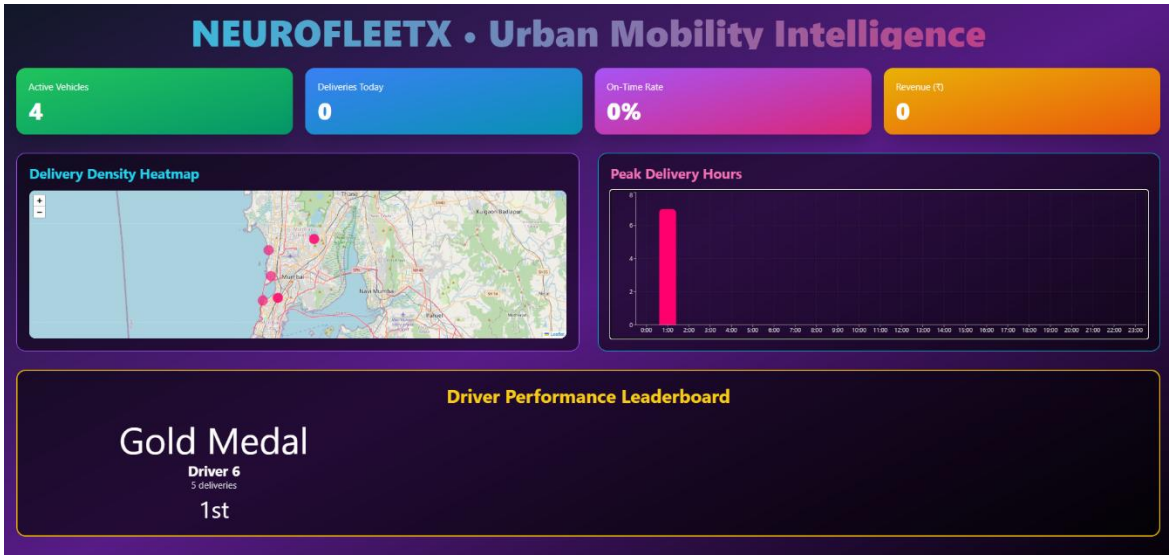
The Customer Dashboard provides options to create a new delivery request, view booking history, check smart recommendations, and track ongoing deliveries. It gives customers an easy and interactive interface to manage their transportation needs.



Module 6: Admin Dashboard & Urban Mobility Insights

6. Admin Dashboard

The Admin Dashboard offers complete control over the system, including user management, analytics, and overall platform monitoring. Admins can view total users, fleet performance, booking statistics, predictive maintenance insights, and system health. This dashboard helps administrators maintain smooth operations and ensure data accuracy across all modules.



7. Challenges Faced

While working on the NeuroFleetX project, I faced some challenges during both backend and frontend development.

- **Backend Integration Errors:**
  At first, I had some issues while connecting the Spring Boot backend with the MySQL database. The problem was mainly in the application.properties file, like wrong port and credentials. After checking the configurations properly, I was able to fix it.

- **API Communication Issues:**
  When I started integrating the frontend with the backend, the APIs were not working properly. This happened because of wrong endpoint URLs and CORS errors. I solved it by correcting the routes and adding proper CORS setup in Spring Boot.

- **Authentication Functionality:**
  While building the login and registration pages, it was a bit tough to manage password validation, role handling, and secure login. I went through a few debugging sessions and made changes in the code to fix the logic. I'm also working on improving JWT-based authentication.

- **UI Design Consistency:**
  Designing the Sign In and Sign Up pages took some time to get the perfect look. I had to adjust the layout, spacing, and responsiveness several times. Using Bootstrap and CSS Flexbox helped me make the design cleaner and well-aligned.

- **Time Management:**
  It was a bit difficult to manage project work along with college studies. I planned my tasks properly and completed Module 1 first (Authentication) before starting Module 2 (Fleet Inventory & Vehicle Telemetry).

- **AI Route Optimization Logic:**
  Implementing the route optimization engine required understanding distance calculations and load balancing. After research and testing different algorithms, a working solution was developed.

- **Predictive Maintenance Analytics:**
  Processing telemetry data to generate meaningful insights was challenging. I resolved it by preprocessing data, defining thresholds, and designing a simple prediction model.

8. Learnings & Skills Acquired

While working on the NeuroFleetX project, I learned and improved many technical as well as soft skills.

1. **Technical Skills:**
    - Gained hands-on experience with **Spring Boot**, **React.js**, **MySQL**, and **RESTful APIs**.
    - Learned how to integrate frontend and backend smoothly using APIs.
    - Improved my understanding of **authentication systems**, **role management**, and **database connectivity**.
    - Enhanced my skills in **HTML**, **CSS**, **JavaScript**, and **Bootstrap** for creating responsive UI designs.
2. **Tools & Technologies:**
    - Used **GitHub** for version control and team collaboration. ○ Worked with **Postman** for API testing and debugging.
    - Used **VS Code** and **IntelliJ IDEA** as main development environments.
3. **Soft Skills:**
    - Improved **time management** and **project planning** by following a module-wise workflow.
    - Learned to **debug issues efficiently** and find solutions through research and testing.
    - Enhanced **team communication** and **collaboration** while discussing project progress and resolving errors.
4. **Domain Knowledge:**
    - Understood how **fleet management systems** work in real-world scenarios.
    - Learned about **vehicle tracking, telemetry, and role-based access systems**.
    - Learned the basics of **AI route optimization** and how to use algorithms for distance and load calculations.
    - Gained understanding of **predictive analytics**, telemetry data handling, and maintenance prediction logic.

Overall, this phase of the project helped me strengthen my full-stack development skills and understand how different technologies connect to build a complete web application.

9. Testimonials from team

This project gave me a complete hands-on experience in full-stack development. Working on all six modules helped me understand how real systems are built and deployed. I enjoyed solving backend challenges and integrating the frontend with APIs.

10. Conclusion

The Infosys Springboard Virtual Internship 6.0 was a valuable learning experience. Completing all six modules of the NeuroFleetX project strengthened my full-stack development skills and helped me understand how real-world fleet management systems work.

This project improved my technical abilities, teamwork, and problem-solving skills, and it strongly aligns with my academic and career goals in software development and AI-based systems.

11. Acknowledgements

I would like to thank **Infosys Springboard** for providing this internship opportunity. I am grateful to our mentor for guidance and feedback throughout the project. I also thank all my teammates for their cooperation and support during the development of NeuroFleetX.