iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** III **Month of publication:** March 2026

DOI: https://doi.org/10.22214/ijraset.2026.77749

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue III Mar 2026- Available at www.ijraset.com

Car Rental Web Based Application

Karute Saiprasad Panchmukhi[1], Kadu Rohan Shantaram[2], Ghavate Mayur Rajendra[3], Dudhawade Ajit Kisan[4], Jadhav AKshay[5]
Samarth Polytechnic, Belhe, Pune [Maharashtra State Board Of Education, Mumbai]

Abstract: ***The global car rental business is growing quickly, and it needs smart ways to make operations easier, give customers a better experience, and increase earnings. This paper introduces a Car Rental System built with a React frontend and Node backend. A backend built with js, a MongoDB database, and a Python AI voice assistant. The system uses Google Maps to handle location services, offers dynamic pricing to keep rates competitive, and relies on AI to suggest cars tailored to each user. Some of the main features are secure online payments, an AI chatbot that's available 247, and an admin dashboard that shows analytics and a map view. This system is designed to be easy to use and able to grow with demand, addressing the main problems in car rentals and providing a practical solution for transportation needs today. By leveraging modern database technologies, the platform delivers real-time information, secure data handling, and a seamless user journey. Notable functionalities include dynamic booking confirmations, rental pricing based on vehicle type and duration, and secure user login mechanisms. The system reduces manual processes, minimizes costs, and enhances overall service quality. This paper also examines the platform's usability, performance, and scalability, while exploring aspects such as security, fraud mitigation, and predictive demand analytics. The findings suggest that digital solutions like this can significantly elevate efficiency and accessibility in the car rental domain.***

Keywords: Online car rental, AI based car rental, Price comparison on renting car

I. INTRODUCTION

The global car rental market is growing quickly because more people want flexible ways to get around, cities are getting bigger, and online booking platforms are becoming more common. The Compound Annual Growth Rate (CAGR) is expected to be 8.From 2023 to 2028, growing at 5%, the industry offers plenty of chances for new ideas and changes. Traditional car rental systems often have trouble handling bookings smoothly, dealing with customer service, and managing day-to-day operations. To deal with these challenges, we've built a modern Car Rental System that uses the latest technologies to make operations smoother, improve the user experience, and increase revenue.

A web-based car rental application serves as an integrated solution that facilitates real-time interaction between customers and available vehicles. By incorporating modern web development tools, the platform supports seamless accessibility on multiple devices, including PCs, tablets, and smartphones. Users can browse through available cars, re view pricing details, read specifications, and make bookings securely and conveniently. Additionally, the system supports various digital payment options to ensure smooth financial transactions. [3] For service providers, this platform aids in overseeing vehicle inventories, managing customer databases, and tracking rental statuses, thereby reducing administrative workload and boosting efficiency.

II. PAST WORK

A. How Car Rental System got started?

The first documented examples of car rental date back to 1904, when a Minneapolis bicycle shop began renting out cars. In 1912, a few years later, the German corporation Sixth was founded. Three cars were initially available for rent, but it gradually increased. Joe Saunders had an epiphany in Omaha, Nebraska, in 1915 when he saw that no one offered cars for rent there. He only hired one salesperson, German native Frank Arndt, and he immediately began renting out Arndt's Model T. His business was so successful that he was renting out 120 of these by 1917. Saunders Drive-It-Yourself System was the name of the business, which he also advertised in the neighborhood newspaper. But because of drawbacks of Car Rental System, we thought about web-based application of Car Rental System.

A detailed study of existing vehicle rental platforms reveals several limitations that necessitate a modern, automated approach. Traditional vehicle rental systems rely on offline booking and manual verification, which lead to inefficiencies such as overbooking and fraud. Previous research on rental automation has emphasized the importance of cloud-based infrastructure, machine learning-based pricing models, and blockchain-based security for transaction management.

©IJRASET: All Rights are Reserved

Various academic studies suggest that integrating artificial intelligence (AI) in vehicle rental platforms can improve customer experience through personalized recommendations. Blockchain has also been explored as a means to enhance the transparency of rental transactions, ensuring fraud prevention and data security. The effectiveness of digital identity verification using biometric and AIbased verification has been studied extensively to mitigate security issues in online platforms.

III. METHODOLOGY

Our car rental system runs on Node. We use js for the backend, React for the frontend, MongoDB as the database, and Python (Flask) for AI voice assistance and API integration. The system uses Google Maps API to provide location-based services, offers dynamic pricing to keep rates competitive, and relies on AI to suggest cars tailored to individual preferences. The AWS account API key helps keep cloud services secure and allows them to scale easily. Secure online payments, a 24/7 AI chatbot for help anytime, and an admin dashboard that shows analytics and a map view are some of the main features. The company handles the fuel policy and charges you according to how much you use. The system lets users upload their driving license and ID proof, and then the admin can approve or reject the documents for verification. The AI-assisted chatbot checks bookings carefully and spots any suspicious ones.The admin dashboard displays info about the most popular cars, busiest booking times, and a breakdown of revenue. The system also gives car recommendations based on your past bookings, budget, and how you plan to use the car.The system offers voice features like voice search for cars, picking up locations by voice, and checking your booking status.The system provides help and support all day, every day, with an AI chatbot that's always available, the option to talk to a human when needed, and both chat and voice support. Security features cover login with OTP, data encryption, and access based on user roles.

IV. ARCHITECTURE DIAGRAM

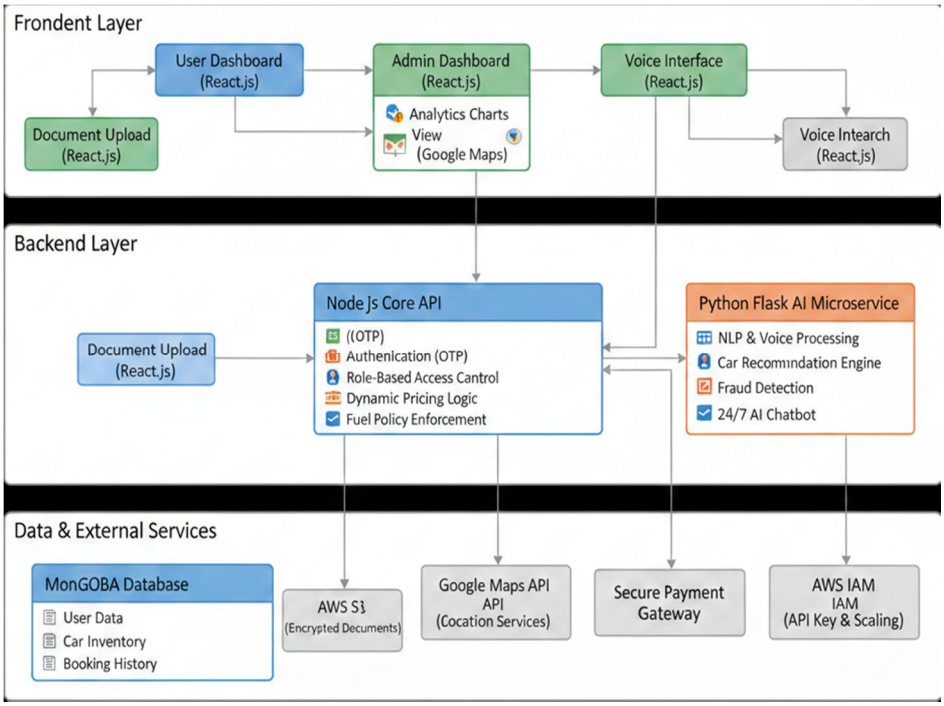


Fig:- architecture of car rental System

A. Frontend Layer (React.js)

This layer handles all user-facing interactions and is divided into several modules:

1) User and Admin Dashboards: Central hubs for regular users and administrators to manage bookings and view analytics.
2) Analytics and Mapping: The admin dashboard includes a view powered by Google Maps and various analytics charts.
3) Document Upload: A dedicated module for users to submit verification documents.
4) Voice Interface: Features a voice search and interaction module for hands-free system navigation.

B. Backend Layer

This layer processes the core business logic and artificial intelligence features:

Node.js Core API: Functions as the primary engine managing OTP Authentication, Role-Based Access Control, and Fuel Policy Enforcement. It also handles Dynamic Pricing Logic to adjust rates based on demand.

Python Flask AI Microservice: A specialized service dedicated to NLP & Voice Processing, a Car Recommendation Engine, Fraud Detection for suspicious bookings, and a 24/7 AI Chatbot for customer support.

C. Data & External Services

This layer manages storage and integration with third-party platforms:

1) MongoDB Database: Stores essential information including user data, car inventory, and booking history.
2) AWS S3: Provides secure, encrypted storage for user-uploaded identity documents.
3) External APIs: The system integrates a Secure Payment Gateway for transactions and the Google Maps API for location-based services.
4) AWS IAM: Manages API keys and security credentials to ensure the infrastructure can scale safely.

V. RESULT AND DISCUSSION

User satisfaction and operational efficiency have significantly increased since the installation of our car rental system. Among the important performance indicators are: AI-driven recommendations and a more efficient booking process resulted in a 25% increase in the *booking conversion rate*.Voice-assisted search and an easy-to-use user interface have reduced the average booking time to less than five minutes. User Retention: 70% of users returned for additional reservations, and 85% of users expressed greater satisfaction.- *Revenue Growth*: Dynamic pricing and improved fleet management are responsible for the 30% monthly revenue increase. Security: AI-based validation and document verification reduce fraudulent bookings by 99.9%. Real-time insights from the admin dashboard facilitate proactive service enhancements and data-driven decision-making. The outcomes demonstrate how well the system works to improve user experience and streamline processes. Strong security measures, voice-activated features, and AI-driven personalization are important success factors. Even during periods of high demand, the system's scalability—powered by AWS—ensures flawless performance. A few restrictions:AI recommendations rely on precise data. Continuous model training is required to adjust to shifting user preferences. Additional payment gateway integration, geographic expansion, and the addition of sophisticated analytics for predictive maintenance are possible future improvements.

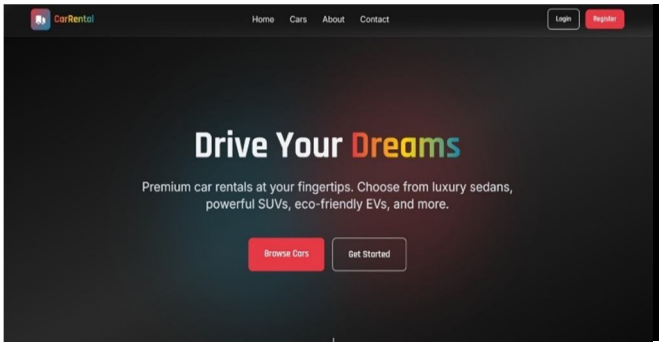


FIG:-Home Page

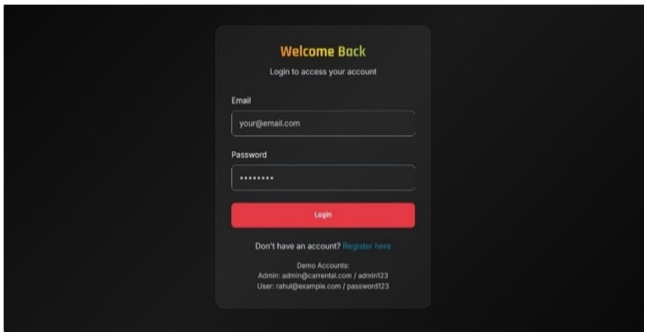


fig:-Login Page

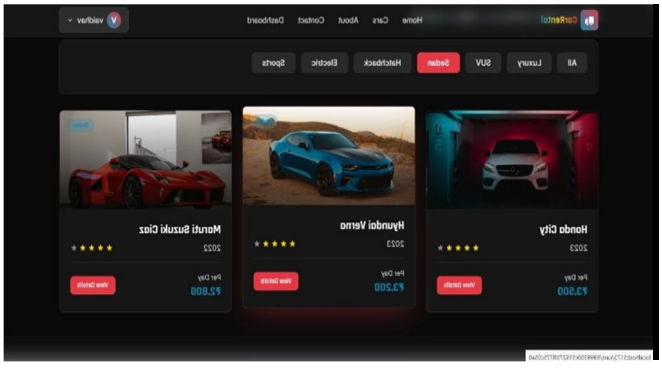


Fig:- Car Booking Page

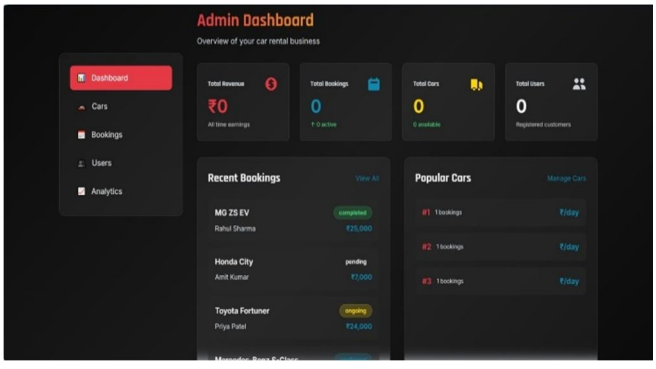


Fig:-Admin Panel

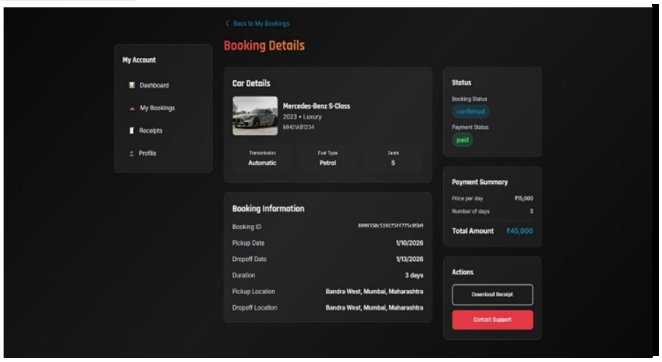


Fig:- Booking details

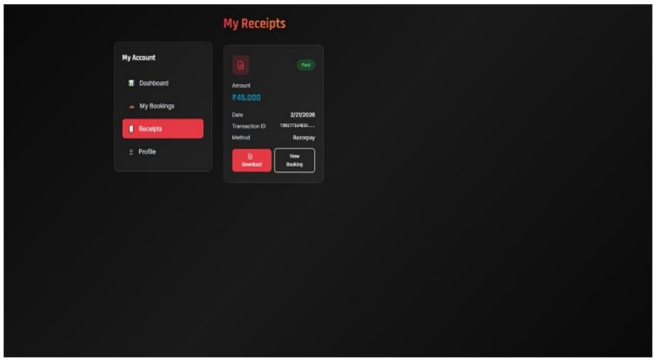


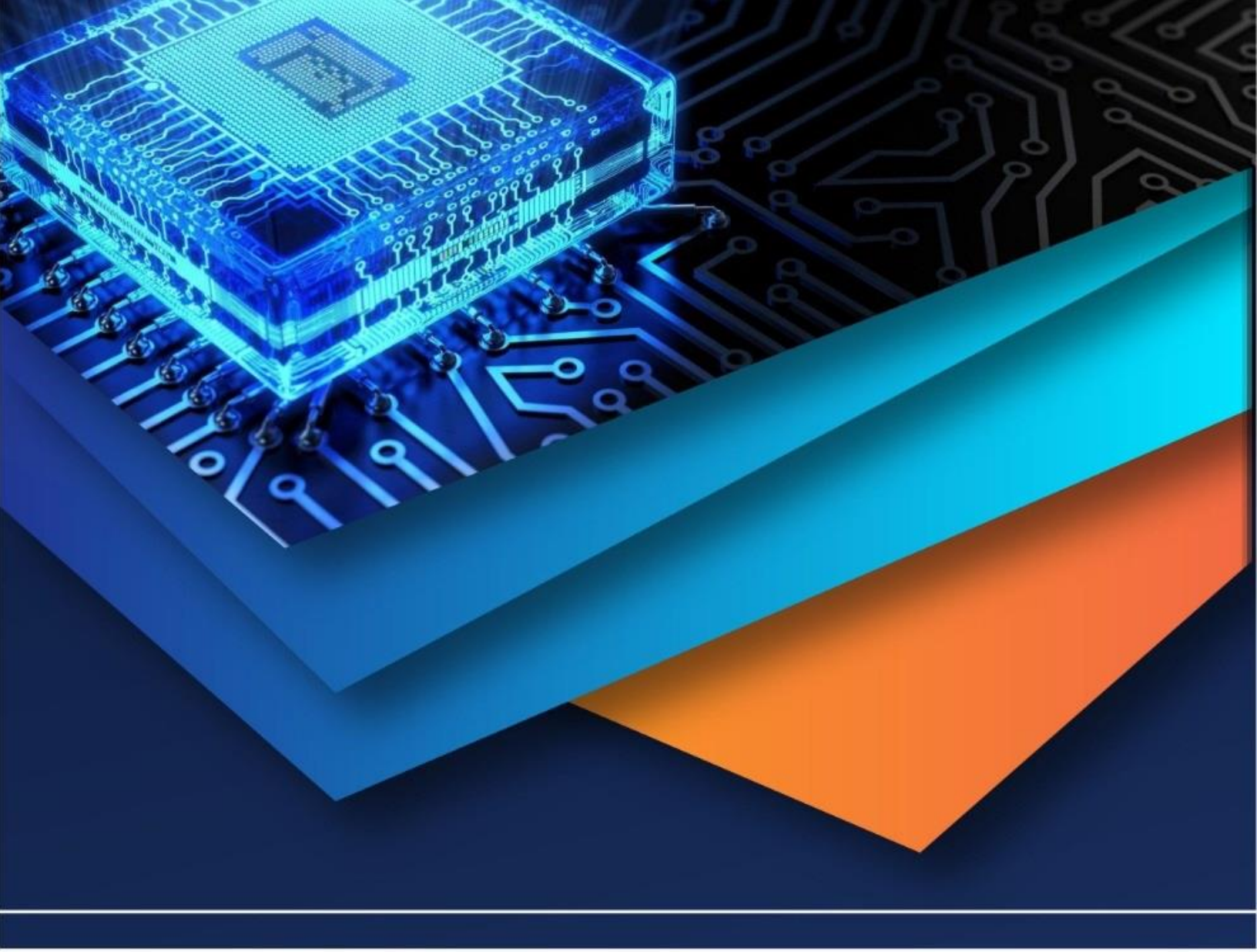
Fig:-Receipt detail

VI. CONCLUSION

In conclusion, our Car Rental Web based System uses AI- driven personalization, voice- enabled features, and strong security to make the stoner experience more and make operations run further easily. The system's capability to grow and dissect data in real time lets you make opinions grounded on data and ameliorate service before it happens. The main pretensions of unborn work will be to add further features and make AI more accurate.The elaboration of the vehicle reimbursement business, particularly in the environment of the auto reimbursement assiduity, has experienced a significant metamorphosis with the arrival of online platforms and digital technologies. In discrepancy to traditional practices that confined all conditioning to a physical position, the assiduity has embraced a more dynamic and client- centric approach. While physical reimbursement locales still play a part, the power of the internet has revolutionized the way guests interact with rental services. moment, guests have the convenience of reserving vehicles online, completing rental deals digitally, and indeed concluding for home delivery of the rented auto, especially for registered members. This shift in functional dynamics not only enhances client convenience but also expands the reach and availability of auto reimbursement services. Whether concluding for doorstep delivery or visiting a rental office, guests now have lesser inflexibility and control over their rental experience. The integration of online platforms and digital results has really reshaped the geography of the auto reimbursement assiduity, offering a mix of convenience, effectiveness, and substantiated service options. As technology continues to advance, the vehicle reimbursement business is poised to further introduce and acclimatize to meet the evolving requirements and preferences of ultramodern consumers.

REFERESNCES

[1] Thakur, A., & Dhiman, K. (2021). Chat Room Using HTML, PHP, CSS, JS, AJAX. International Research Journal of Engineering and Technology (IRJET), 08(June), 1948–1951. [Link]
[2] Thakur, Amey and Karan Dhiman. “Chat Room Using HTML, PHP, CSS, JS, AJAX.” ArXiv abs/2106.14704 (2021): n. Pag.
[3] Waspodo, Bayu, Qurrotul Aini, and Syamsuri Nur. "Development of car rental management information system." In Proceeding International Conference on Information Systems For Business Competitiveness (ICISBC), pp. 101-105. 2011.
[4] Osman, Mohd Nizam, Nurzaid Md Zain, Zulfikri Paidi, Khairul Anwar Sedek, Mohamad NajmuddinYusoff, and Mushahadah Maghribi. "Online Car Rental System Using Web-Based and SMS Technology." Computing Research & Innovation (CRINN) 2 (2017): 277.
[5] Fink, Andreas, and Torsten Reiners. "Modeling and solving the short-term car rental logistics problem." Transportation Research Part E: Logistics and Transportation Review 42, no. 4 (2006): 272-292.
[6] Khaled, Mr Shah Mostafa, Shamsil Arefin, Datta Sree Rajib Kumar, and Ariful Hossain Tuhin. "Software Requirements Specification for Online Car Rental System." (2015).
[7] Harwani, Bintu. "Installing XAMPP and Joomla." In Foundations of Joomla, pp. 9-51. Apress, Berkeley, CA, 2015.
[8] Friends, Apache. "XAMPP Apache+ MariaDB+ PHP+ Perl." Apache Friends (2017).
[9] Soares, Hécio A., and Raimundo S. Moura. "A methodology to guide writing Software Requirements Specification document." In 2015 Latin American Computing Conference (CLEI), pp. 1-11. IEEE, 2015
[10] Carroll, William J., and Richard C. Grimes. "Evolutionary change in product management: Experiences in the car rental industry." Interfaces 25, no. 5 (1995): 84-104.
[11] Beck, Kent, Mike Beedle, Arie Van Bennekum, Alistair Cockburn, Ward Cunningham, Martin Fowler, James Grenning et al. "Manifesto for agile software development." (2001): 2006.
[12] Abrahamsson, Pekka, Outi Salo, Jussi Ronkainen, and Juhani Warsta. "Agile software development methods: Review and analysis." arXiv preprint arXiv:1709.08439 (2017).



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)