

**A
Project Report
On
"Vehicle Rental System"**

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Under the guidance of
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A Report Submitted to
Charotar University of Science and Technology
For Partial Fulfillment of the Requirements for the
5th Semester Summer Internship-I (CS306)

Submitted at



Department of Computer Science & Engineering
Devang Patel Institute of Advance Technology and Research
At: Changa, Dist: Anand – 388421
July 2025



CHARUSAT

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

CERTIFICATE

This is to certify that the report entitled “Vehicle Rental System” is a bonafide work carried out by **Mr. Veer Bhalodia (23DCS010)** under the guidance and supervision of **Prof. Arpit Bhatt** for the subject **CSE306 Summer Internship-I** of 5th Semester of Bachelor of Technology in **Department of Computer Science & Engineering, DEPSTAR** at Faculty of Technology & Engineering – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

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Summer Internship Completion Certificate

To: Mr. Veer Bhalodia

This is to certify that **Mr. Veer Bhalodia** has successfully completed a **1-month Summer Internship** at **W3NUTS**, Rajkot, as a Full Stack Web Development Intern. The internship was conducted in offline mode at our Rajkot office from **May 12th, 2025 to June 13th, 2025**.

During the internship, Veer actively engaged in learning and implementing Frontend and Backend development concepts. He demonstrated a sincere attitude, adaptability, and a willingness to learn new technologies. His performance during this period has been satisfactory, and he has gained valuable hands-on experience in Full Stack Web Development.

We commend his efforts during the internship and extend our best wishes for his continued academic and career growth.

Best regards,

W3NUTS, Rajkot

For W3NUTS

Partner



ACKNOWLEDGEMENT

I would like to express my sincere gratitude to **W3NUTS** for giving me the opportunity to undertake my internship at their esteemed organization. It has been a truly valuable and enriching experience, allowing me to gain practical exposure in the field of **Full Stack Web Development**.

I am especially thankful to my mentor, **Mr. Darpan Bhatt**, Lead Developer at W3NUTS, for his constant support, guidance, and encouragement throughout the internship. His technical expertise, insightful feedback, and mentorship played a crucial role in enhancing my skills and understanding of real-world development practices.

I would also like to thank the entire team at W3NUTS for creating a collaborative and motivating work environment. Their support and professionalism made this internship a highly productive and enjoyable learning experience.

This internship has been a significant step in my professional journey, and I am truly grateful for the insights and experience I have gained.

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ABSTRACT

The Vehicle Rental System is a comprehensive web-based platform developed to facilitate the efficient and hassle-free rental of vehicles such as bikes, sedans, and SUVs. The system aims to modernize the traditional rental process by offering a digital interface where users can explore a wide range of vehicles, check availability, and make bookings seamlessly. The platform features a clean and interactive user interface for customers, allowing them to search, filter, and view vehicle details easily. On the administrative side, the system provides powerful tools to manage vehicle inventory, oversee bookings, and maintain user records, all through a centralized dashboard. Key functionalities include secure user authentication, booking confirmation, rental duration management, and dynamic price calculation. The application is built using the MERN Stack (MongoDB, Express.js, React.js, and Node.js), ensuring a modern architecture that is both scalable and efficient. With a focus on usability, security, and performance, the project also incorporates responsive design principles to ensure smooth accessibility across devices. This project reflects a practical implementation of full-stack development by integrating real-time data operations and user-centric design. It provides a robust solution for vehicle rental businesses looking to transition from manual to automated operations, while also offering users a fast, reliable, and intuitive way to rent vehicles online.

TABLE OF CONTENT

ACKNOWLEDGEMENT	ii
ABSTRACT	ii
COMPANY DESCRIPTION.....	iv
CHAPTER 1: PROJECT DEFINITION.....	1
1.1 INTRODUCTION	1
1.2 OBJECTIVE OF PROJECT	1
1.3 SCOPE OF PROJECT	1
1.4 PROBLEM STATEMENT	2
CHAPTER 2: PROJECT DESCRIPTION.....	3
2.1 OVERVIEW OF THE SYSTEM.....	3
2.2 SYSTEM ARCHITECTURE	3
2.3 USER ROLES AND RESPONSIBILITIES	3
2.4 TECHNOLOGY STACK	4
2.5 DEVELOPMENT METHODOLOGY	4
CHAPTER 3: SOFTWARE AND HARDWARE REQUIREMENTS	5
3.1 SOFTWARE REQUIREMENTS	5
3.2 HARDWARE REQUIREMENTS.....	5
CHAPTER 4: MAJOR FUNCTIONALITY	6
4.1 CUSTOMER FUNCTIONALITIES	6
4.2 ADMINISTRATOR FUNCTIONALITIES	6
4.3 COMMON FEATURES	7
CHAPTER 5: FLOW CHART	8
CHAPTER 6: SCREENSHOTS OF YOUR PROJECT OUTPUT	12
CHAPTER 7: LIMITATIONS OF PROJECT	15
CHAPTER 8: OUTCOMES	16
CHAPTER 9: FUTURE ENHANCEMENT	17
CHAPTER 10: REFERENCES	18

COMPANY DESCRIPTION

W3NUTS is a fast-growing and dynamic IT company based in **Rajkot, Gujarat, India**, specializing in web development, mobile application development, UI/UX design, and digital solutions. Since its inception, W3NUTS has consistently delivered high-quality, customized technology solutions to a wide range of clients including startups, small businesses, and enterprises across India and overseas. The company focuses on transforming innovative ideas into functional, user-centric digital products by leveraging modern technologies and industry best practices.

W3NUTS offers a variety of services including full-stack web development, e-commerce platforms, mobile app development, CMS-based websites, and business automation tools. It emphasizes clean, scalable design and efficient back-end systems, ensuring optimal performance and user experience. The organization operates with a strong focus on agility, innovation, and client satisfaction.

The administrative structure at W3NUTS is flat yet efficient, promoting seamless collaboration between teams and departments. The company is divided into key functional divisions such as Web Development, Mobile App Development, UI/UX Design, Quality Assurance, and Client Support. The team consists of **30–40 skilled professionals**, including developers, designers, testers, and project managers, who work together to deliver robust, reliable, and timely software solutions.

During my internship, I was placed in the **Web Development Division** and worked under the guidance of **Mr. Darpan Bhatt**, Lead Developer. I had the opportunity to contribute to a live project using full-stack development technologies and gain hands-on experience in real-world software development environments.

CHAPTER 1: PROJECT DEFINITION

1.1 INTRODUCTION

The project titled "**Vehicle Rental System**" was undertaken as part of a summer internship at **W3NUTS**, Rajkot. The aim of this project is to design and develop a full-stack web application that facilitates the online rental of vehicles, offering a digital solution to streamline the booking and management process. This system enables customers to browse, filter, and rent various types of vehicles such as bikes, sedans, and SUVs, while providing administrators with tools to manage listings, bookings, and user data efficiently. The project applies practical web development skills to solve real-world problems in the vehicle rental industry.

1.2 OBJECTIVE OF PROJECT

- To develop a responsive and user-friendly vehicle rental web application.
- To implement user authentication, booking, and rental management functionalities.
- To apply full-stack development skills using the MERN stack (MongoDB, Express.js, React.js, Node.js).
- To create a functional admin panel for vehicle and booking management.
- To enhance problem-solving and real-world application development skills.

1.3 SCOPE OF PROJECT

- Implementation of user registration, login, and secure authentication.
- Integration of search and filter options for customers to find vehicles based on type.
- Admin functionalities to manage vehicles, users, and bookings through a centralized dashboard.
- Real-time booking system with price calculation and booking history.
- Use of modern web development technologies such as React for the frontend and Node.js with MongoDB for the backend.

1.4 PROBLEM STATEMENT

The traditional vehicle rental process often involves manual bookings, lack of real-time availability, and inefficient data management, leading to delays, confusion, and poor customer experience. This project addresses the need for an automated and efficient system where users can easily rent vehicles online, and administrators can manage operations without paperwork or physical presence. By developing a modern, web-based Vehicle Rental System, the project aims to provide a digital solution that improves accessibility, enhances operational efficiency, and delivers a seamless experience for both users and service providers.

CHAPTER 2: PROJECT DESCRIPTION

2.1 OVERVIEW OF THE SYSTEM

The Vehicle Rental System is a web-based platform developed to simplify and automate the process of renting vehicles. It provides a structured interface for users to explore available vehicles, make bookings, and manage their rentals online. The system also equips administrators with tools to manage vehicle listings, view bookings, and oversee user activities from a centralized dashboard. The overall design is aimed at improving service efficiency, minimizing manual errors, and offering a smooth user experience.

2.2 SYSTEM ARCHITECTURE

The application follows a three-tier architecture comprising:

- **Frontend (Client Side):** Built with React.js for dynamic and responsive user interfaces.
- **Backend (Server Side):** Developed using Node.js and Express.js to handle business logic and API routes.
- **Database Layer:** Uses MongoDB to store data related to users, vehicles, and bookings in a flexible NoSQL format.

This modular separation ensures scalability, maintainability, and secure communication between layers.

2.3 USER ROLES AND RESPONSIBILITIES

The system includes two primary user roles with distinct access levels:

- **Customer:** Can register, log in, view and filter available vehicles, and place bookings based on rental dates.
- **Administrator:** Has access to vehicle inventory management, user records, and booking overviews. Admins can add, update, or delete vehicle entries and monitor system activity.

Role-based access control ensures that each user sees only the features relevant to their role.

2.4 TECHNOLOGY STACK

The system is built using the following technologies:

- **Frontend:** React.js
- **Backend:** Node.js with Express.js
- **Database:** MongoDB
- **Styling:** Bootstrap 5 and CSS
- **Authentication:** JSON Web Token (JWT) for secure login sessions
- **Editor:** Visual Studio Code

These technologies were selected for their modern design principles, flexibility, and real-time data handling.

2.5 DEVELOPMENT METHODOLOGY

The project was developed using a modular, incremental approach. Each component—authentication, vehicle management, booking system—was built individually and then integrated into the overall system. Regular reviews and feedback sessions with the mentor ensured that each phase met functional and visual expectations before moving to the next.

CHAPTER 3: SOFTWARE AND HARDWARE REQUIREMENTS

3.1 SOFTWARE REQUIREMENTS

The following software components were used during the development process:

- **Operating System:** Windows 10 or higher (compatible with Node.js and MongoDB)
- **Code Editor:** Visual Studio Code – used for writing, testing, and debugging code
- **Frontend Framework:** React.js – for building a dynamic and responsive user interface
- **Backend Framework:** Node.js with Express.js – for building server-side APIs
- **Database:** MongoDB – for storing vehicle, user, and booking data
- **Styling Tools:** Bootstrap 5 and custom CSS – for designing responsive layouts
- **Authentication Libraries:** JSON Web Token (JWT) and bcrypt – used for secure login and password encryption
- **API Testing Tool:** Postman – for testing backend routes and API responses
- **Web Browser:** Google Chrome / Microsoft Edge – for running and testing the application interface

3.2 HARDWARE REQUIREMENTS

To develop and test the application effectively, the following hardware configuration was used:

Processor: Intel Core i5 or AMD Ryzen 5 (or higher)

RAM: Minimum 8 GB

Storage: At least 200 MB of free space for project files and local MongoDB data

Monitor: 14" or larger screen with minimum 1366×768 resolution

This configuration was sufficient for running both frontend and backend services simultaneously without performance issues.

CHAPTER 4: MAJOR FUNCTIONALITY

4.1 CUSTOMER FUNCTIONALITIES

Customers are the end users who interact with the platform to explore and book vehicles.

The following functionalities are available for customer use:

- **User Registration and Login:** Allows customers to create an account and securely log in using encrypted credentials.
- **Vehicle Browsing:** Displays all available vehicles categorized by type (e.g., Bike, Sedan, SUV) with images and details.
- **Vehicle Booking:** Customers can book a selected vehicle by choosing rental dates and viewing total cost based on duration.
- **Booking History:** Users can view their previous and current bookings in a personalized dashboard.
- **Logout Functionality:** Ensures session security and allows users to safely log out from the system.

4.2 ADMINISTRATOR FUNCTIONALITIES

Administrators manage the backend operations of the system. The admin dashboard provides the following key features:

- **Admin Authentication:** Secure login for administrators to access the management dashboard.
- **Vehicle Management:** Admins can add, update, or delete vehicle listings along with uploading images and pricing information.
- **Booking Management:** View all customer bookings, including user details, vehicle information, and rental status.
- **User Management:** Admins can view a list of all registered users and their booking activities.

4.3 COMMON FEATURES

These functionalities are available to both users and admins and are essential to overall system operation:

- **Responsive User Interface:** Ensures a smooth and consistent experience across desktops, tablets, and mobile devices.
- **Authentication and Authorization:** Role-based access control is implemented using JWT to ensure secure access for users and admins.
- **Error Handling and Validation:** Form validations and error messages guide users in entering correct data during registration, booking, or vehicle addition.
- **User-friendly Navigation:** Intuitive menus and layout help users move through the system with ease.

CHAPTER 5: FLOW CHART

The system is divided into two main modules:

- Customer Module
- Admin Module

Each module has specific processes that work independently but interact with shared components such as the vehicle database and booking logic.

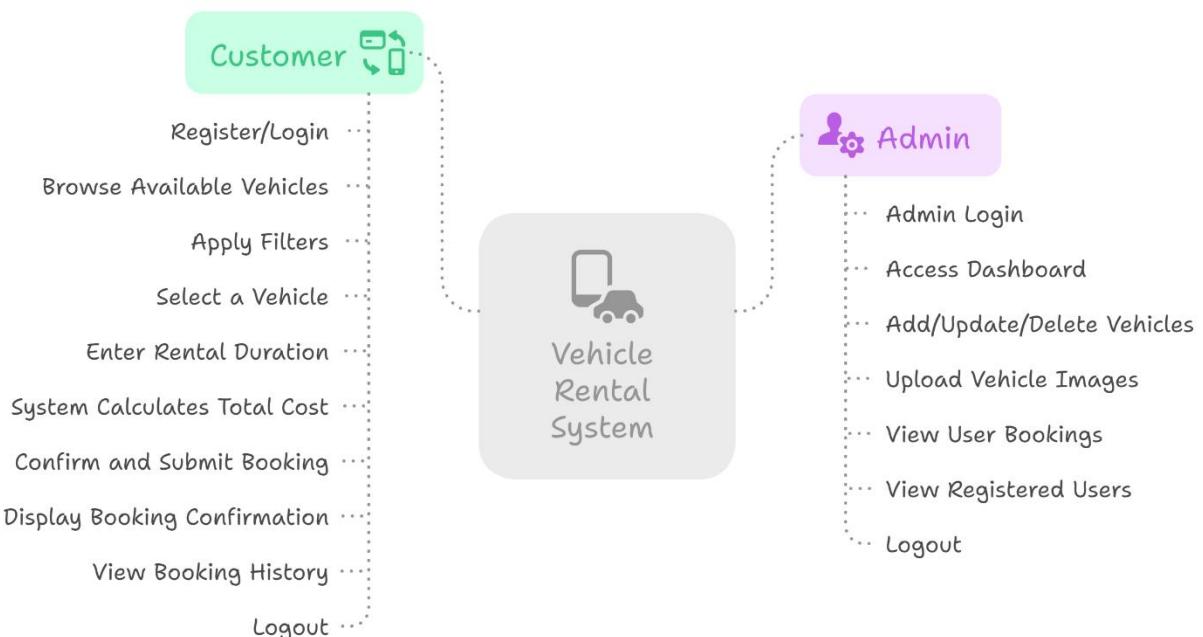


Fig 5.1 Admin and Customer Module

Customer Flow Chart:

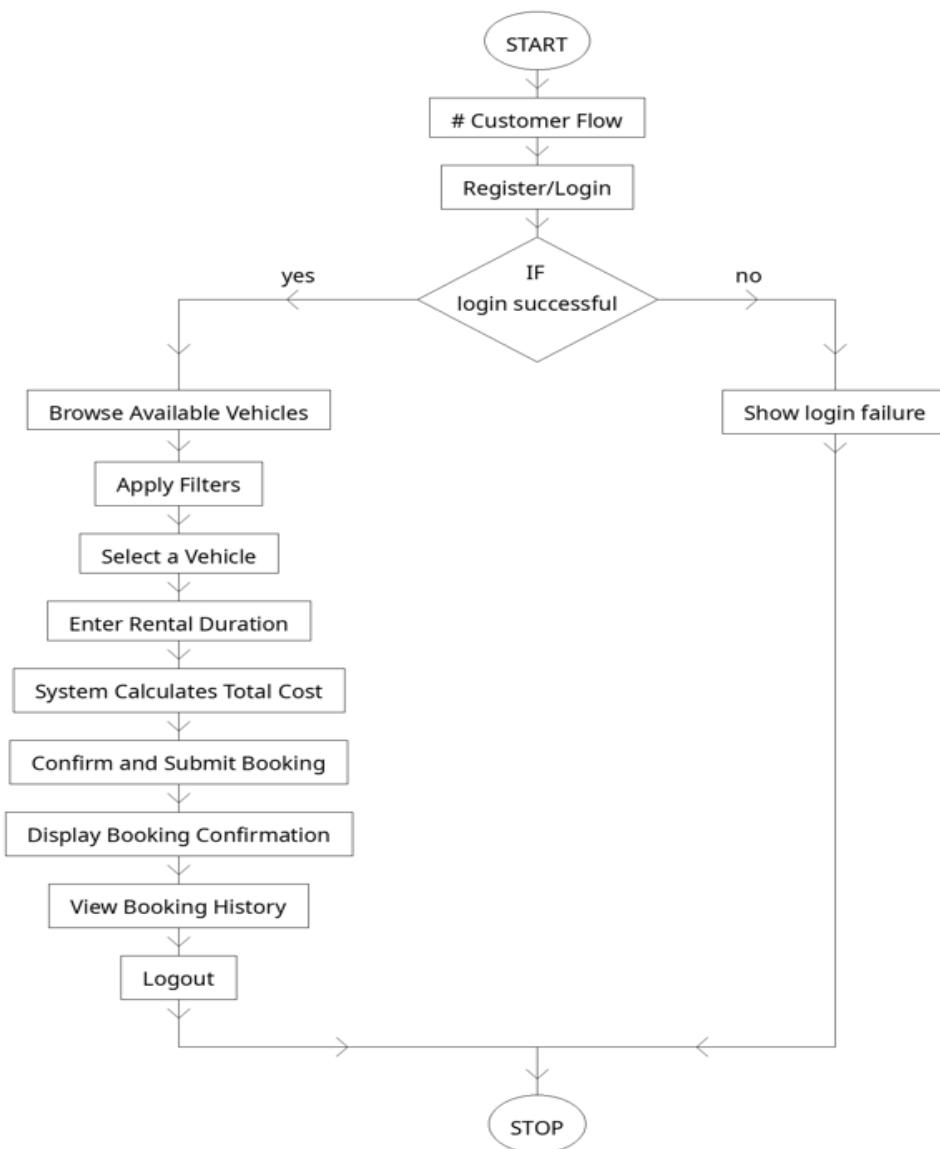


Fig 5.2 Customer Flowchart

- **Start:** The customer process begins.
- **Register/Login:** The customer registers or logs into the system.
- **Login Verification:** If the login is successful, proceed to the next step; otherwise, a "Login Failure" message is displayed.
- **Browse and Filter Vehicles:** The customer views available vehicles and applies filters (e.g., type, price).
- **Select Vehicle & Enter Rental Duration:** The customer selects a vehicle and provides the rental period.

- **System Calculates Cost:** The system automatically calculates the total rental cost based on duration and vehicle type.
- **Confirm and Submit Booking:** The customer confirms and submits the booking request.
- **Booking Confirmation & History:** A confirmation message is displayed, and the customer can view their booking history.
- **Logout & Stop:** The customer logs out, ending the session.

Admin Flowchart:

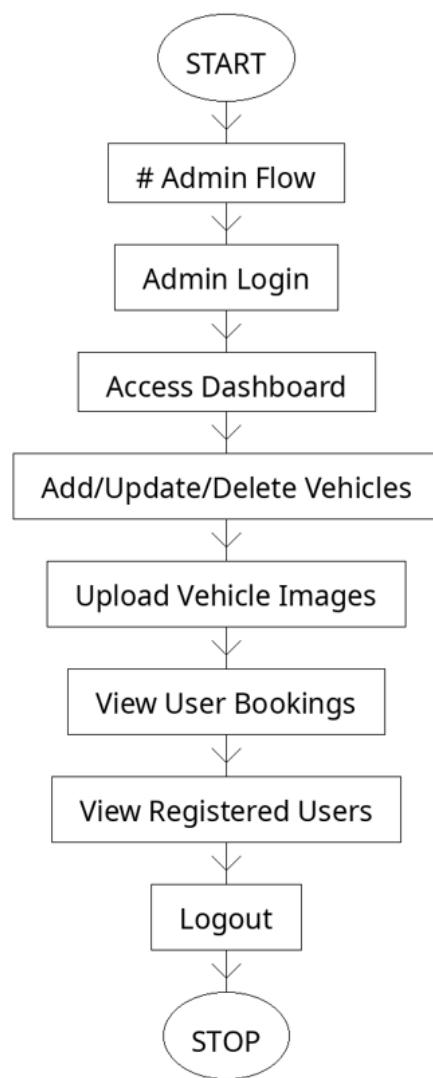


Fig 5.1 Admin Flowchart

- **Start:** The admin process begins.
- **Admin Login:** The admin logs in with valid credentials.
- **Dashboard Access:** Upon login, the admin accesses the dashboard.
- **Manage Vehicles:** The admin can add, update, or delete vehicles, and upload related images.
- **View Data:** The admin can view all user bookings and registered users.
- **Logout & Stop:** The admin logs out, and the session ends.

CHAPTER 6: SCREENSHOTS OF YOUR PROJECT OUTPUT

Home Page: This is the Home Page of the Vehicle Rental System with a clean layout.

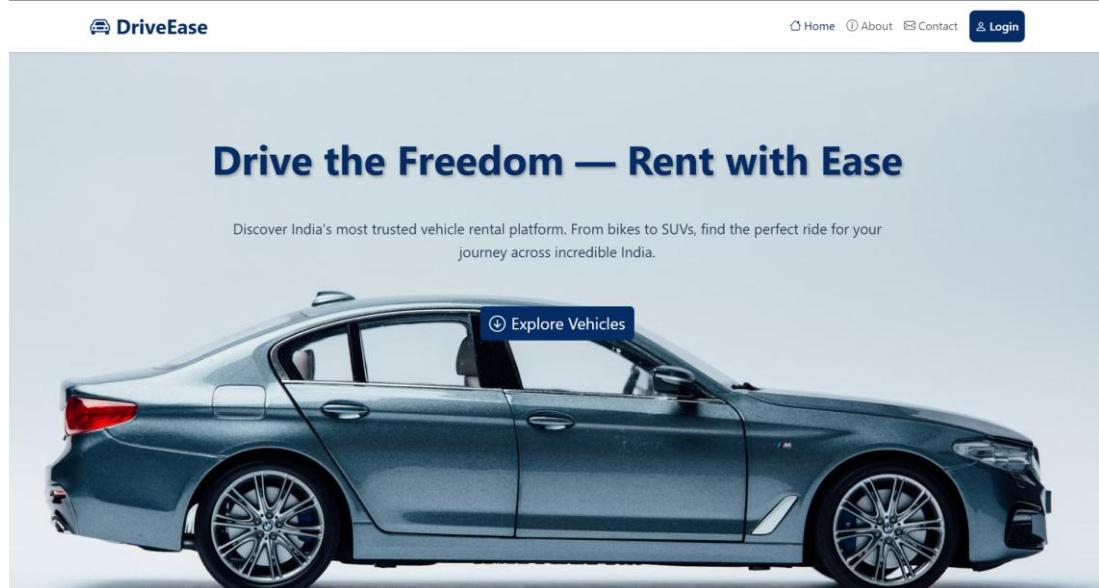


Fig 6.1 Home Page

Category Section: This section allows users to choose their preferred vehicle category such as Bike, Sedan, SUV, or Hatchback.

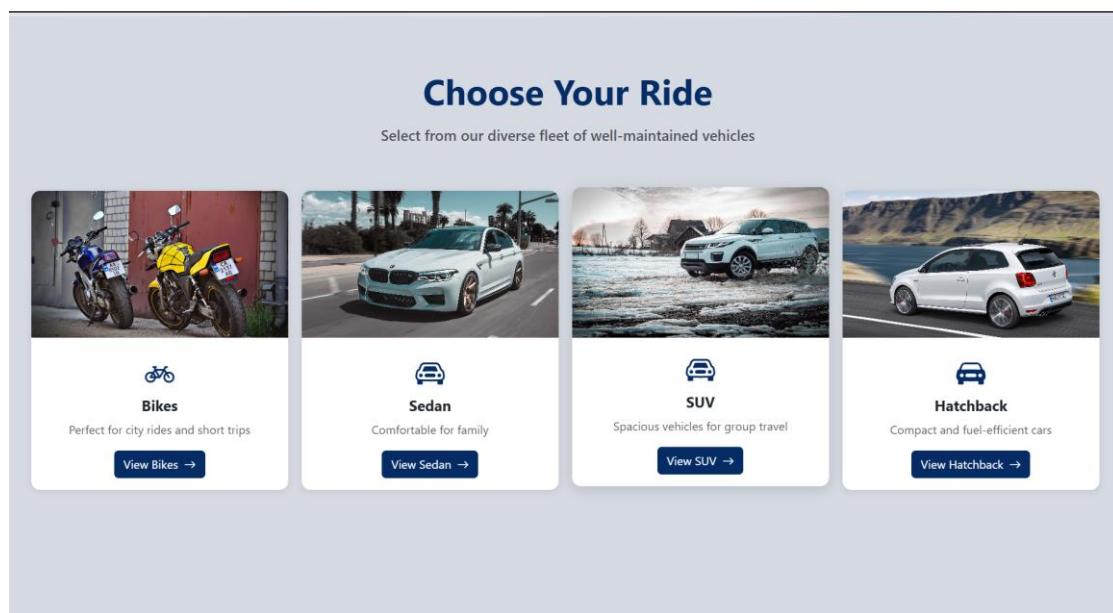


Fig 6.2 Category Section

Customer Review: This section displays customer reviews and ratings, highlighting positive user experiences from various cities.

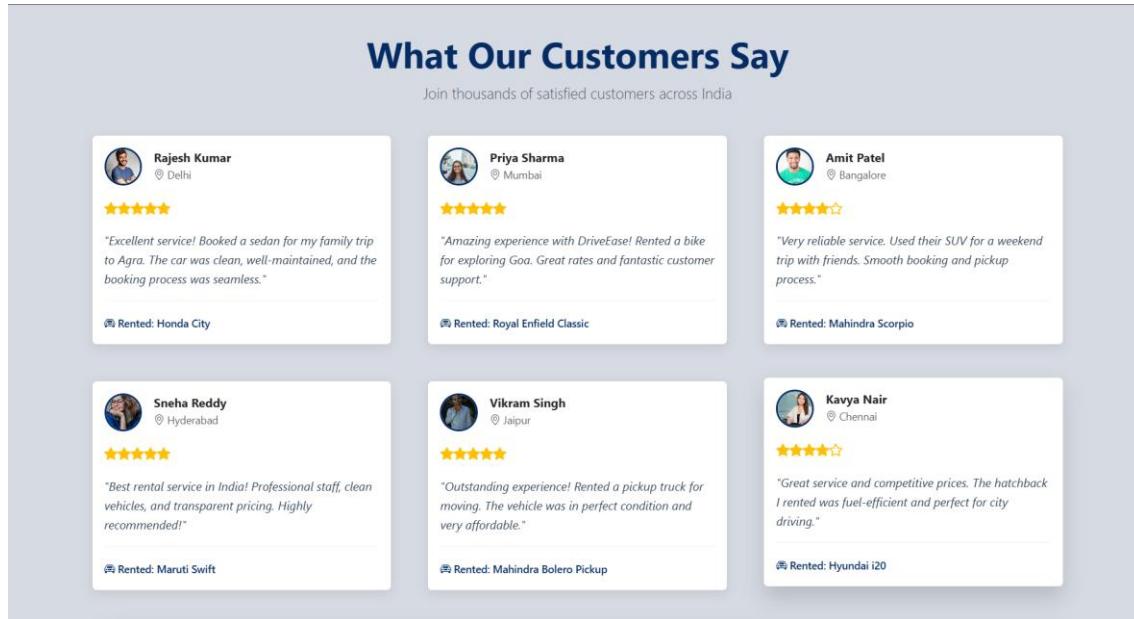


Fig 6.3 Customer Reviews

Sign Up: This page allows new users to create an account by entering their personal details and credentials.

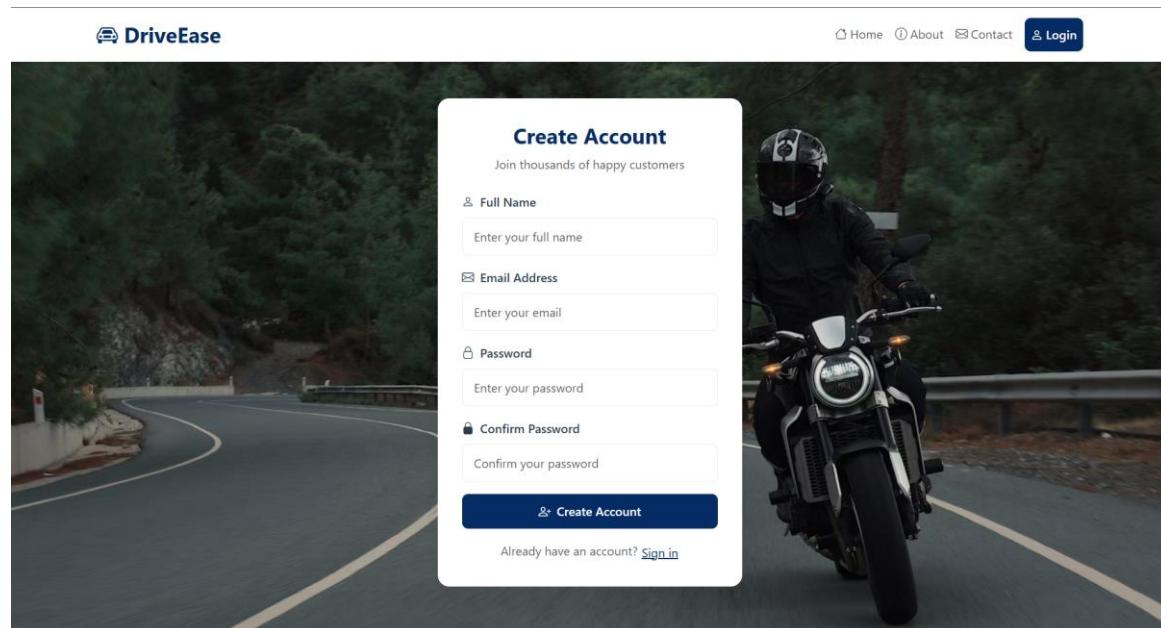


Fig 6.4 Sign Up

Login Page: This page enables registered users to securely log into the system using their email and password.

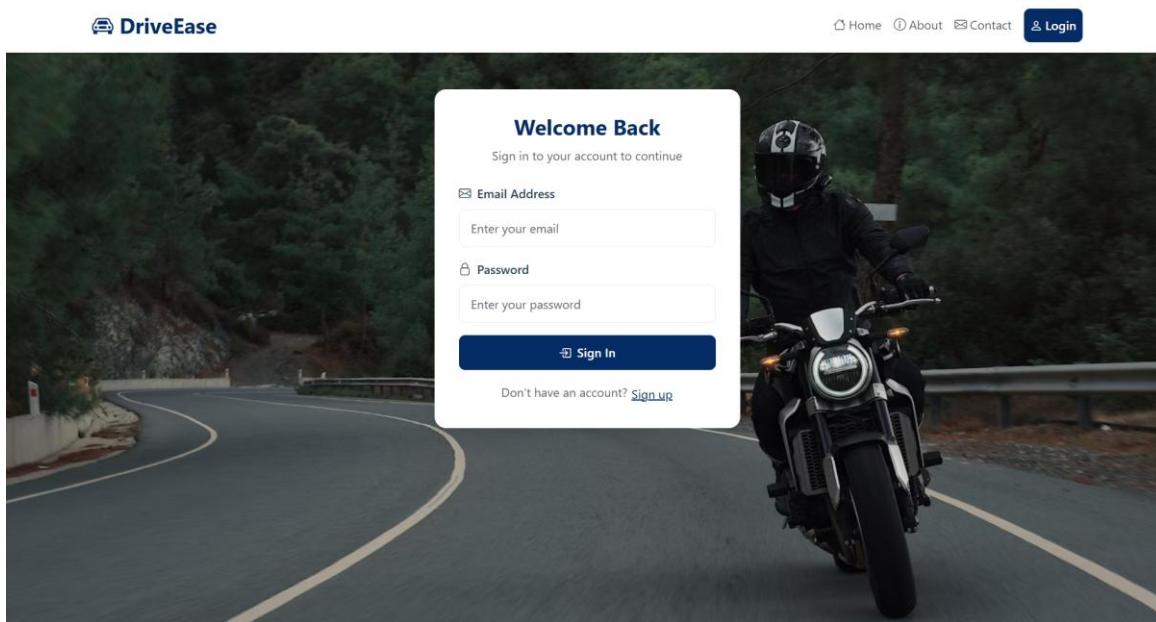


Fig 6.5 Login Page

Admin Dashboard: This is the Admin Dashboard providing access to manage vehicles, user bookings, and registered users.

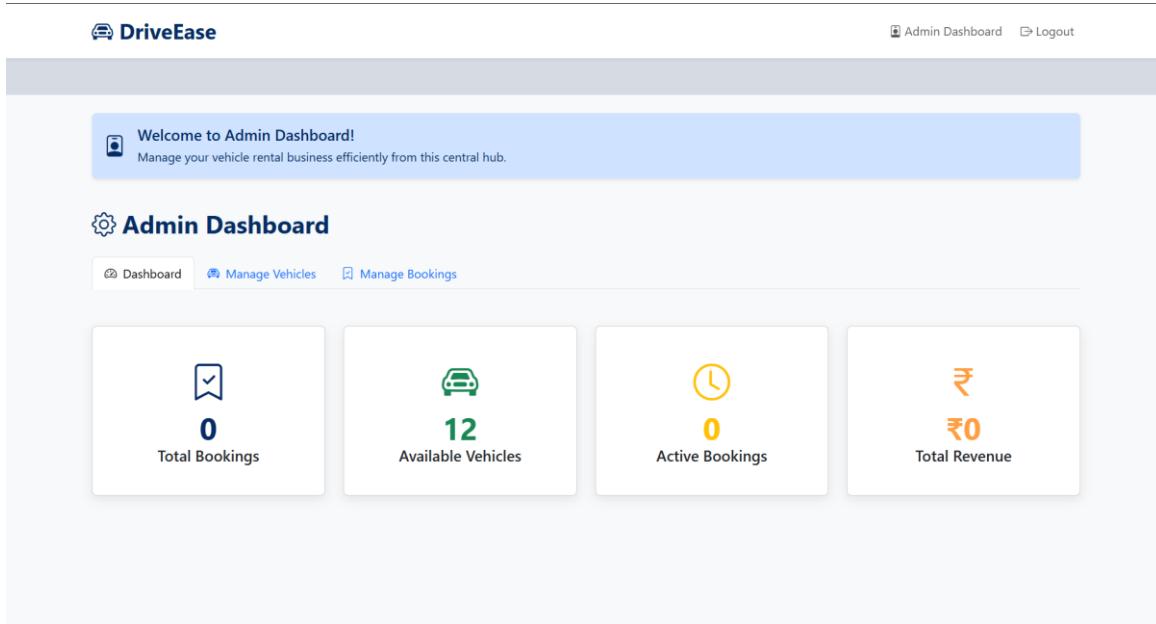


Fig 6.6 Admin Dashboard

CHAPTER 7: LIMITATIONS OF PROJECT

While the Vehicle Rental System successfully implements essential features for vehicle booking and management, there are a few limitations due to time constraints and scope of the internship project:

- **No Online Payment Integration**

The system does not currently support online payment gateways for advance booking or payment processing. All bookings are assumed to be confirmed without real-time payment validation.

- **Basic UI Design**

Although the application is responsive, the user interface could be enhanced further for better user experience, accessibility, and visual appeal.

- **No Real-Time Vehicle Availability Tracking**

The system does not yet handle real-time updates of vehicle availability in case of overlapping bookings or cancellations.

- **Single Admin Access**

Only one admin is supported in the current system. Role-based multi-admin support with permissions is not implemented.

- **Lack of Notification System**

Users do not receive booking confirmations or updates via email/SMS. Integration with a notification service is not available.

- **Limited Error Handling**

Basic validation and error feedback are provided, but more comprehensive input validation and exception handling are required for a production-level system.

- **No Mobile App**

The system is web-based only and not available as a mobile application, which could be useful for better accessibility.

CHAPTER 8: OUTCOMES

The development of the **Vehicle Rental System** as part of the summer internship at W3NUTS successfully met the primary goals and objectives set at the beginning of the project. A fully functional web application was built using the MERN stack, offering an efficient solution for managing online vehicle rentals.

Through this project, a complete booking flow was implemented — from user registration and login to browsing available vehicles, booking them for specific dates, and allowing administrators to manage listings and monitor bookings through a dashboard. The system supports secure authentication, role-based access, dynamic vehicle filtering, and interactive UI components.

In addition to the technical outcome, the project significantly improved hands-on experience with full-stack web development, backend API integration, database operations, and frontend design principles. It also strengthened skills in using real-world tools like MongoDB, Express.js, React.js, Node.js, JWT, and overall application structure.

Overall, the project achieved its intended functionality and provided a strong foundation for real-time digital vehicle rental systems, with scope for future improvements and deployment in commercial use.

CHAPTER 9: FUTURE ENHANCEMENT

Although the Vehicle Rental System fulfils the basic requirements of a digital vehicle booking platform, there are several enhancements that can be implemented to improve functionality, scalability, and user experience in the future:

Online Payment Integration

Adding support for payment gateways like Razorpay, Stripe, or PayPal would enable users to pay for their bookings directly through the platform, making the system more reliable and commercially viable.

Mobile Application Development

Creating Android and iOS mobile apps would make the platform more accessible and convenient for users on the go.

Multi-Admin Role Management

Introducing role-based access control would allow multiple administrators with specific permissions (e.g., booking manager, vehicle manager) to operate the system securely.

Live Vehicle Tracking and Availability

Integrating real-time GPS tracking and live availability updates would help users make more informed booking decisions and avoid scheduling conflicts.

Email and SMS Notifications

Implementing automated notifications for booking confirmations, reminders, and cancellations would enhance user engagement and communication.

Advanced Filtering and Sorting

Adding filters such as price range, location, fuel type, or brand can improve the customer experience and help them find suitable vehicles faster.

Admin Analytics Dashboard

Integrating charts and statistics into the admin panel could help track business metrics like revenue, booking trends, and vehicle utilization.

CHAPTER 10: REFERENCES

The following official documentation and resources were referred to during the development of the Vehicle Rental System project. These sources provided guidance on tools, technologies, libraries, and best practices:

1. React Documentation – <https://reactjs.org/docs/getting-started.html>
(Used for understanding component structure, props, state management, and React hooks.)
2. Express.js Guide – <https://expressjs.com/en/starter/installing.html>
(Referenced for setting up server routes, middleware, and REST API handling.)
3. MongoDB Manual – <https://www.mongodb.com/docs/manual/introduction/>
(Used to understand NoSQL database concepts and CRUD operations.)
4. Mongoose Documentation – <https://mongoosejs.com/docs/guide.html>
(Helpful for defining schemas, models, and performing database operations efficiently.)
5. JSON Web Token (JWT) Introduction – <https://jwt.io/introduction>
(Used to implement secure token-based user authentication.)
6. bcrypt npm Package – <https://www.npmjs.com/package/bcrypt>
(Utilized for hashing passwords securely during user registration.)
7. Multer Middleware – <https://www.npmjs.com/package/multer>
(Integrated for handling file uploads like vehicle images in the admin panel.)
8. Postman API Platform – <https://www.postman.com/api-platform/>
(Tool used extensively for testing backend APIs and verifying response handling.)
9. Node.js Documentation – <https://nodejs.org/en/docs>
(Referenced for understanding backend runtime behavior, modules, and async operations.)