



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 15, Issue 2, February 2026

Drive Easy: A Full Stack Web-Based Car Rental Platform A Modern, Secure & Automated Vehicle Rental Solution

Y. Suneetha¹, A. Daan Reddy², S. Mounika³, N. Meghana⁴, M. Likhith⁵, A. Pavan Kumar⁶

Assistant Professor, Dept. of CSE, Kuppam Engineering College, A.P., India¹

B.Tech Student, Dept. of CSE, Kuppam Engineering College, A.P., India²

B.Tech Student, Dept. of CSE, Kuppam Engineering College, A.P., India³

B.Tech Student, Dept. of CSE, Kuppam Engineering College, A.P., India⁴

B.Tech Student, Dept. of CSE, Kuppam Engineering College, A.P., India⁵

B. Tech Student, Dept. of CSE, Kuppam Engineering College, A.P., India⁶

ABSTRACT: The growing demand for secure, transparent, and automated car rental services comes from the rise of on-demand mobility services. Traditional car rental operations depend on manual processes, documents, and verification. This reliance leads to inefficiencies, disputes, and a lack of trust between car owners and users. To tackle these problems, Drive Easy, a web-based car rental system, was created to simplify and automate car rental services. The new system includes role-based control, secure online transactions, online rental contracts, vehicle verification, and monitoring, all integrated into one platform. By eliminating manual processes and ensuring transparency at each step, the system improves efficiency, reduces conflicts, and builds trust between car owners and users. It is also highly scalable and user-friendly, making it suitable for both individuals and car rental services with fleets.

KEYWORDS: Car Rental System, Web Application, Digital Agreements, Secure Payments, Role-Based Access Control.

I. INTRODUCTION

Car rental services have become an essential part of modern transportation, offering people the freedom to travel without the responsibility of owning a vehicle. Individuals and businesses often require vehicles for short-term purposes such as travel, tourism, relocation, business trips, or emergency needs. Renting a car helps reduce the financial burden associated with purchasing, maintaining, and insuring a vehicle, making it a practical and cost-effective solution.

However, many traditional car rental systems still rely heavily on manual processes like paper-based documentation, offline bookings, and verbal agreements. These outdated practices often lead to issues such as miscommunication, lack of transparency in pricing, disputes over deposits and refunds, and poor record management. Customers may not clearly understand rental terms or vehicle availability, while service providers find it difficult to efficiently manage bookings, track revenue, and maintain vehicle records. The absence of a centralized digital system increases operational challenges and reduces overall efficiency.

To overcome these limitations, Drive Easy is introduced as a web-based car rental platform designed to modernize and simplify the rental process. The system incorporates features such as secure user authentication, role-based access control, online booking, digital rental agreements, and integrated payment processing. Users can easily browse available vehicles, view transparent pricing details, and complete bookings online. At the same time, administrators can efficiently manage fleet operations and monitor business performance through a dedicated dashboard. By ensuring automation, transparency, and secure interactions, Drive Easy enhances user experience and supports the ongoing digital transformation of the car rental industry.

Objectives of the Proposed System

The primary objective of the Drive Easy platform is to develop a reliable, secure, and fully automated web-based car rental system that simplifies the entire rental process. The system is designed to replace manual operations with a digital approach, enabling users to easily browse vehicles, make bookings, complete payments, and generate rental agreements online.

Another key objective is to ensure data security and accuracy by implementing strong authentication mechanisms and role-based access control. A centralized database will be used to efficiently store and manage all information related to users, vehicles, and transactions.

In addition, the platform aims to enhance overall operational efficiency by reducing manual workload and minimizing errors. It also focuses on improving the user experience by providing a smooth, transparent, and user-friendly interface. Furthermore, the system will offer real-time monitoring and analytical insights, helping administrators and vehicle owners effectively manage their operations and make informed decisions.

II. RELATED WORK**1. Car Rental System**

Gupta et al. [1] proposed a full-stack car rental system published in the International Journal of Innovative Research in Technology (IJIRT) in 2025. This system was developed using modern web technologies such as React and Node.js, along with MongoDB for database management. It supports vehicle listing, booking confirmation, and secure authentication modules. The study focuses on scalable system architecture and enhanced customer interaction through systematic web interfaces.

2. Enhanced Car Rental System with Cloud Deployment and Analytics

Sharma et al. [2] presented a cloud-enabled car rental system, and it was published in the International Journal of Emerging Technology in Computer Science & Electronics, IJETCSE, 2024. It incorporates cloud deployment strategies and analytics dashboards for monitoring booking trends and rental statistics. This research study has pointed out the enhanced scalability of the system and data processing at a centralized level when compared with traditional stand-alone applications.

3. Web Based Online Car Rental System

Chaudhary et al. [3] proposed an online platform for car rentals and presented it in the IEEE 1st Karachi Section Humanitarian Technology Conference (KHI-HTC) held in 2024. Structured bookkeeping, security mechanisms like authentication, and the web-based framework are key features of this online platform for car rentals. In this research, the authors aimed to facilitate a sense of transparency and maximum user experience by employing proper security mechanisms for users to log in to their accounts.

4. Vehicle Renting System

Nag et al.[4] have presented a study on a 'Vehicle Renting System' that is published in the International Journal for Research in Applied Science & Engineering Technology (IJRASET) with a publication year of 2024. The study presents how a web-based system reduces complexities by being automated.

5. Web-Based Car Rental Information System

Karsa et al. [5] designed a web-based car rental information system published in the Asian Journal of Engineering, Social, and Health Sciences in 2024. This system aims to standardize car rental processing, track availability, and boost transactional efficiency. In fact, they stressed the significant impact of database management on an information system, particularly for car rentals.

6. Automating Car Rental Services: A Modern Management System Framework

Algeelani and Al Moaiad [6], in their work, proposed a contemporary Web-based architecture for car rentals. It was published in the International Journal of Contemporary Computer Research, IJCCR, 2024. Their system follows the model-view-controller architecture, responsive UI design, and secure client-server communication. The research emphasizes maintainability and modularity in web rental platforms.

7. Car Rental System

Yadav et al. in [7] suggested a web-based car rental management system, published in the International Journal of Scientific Research in Engineering and Management (IJSREM) in 2022. The system allows users to perform CRUD operations, confirm booking, and manage databases. The research proves its effectiveness in organizing car rental records.

8. Responsive Web-Based Vehicle Rental System

Patel and Shah [8], in their research, created a responsive web-based rental platform, which was published in the International Journal of Engineering Research & Technology (IJERT). They highlighted the importance of cross-device compatibility and interface design for a rental platform in 2022. The real-time availability and update of booking also enhance customer accessibility.

9. Development of a Car Rental Web Application Using Django Framework

Rahman and Islam [9] developed a car rental application using Django, published in IJCSIS 2021. It has an authentication system, can create, read, update, and delete data, and it has role-based access control. For the scalability and maintainability features, the proposed system has a modular backend architecture.

10. Car Rental System

Thakur [10] developed an online car reservation system, which has been published in International Journal for Research in Applied Science & Engineering Technology (IJRASET) in 2021. By using an online car reservation system, customers will be able to browse cars and make their bookings online. Database integration is also used in the online car reservation system.

III. PROBLEM STATEMENT

Most traditional car rental systems still rely on manual processes such as paper-based documentation, offline bookings, and informal communication between customers and vehicle owners. These methods often lack transparency, proper organization, and efficiency. As a result, customers may face issues like unclear pricing, unexpected additional charges, confusion regarding deposits and refunds, and disagreements about the vehicle's condition. The absence of standardized digital agreements and verification mechanisms further increases the chances of misunderstandings, ultimately affecting customer trust and satisfaction.

On the other hand, vehicle owners encounter difficulties in managing their operations efficiently. Without a centralized system, it becomes challenging to track vehicle availability, monitor bookings, maintain service records, and analyze revenue. Manual or partially digital solutions do not provide real-time updates or meaningful insights, which limits effective decision-making. In addition, the lack of secure authentication, role-based access control, and integrated payment systems raises concerns about data protection and transaction reliability. Therefore, there is a strong need for a centralized, secure, and automated web-based platform that enhances transparency, improves operational efficiency, and ensures a smooth and reliable rental experience for both customers and service providers.

IV. METHODOLOGIES

The development of the proposed car rental platform follows a structured Software Development Life Cycle (SDLC) approach combined with a modular and iterative development strategy. This method ensures systematic progress from requirement analysis to deployment while maintaining software quality and reliability. Emphasis is placed on clear requirement validation, efficient system design, secure coding practices, and performance optimization. Continuous feedback is incorporated at each stage to improve usability and functionality. Proper documentation is maintained throughout the development process to support future maintenance and upgrades. Version control tools are also used to manage code changes and enable smooth collaboration among team members. This structured approach helps minimize risks related to scalability, data inconsistency, and security vulnerabilities.

1. Requirement Gathering

In this phase, a detailed analysis is carried out to understand user needs and system requirements. Inputs are collected from stakeholders to identify common issues in existing rental systems, such as manual record handling and lack of clarity in agreements. Functional requirements are categorized into key modules, including vehicle management, booking system, payment processing, reporting, and user feedback. Non-functional requirements such as system performance, availability, data consistency, and security are also defined. Special attention is given to security features like encrypted password storage, secure session management, and protection against unauthorized access. Compliance aspects related to digital agreements and online transactions are also considered. The outcome of this phase is a comprehensive requirement specification document that guides the design and implementation stages.

2. System Design

The system design phase focuses on converting requirements into a structured architecture. A three-tier architecture is adopted to separate the presentation layer, business logic, and data storage. The presentation layer is designed to be responsive, ensuring compatibility across devices such as desktops, tablets, and smartphones. The application layer handles core functionalities, including booking validation, pricing logic, and agreement generation. Communication between front-end and back-end is managed using Restful APIs. The database is designed using normalization techniques to eliminate redundancy and maintain consistency. Performance optimization is achieved through indexing and efficient query design. Security features such as token-based authentication and input validation are integrated into the system design to ensure safe operations.

3. Implementation

During the implementation phase, the system is developed using Python full-stack technologies, with Django as the back-end framework. Django’s Model-View-Template (MVT) architecture helps maintain a clean separation between components, improving code organization and maintainability. The back-end includes features such as secure authentication, session management, and data validation. Core functionalities like CRUD operations for vehicles, users, bookings, and payments are implemented with proper error handling to ensure system stability.

The front-end is developed using HTML, CSS, Bootstrap, and JavaScript to create an interactive and user-friendly interface. Features such as search functionality, dashboards, and booking workflows are designed to enhance user experience. Payment integration is implemented with verification mechanisms to ensure secure transactions. Additionally, logging and monitoring tools are used to track system activity and identify potential issues. The modular development approach allows for easy future enhancements without affecting existing system components.

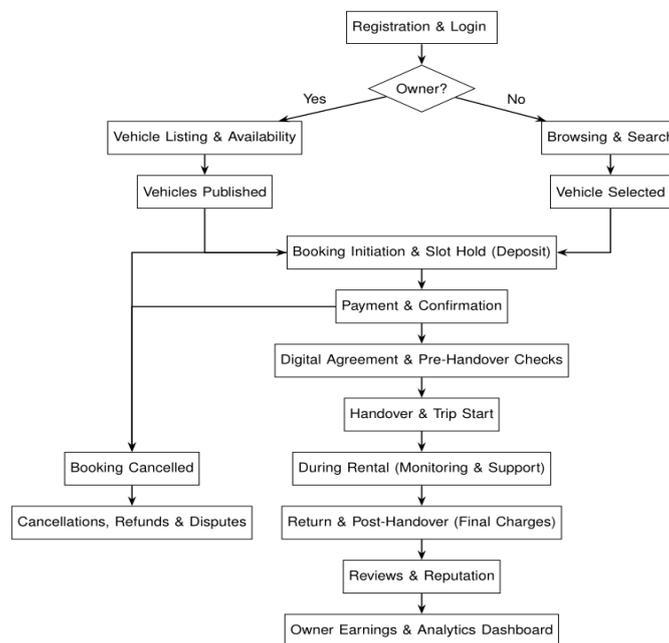


Fig. 1. Role-Based Booking Workflow of the Car Rental Platform

As illustrated in Fig. 1, the system authenticates users, assigns roles, and provides access to authorized operations such as vehicle listing, booking initiation, payment processing, digital agreement generation, and rental monitoring through role-specific dashboards.

4. Testing and Deployment

After the development phase, the system is thoroughly tested to ensure it functions correctly and provides a smooth user experience. Initially, unit testing is performed to verify the functionality of individual components. This is followed by integration testing to ensure that different modules work together without issues. Finally, the complete

Volume 15, Issue 2, February 2026**|DOI: 10.15680/IJIRSET.2026.1502084**

system is evaluated through User Acceptance Testing (UAT) to confirm that it meets user requirements and expectations.

In addition to functional testing, performance and security testing are conducted to evaluate how the system behaves under different loads and to identify any vulnerabilities. Once the system passes all testing stages and is considered stable, it is deployed in a cloud environment for better accessibility and scalability. After deployment, continuous monitoring and regular maintenance are carried out to ensure consistent performance, system reliability, and uninterrupted service availability.

V. SYSTEM OVERVIEW

The proposed web-based car rental platform is designed as a centralized and automated system that integrates user interaction, business logic, and data management into a single environment. It enables real-time vehicle availability tracking, seamless booking processes, secure payment handling, and efficient document management. The system provides role-based dashboards, allowing users, administrators, and vehicle owners to access features relevant to their roles.

A centralized database ensures that all information is consistently updated and easily accessible, improving record management and operational efficiency. Security mechanisms are implemented to protect sensitive data such as user credentials and financial details. Overall, the platform is designed to be reliable, scalable, and easy to maintain, ensuring smooth and efficient operation for all stakeholders.

A. Existing System

The current car rental process largely depends on manual coordination between customers and vehicle owners, often involving phone calls or face-to-face interactions. This approach can lead to delays, communication gaps, and misunderstandings. Manual record-keeping increases the chances of data loss and inconsistencies, making it difficult to maintain accurate information.

There is also limited transparency in terms of pricing, rental policies, and deposit handling, which can result in disputes. Without a centralized system, tracking vehicle usage, managing bookings, and monitoring revenue becomes challenging. Additionally, the lack of proper documentation makes conflict resolution difficult. These traditional methods are not scalable and fail to provide real-time access or automation, ultimately affecting efficiency, customer satisfaction, and business growth.

B. Proposed System

The proposed car rental platform offers a modern solution by introducing a centralized and secure web-based system developed using Django. It provides real-time updates on vehicle availability and supports automated booking processes, making the system more efficient and user-friendly. Integrated payment functionality ensures secure transactions and transparent handling of deposits and refunds.

The system also generates digital rental agreements, which help in reducing disputes by maintaining clear and structured records. A well-designed relational database manages user, vehicle, and booking information efficiently. Role-based access control enhances security by restricting unauthorized actions.

In addition, analytical dashboards provide valuable insights into booking trends, revenue generation, and system usage, helping administrators make informed decisions. The system is designed to be scalable, allowing future enhancements such as mobile application support or intelligent recommendation features. Overall, the proposed solution improves transparency, operational efficiency, and user trust in the car rental process.

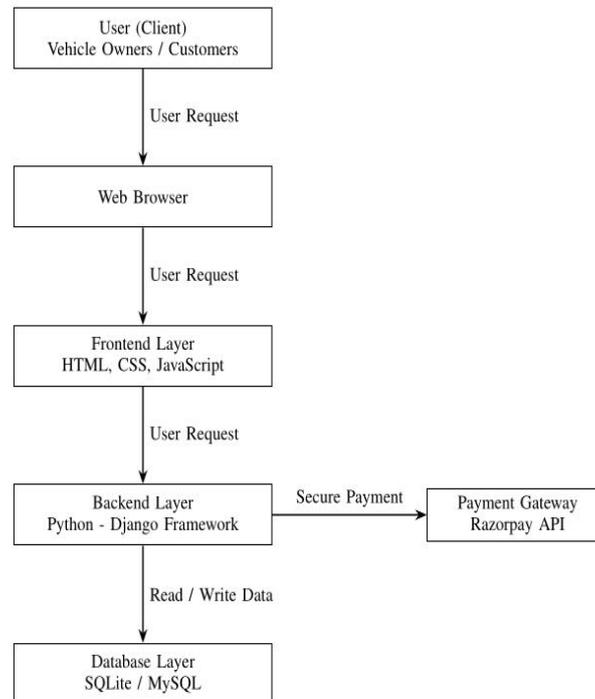


Fig. 2. System Architecture of the Web-Based Car Rental Platform

As shown in Fig. 2, the proposed system follows a three-tier architecture consisting of the presentation layer, application layer, and database layer, ensuring secure role-based access and efficient data management.

VI. EXPECTED OUTCOMES

The proposed web-based car rental platform is expected to deliver a secure, reliable, and fully automated solution for managing rental operations efficiently. By digitizing core activities such as vehicle listing, booking management, payment processing, and rental agreement generation, the system significantly reduces manual effort and minimizes errors.

The implementation of role-based access control and secure authentication ensures that only authorized users can access specific functionalities, thereby strengthening system security. The use of a relational database management system helps maintain data accuracy, consistency, and integrity across all transactions.

Additionally, real-time updates regarding vehicle availability, booking status, and payment confirmation enhance transparency and build trust among customers, vehicle owners, and administrators. Centralized monitoring and reporting features support better decision-making, improved resource utilization, and efficient administrative control. Overall, the system is expected to enhance operational efficiency, scalability, transparency, and user satisfaction in the car rental domain.

VII. FUTURE ENHANCEMENTS

The proposed system can be further improved with the following enhancements:

- Development of a mobile-friendly interface or a dedicated mobile application to enable easy access for users on smartphones and tablets.

Volume 15, Issue 2, February 2026**|DOI: 10.15680/IJIRSET.2026.1502084**

- Deployment on cloud platforms to ensure better scalability, high availability, and improved performance for a larger user base.
- Integration of advanced analytics and machine learning techniques to support dynamic pricing, demand forecasting, and fraud detection.
- Implementation of stronger security features such as data encryption, multi-factor authentication, and detailed audit logs.
- Integration of real-time GPS tracking and notification systems to enhance vehicle monitoring and improve communication between users.

VIII. CONCLUSION

The web-based car rental platform is designed as a secure and centralized system developed using Python and the Django framework. It aims to streamline and modernize car rental operations by providing an efficient and automated environment.

The platform supports role-based access for administrators, vehicle owners, and customers, ensuring controlled and secure usage of system functionalities. Automation of rental processes reduces manual intervention, minimizes errors, and helps prevent potential conflicts between users.

The use of a relational database ensures structured data storage, data integrity, and quick retrieval of information. Real-time data updates improve transparency and strengthen trust among all stakeholders. With its robust design and scalability, the system is well-suited for modern car rental services and can be easily extended with future enhancements.

IX. ACKNOWLEDGMENT

I would like to express my sincere gratitude to everyone who supported me in the successful completion of this project. I am thankful to the Head of the Department and all faculty members for their continuous guidance and encouragement. I extend my special thanks to my project guide for their valuable suggestions, technical support, and constant motivation throughout the development process. Their guidance played a crucial role in improving the quality of this work.

I also acknowledge the institution for providing the necessary resources and environment required to complete this project. Finally, I would like to thank my parents and friends for their moral support and encouragement, which helped me accomplish this work successfully.

REFERENCES

- [1] N. Gupta, D. Patel, V. Patel and D. Mistry, "Car Rental System," *International Journal of Innovative Research in Technology (IJIRT)*, vol. 11, no. 10, pp. 1422–1425, 2025. Focus: React/Node/MongoDB-based vehicle rental platform with secure authentication and scalable architecture.
- [2] A. Sharma, P. Verma and R. Kulkarni, "Car Rental System Enhancement with Cloud Deployment and Analytics," *International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE)*, vol. 10, no. 3, pp. 145–152, 2024. Focus: Cloud-based backend deployment, analytics dashboard integration, and improved security architecture.
- [3] V. Chaudhary, S. Midha and R. Bahuguna, "Web Based Online Car Rental System," 2024 IEEE 1st Karachi Section Humanitarian Technology Conference (KHI-HTC), pp. 1–5, 2024. doi:10.1109/KHI-HTC60760.2024.10482218. Focus: IEEE-based secure web rental platform with structured booking workflow and authentication module.
- [4] S. Nag, J. Saheb, U. R. Pillay, K. Gupta and S. Sharan Tripathi, "Vehicle Renting System," *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, vol. 12, no. 4, pp. 402–412, Apr. 2024. doi:10.22214/ijraset.2024.60989. Focus: Automation of rental process, inventory management, and customer booking validation.
- [5] A. Hermaya A. N. Karsa, O. Wahyuningsih, R. Jannah and N. Saebah,

Volume 15, Issue 2, February 2026

|DOI: 10.15680/IJRSET.2026.1502084

- “Web-Based Car Rental Information System,” Asian Journal of Engineering, Social and Health Sciences (AJESH), vol. 3, no. 2, pp. 246–253, 2024. doi:10.46799/ajesh.v3i2.246.
Focus: Database-driven rental information system with improved data accuracy and booking management.
- [6] N. Algeelani and Y. Al Moaiad, “Automating Car Rental Services: A Modern Management System Framework,” International Journal of Contemporary Computer Research (IJCCR), vol. 1, no. 1, pp. 1–8, 2024.
Focus: MVC-based web rental system with responsive interface and secure client-server communication.
- [7] R. Yadav, P. Bano, A. Yadav, P. R. Tiwari and V. Agarwal, “Car Rental System,” International Journal of Scientific Research in Engineering and Management (IJSREM), vol. 6, no. 4, pp. 1–7, 2022.
Focus: CRUD-based rental management system with booking and customer record handling.
- [8] A. Patel and K. Shah, “Responsive Web-Based Vehicle Rental System,” International Journal of Engineering Research & Technology (IJERT), vol. 11, no. 3, pp. 678–684, 2022.
Focus: Cross-device responsive rental application emphasizing UI/UX design and availability tracking.
- [9] M. Rahman and S. Islam, “Development of a Car Rental Web Application Using Django Framework,” International Journal of Computer Science and Information Security (IJCSIS), vol. 19, no. 5, pp. 45–52, 2021.
Focus: Django-based modular backend with authentication and role-based access implementation.
- [10] Amey Thakur, “Car Rental System,” International Journal for Research in Applied Science & Engineering Technology (IJRASET), vol. 9, no. 7, pp. 402–412, Jul. 2021. doi:10.22214/ijraset.2021.36339.
Focus: Online car reservation platform with customer booking and vehicle preference management.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details