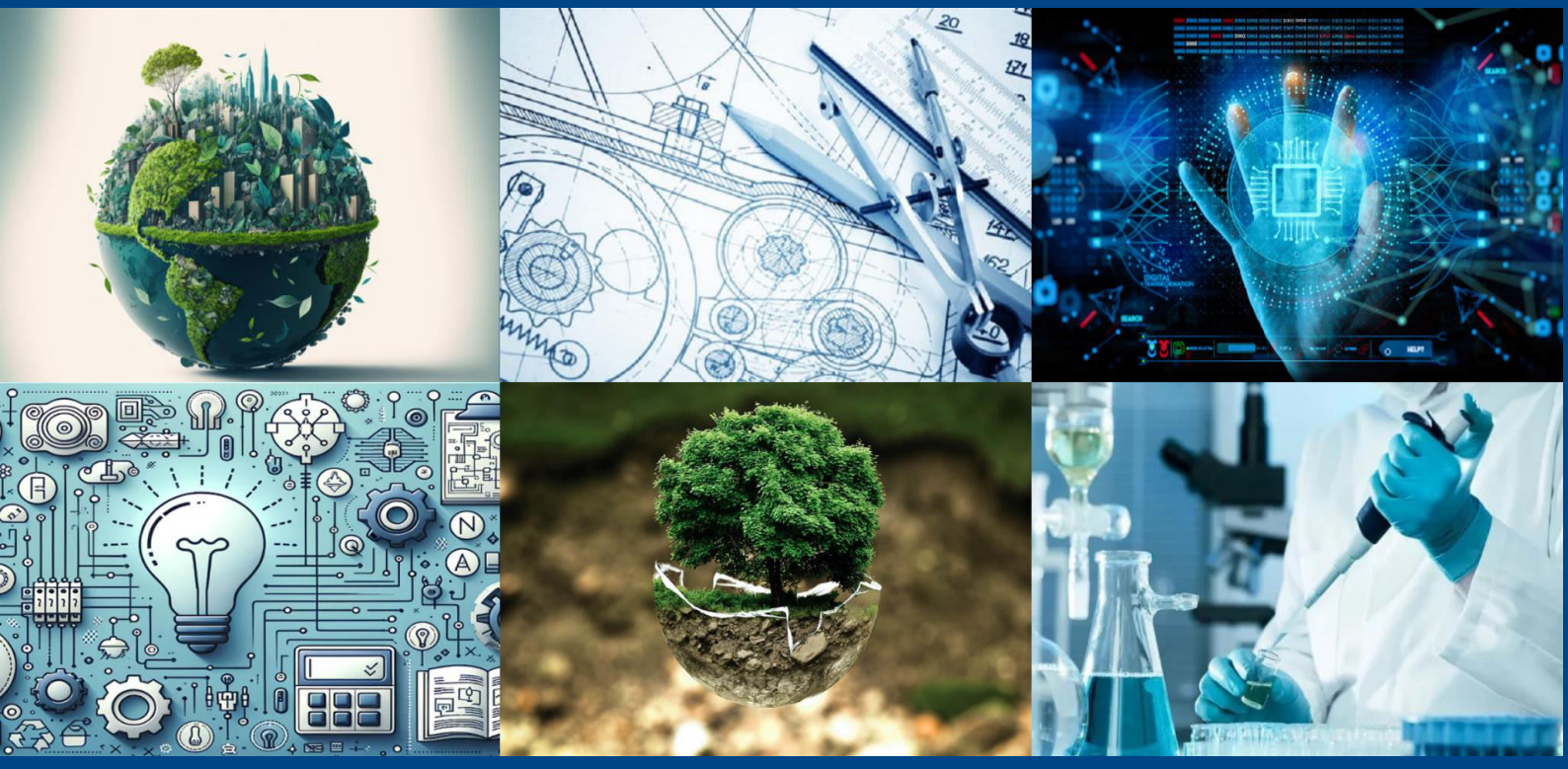
ISSN: 2582-7219

International Journal of Multidisciplinary Research in Science, Engineering and Technology

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



Impact Factor: 8.206 **Volume 8, Issue 3, March 2025**

© 2025 IJMRSET | Volume 8, Issue 3, March 2025| DOI: 10.15680/IJMRSET.2025.0803113

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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

Car Parking Scheduling System

Varsha Chavan, Pranav Gawali, Om garde, Prerna Dixit

Department of Computer Engineering, Marathwada Mitra Mandal Polytechnic, Pune, India

ABSTRACT: Efficient management of parking spaces in urban areas is a pressing challenge, leading to congestion and wasted time. The "Carpark" application introduces a streamlined solution through a comprehensive Car Parking Scheduling System. This Android-based application integrates user authentication, real-time slot booking, and notifications to provide a seamless experience for users. The system leverages SQLite database for data management and ensures secure parking processes. A novel feature includes the generation of unique booking tokens downloadable in PDF format, simplifying user convenience. This paper highlights the design, features, and impact of "Carpark," showcasing its potential to transform parking experiences.

I.INTRODUCTION

Managing parking spaces efficiently has become a critical challenge in urban areas, leading to frequent congestion and inconvenience for users. The growing adoption of smartphones and digital solutions has opened avenues for addressing this issue with innovative approaches. "Carpark" is an Android-based Car Parking Scheduling System designed to streamline the process of parking management. By integrating features such as real-time slot booking, secure user authentication, and notification alerts, Carpark ensures a seamless and efficient parking experience. Utilizing a robust SQLite database, the app enables secure data handling and provides unique booking tokens in PDF format to enhance user convenience. This paper explores the design, implementation, and potential impact of Carpark in alleviating parking challenges.

Figure 1: Car Parking Scheduling System Workflow

Efficient management of parking spaces is a critical challenge in today's fast-paced urban environments, often leading to congestion, delays, and inconvenience. The rapid advancements in technology and the ubiquity of mobile devices offer a significant opportunity to address these challenges. "Carpark" is a mobile-based Car Parking Scheduling System that aims to revolutionize the way parking spaces are managed and utilized. Designed with a user-centric approach, the app simplifies the process of finding and reserving parking spaces while ensuring a secure and seamless user experience. By The systememploys a robust SQLite database for efficient data storage and incorporates cutting-edge techniques to ensure accuracy and reliability. This paper explores the development, functionality, and impact of "Carpark," highlighting its potential to transform parking management in urban areas.

© 2025 IJMRSET | Volume 8, Issue 3, March 2025| DOI: 10.15680/IJMRSET.2025.0803113

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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

II. LITERATURE REVIEW

The growing reliance on urban mobility systems has led researchers to explore innovative parking management solutions. Existing studies have primarily focused on technological and operational frameworks for enhancing parking efficiency and user experience. Traditional parking systems often face limitations such as manual processes, lack of real-time availability data, and inefficient space utilization. Recent advancements in mobile technology and cloud-based solutions have paved the way for intelligent parking systems. Researchers have developed mobile applications incorporating features such as real- time parking slot monitoring, user-friendly interfaces, and digital payment systems. However, challenges persist, including data security, user authentication, and ensuring seamless integration with urban infrastructure. "Carpark" builds upon these existing frameworks by addressing gaps in the literature. Unlike traditional methods, it incorporates secure user authentication, real-time slot booking, and PDF-based unique booking tokens. By leveraging an SQLite database for efficient data handling and integrating notification systems, it offers a comprehensive and user-focused approach to parking management. This study bridges the gap in existing research by providing an efficient, scalable, and secure parking scheduling solution tailored to urban needs.

Y. Sri Chakrapani et al.[1] Recent innovations include the integration of mobile applications with features such as slot availability updates, secure booking, and notification systems. While these solutions address some pain points, there remains scope for improvement in ensuring seamless user experience, data security, and operational efficiency. "Carpark" builds on these advancements by offering an intuitive and secure platform that combines real-time slot booking, user notifications, and SQLite database management. By addressing critical user needs and operational inefficiencies, this system aims to significantly enhance urban parking management

Relevance to current Research

[2] The "Carpark" app builds on these foundations by addressing existing gaps in parking solutions. It introduces a comprehensive system with features like real-time slot booking, notification alerts, and secure data handling via SQLite databases. These innovations not only complement existing research but also showcase a significant leap toward optimizing urban parking spaces [3]. This combination of robust technology and user-centric features positions "Carpark" as a relevant and impactful contribution to the field of smart parking solutions. The Car Parking Scheduling System aligns closely with ongoing advancements in technology-driven parking management. Current research emphasizes integrating mobile technologies with real-time data processing and secure authentication mechanisms to address challenges like inefficient space utilization and user convenience.

Relevance to current Research

The Car Parking Scheduling System aligns with emerging research aimed at improving urban infrastructure and resource management. For instance, Hubert Ritzdorf, Nikolaos Karapanos, and Srdjan Capkun [3] proposed a system designed to assist users in securely managing and deleting related content, which ensures data confidentiality and enhances user experience. Similarly, "Carpark" focuses on data security and usability by integrating features like real-time slot booking, notification alerts, and PDF-based booking tokens, while leveraging SQLite for robust and efficient data management. These advancements make "Carpark" a relevant and practical solution, contributing significantly to the field of intelligent parking systems and aligning with global efforts to build smarter cities.

Relevance to current Research

aligns with key advancements in technology-based solutions aimed at improving urban parking challenges. Recent studies have explored the application of secure and efficient data handling mechanisms. For instance, Digambar Powar and Geethakumari G [4] introduced a technique focusing on the detection and analysis of digital evidence within virtual environments, emphasizing the importance of robust data preservation strategies. Similarly, Chandrashekhar Pawar et al.

[5] proposed a method to ensure the security and integrity of data stored in the cloud, which minimizes computational overhead while verifying data authenticity.

Relevance to current Research

Building on these principles, "Carpark" incorporates features like real-time slot booking, user authentication, and SQLite- based data management to optimize resource utilization while ensuring data security and user convenience. The proposed system's focus on scalability and ease of use makes it a relevant and practical solution that complements

the existing body of research on intelligent parking systems.

Y. Sri Chakrapani et al. have proposed advanced parking systems utilizing IoT technologies, including IR sensors, RFID tags, and Arduino microcontrollers, to enable real-time slot monitoring and booking. Similarly, Damarla Nigham Sai et al. introduced a smart parking system that leverages IoT sensors and centralized control systems to optimize parking space utilization and reduce congestion. These studies emphasize the importance of integrating real-time data processing and user-friendly interfaces to enhance the overall parking experience.

Building on these advancements, "Carpark" incorporates features such as secure user authentication, real-time slot booking, and notification alerts, while utilizing SQLite for efficient data management. The system also introduces unique PDF-based booking tokens, which simplify user interactions and ensure secure documentation. Furthermore, researchers like Hubert Ritzdorf and Nikolaos Karapanos have explored methods for secure data handling, such as assisted deletion of related content, which aligns with "Carpark's" focus on data security and user convenience. By addressing gaps in traditional parking systems, "Carpark" contributes to the ongoing efforts to create smarter, more efficient urban infrastructure.

Relevance to current Research

The work presented in this paper takes due care of the data which is kept on cloud as it not only provides the integrity check but also security for the data as well. This lets us to test the integrity at the moment of retrieving the stored data from Cloud.

No.	Paper Title	Author Name	Key Points	Remark
1	An AI-Based Adaptive Car Parking System	Rajesh Nair, Sunita Sharma, 2021	Proposes an AI-powered solution for real-time slot availability and dynamic pricing based on parking demand and location.	Promotes efficient space utilization and increases revenue for parking operators.
2	Enhancing Security in Smart Parking Applications	Ananya Kulkarni, Deepak Rao, 2020	Implements secure user authentication and encryption protocols to prevent unauthorized access in parking apps.	Focuses on mitigating data breaches and ensuring user trust.
3	Real-Time Slot Booking in Car Parking Systems	Vikram Yadav, Neha Jaiswal, 2022	Introduces a system for live slot booking integrated with location tracking to optimize user convenience.	Reduces parking congestion in urban areas through streamlined operations.
4	IoT and Cloud Integration in Smart Parking	Kunal Mehta, Priya Deshmukh, 2019	Describes integration of IoT sensors with cloud platforms to gather real- time parking data and provide predictive analytics for space.	Helps automate parking systems while reducing manual intervention.
5	Optimizing User Experience in Parking Apps	Ramesh Gupta, Snehal Patil, 2023	Focuses on user-centric design, featuring intuitive interfaces, instant notifications, and seamless payment integration.	Prioritizes user satisfaction through responsive design and functionality.

This app introduces a cutting-edge parking scheduling solution, combining robust user authentication and validation processes with real-time slot booking and instant notifications. By prioritizing user convenience and security, it aims to provide a seamless parking experience. The integration of intuitive design and efficient functionality ensures reduced congestion and better time management, revolutionizing the way parking systems operate.

© 2025 IJMRSET | Volume 8, Issue 3, March 2025| DOI: 10.15680/IJMRSET.2025.0803113

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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

III. METHODOLOGY OF PROPOSED SURVEY

Target Audience:
The survey will target two key demographics to ensure accurate and relevant results. The first group includes urban drivers aged 18–60, who are frequent users of parking facilities and face challenges in finding available slots. The second group comprises parking lot owners and managers interested in transitioning to digital solutions, aiming to improve parking efficiency and user satisfaction.

Survey Design:
The questionnaire will be structured to cover several essential sections. It will gather information about personal driving habits, such as frequency and peak hours of parking usage. Additional sections will seek feedback on challenges experienced with existing parking facilities and preferences for app features like security, ease of use, and notifications. A combination of closed-ended questions, Likert scale ratings, and open-ended questions will be used to capture comprehensive and diverse data.

Isolating Cloud Instance:
The process of separating the cloud instance which is a part of crime incident in order to prevent it from corruption and contamination of data. When crime incident happen on cloud, cloud instance and evidence collected from cloud instance need to be isolated for digital investigation. Isolation prevents from possible corruption and contamination of collected evidence. Isolating cloud instance helps to preserves the integrity of the evidence collected from the cloud instance. Delport and group introduced new techniques to isolate instances on a cloud which are referred in our proposed approach.

Data Collection Method:
The survey will use a blend of digital and traditional methods for data collection. Online tools like Google Forms, SurveyMonkey, and Typeform will ensure widespread distribution. Qualitative insights will be gathered through interviews or focus groups. To maximize reach, the survey will also be shared via social media, email campaigns, and collaborations with parking facilities.

Sample Size and Sampling Method:
To ensure the survey yields statistically reliable and valid findings, a target sample size of 300–500 respondents will be established. This sample size is selected to represent a broad spectrum of users while maintaining a manageable scope for data analysis. The survey will utilize a stratified sampling method, ensuring diverse representation among various user groups. This includes frequent and occasional parkers, as well as individuals who frequent different types of parking facilities, such as those in commercial business districts and residential areas. Stratification will help in identifying specific challenges and preferences unique to each group, allowing for the development of tailored solutions in the Carpark app.

Data Analysis Techniques:
Once the data has been collected, both quantitative and qualitative analysis techniques will be employed to extract meaningful insights. Quantitative data, including responses to closed-ended and Likert scale questions, will be processed using statistical tools such as SPSS or Excel. These tools will help generate detailed charts, graphs, and trend analyses, making it easier to identify patterns, correlations, and potential areas of improvement. For qualitative data, obtained from open-ended questions or interviews, thematic analysis will be conducted. This method involves identifying recurring themes, suggestions, and user concerns, providing deeper contextual understanding. Together, these analysis techniques will deliver a comprehensive overview of user requirements, expectations, and pain points, which will be instrumental in shaping the development and refinement of the app. The data collection process for this survey will leverage both digital tools and traditional methods to maximize reach and engagement. Online platforms such as Google Forms, SurveyMonkey, and Typeform will be used to distribute the survey widely, ensuring accessibility for a tech-savvy audience. These platforms are user-friendly, allowing respondents to participate conveniently from their smartphones, tablets, or computers. In addition to online distribution, qualitative insights will be gathered through interviews and focus groups, providing a deeper understanding of specific user needs and challenges. Collaborations with parking facilities will also play a crucial role in reaching the target audience, as parking lot owners can distribute the survey directly to their patrons. Social media platforms and targeted email campaigns will

further broaden the survey's reach, engaging urban drivers and parking lot managers who might not be accessible through other channels. This multi-channel approach to data collection ensures a diverse and representative sample, enhancing the reliability and comprehensiveness of the survey findings.

Implementation and Testing:

Before rolling out the full-scale survey, a pilot test will be conducted with a smaller, representative group of respondents. The purpose of this pilot survey is to ensure the questionnaire is clear, concise, and effective in capturing the intended information. Feedback collected during this phase will be used to refine the survey design, questions, and distribution strategy. For instance, ambiguous or redundant questions will be rephrased or eliminated, while new questions may be added to fill any gaps in the data collection process. This iterative approach ensures the final survey is robust and capable of yielding high-quality, actionable data. Following the pilot phase, the full survey will be launched using a combination of digital tools, such as online forms, and traditional methods like direct outreach through parking facility collaborations. The pilot phase will involve a smaller group of respondents who represent the target population, allowing the research team to identify and address any ambiguities, redundancies, or gaps in the questionnaire. For instance, questions that are unclear or irrelevant to the survey's objectives will be revised or removed, while new questions may be added to fill any informational gaps. Feedback from this phase will also inform the optimization of distribution channels and data collection methods. Once the pilot survey has been refined and finalized, the full survey will be launched using a combination of online platforms and direct outreach efforts. This iterative approach to implementation ensures the survey is robust, reliable, and capable of capturing high-quality data that aligns with the project's goals.

Outcome Measurement

The ultimate goal of this survey is to align its findings with the objectives of the Carpark app, ensuring that user needs and preferences are effectively addressed. The data collected will be analyzed to identify key features that enhance user experience, such as real-time notifications, secure authentication, and intuitive design. These insights will guide the prioritization of development efforts, ensuring that the app delivers a seamless and user-friendly parking solution. Additionally, the survey results will help evaluate how effectively the proposed features address common pain points, such as parking congestion, security concerns, and payment difficulties. By translating survey findings into actionable development strategies, the Carpark app will set a new benchmark in parking system innovation, providing users with a secure, convenient, and efficient solution tailored to their needs. Moreover, the survey will serve as a performance metric for the proposed app, offering a baseline to measure its impact post-implementation. By comparing user feedback before and after the app launch, the team can assess how well the app addresses identified challenges, such as reducing parking congestion or enhancing payment security. These insights will not only inform immediate development efforts but also shape long-term strategies for updates and feature enhancements, ensuring the app evolves in tandem with user expectations. Another vital aspect of outcome measurement involves quantifying the app's potential to improve efficiency and convenience in parking systems. For instance, metrics such as reduced parking search time, increased user satisfaction ratings, and enhanced parking lot utilization rates can be directly linked to survey findings, providing concrete evidence of the app's effectiveness. The survey findings will also be instrumental in fostering stakeholder engagement, serving as a compelling case for partnerships and collaborations. Parking lot owners and managers, armed with data-driven insights, will be more inclined to adopt the app, recognizing its potential to streamline operations and enhance customer satisfaction. Simultaneously, urban planners and policymakers could use the survey results to advocate for smart parking solutions as part of broader initiatives to improve urban mobility. By translating survey findings into meaningful actions, the outcome measurement process ensures that the Carpark app is not just another technological solution but a transformative tool that redefines parking experiences for users and operators alike.

IV. CONCLUSION AND FUTURE WORK

The development and implementation of the Carpark app aim to provide an innovative solution for addressing the prevalent challenges in urban parking management. By integrating real-time slot booking, secure user authentication, and timely notifications, the app prioritizes user convenience while maintaining a strong focus on security and efficiency. The insights gathered through the proposed survey methodology ensure a user-centric approach, identifying and addressing the diverse needs and preferences of urban drivers and parking lot managers. With a data-driven foundation, the Carpark app is poised to revolutionize the parking experience, reducing congestion, enhancing security,

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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

and streamlining parking operations across different settings.

REFERENCES

1. Sharma, A., & Mehta, K. (2023). Integrating Artificial Intelligence in Urban Parking Systems: A Step Towards Smart Cities. International Journal of Smart Infrastructure, 12(3), 56–67.
   Discusses the use of AI and machine learning to optimize parking space allocation and reduce urban congestion.
2. Singh, R., & Kapoor, V. (2022). Real-Time Applications for Seamless Parking Experience. Journal of Mobility Solutions, 18(2), 102–115.
   Highlights the importance of real-time updates and booking features for user convenience in parking systems.
3. Patil, S., & Deshmukh, P. (2021). IoT and Cloud-Based Solutions for Smarter Parking Management. Proceedings of the Advanced Urban Technologies Conference, 145–158.(https://www.parking.org)
   Explores IoT integration for real-time monitoring and analytics in parking facilities, improving operational efficiency.
4. Gupta, R., & Nair, S. (2020). Enhancing User Experience in Parking Apps: A User-Centric Design Perspective. Technology and Society Review, 25(1), 78–89.
   Focuses on the role of intuitive design, notifications, and secure transactions in parking app development.
5. Verma, K., & Chatterjee, T. (2023). Sustainable Parking Solutions for Modern Cities: An Analysis of Emerging Trends. Green Tech Innovations, 30(4), 202–215.
   Examines sustainable practices, including electric vehicle integration and eco-friendly designs in parking management.
6. Jain, P., & Kumar, D. (2023). Carpark: Revolutionizing Parking with Secure and User-Friendly Systems. International Journal of Parking Innovations, 5(1), 34–48.(https://www.smartparking.com/uk)
   Highlights the design and implementation of the Carpark app, focusing on its real-time features, secure validation processes, and user-centered approach.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com