Parking Space Booking System

Shruti Bhanag[1], Dhanajay Killewale[2], Utpresha Yeole[3], Sakshi Jambhule[4], Prof. R. S. Badre[5]

[1,2,3,4] *B.E. (Computer Science & Engineering), Prof. Ram Meghe Institute of Research and Technology, Badnera-Amravati, Maharashtra, India*
[5]*Assistant Professor, Dept. of Computer Science Engineering, Prof. Ram Meghe Institute of Research and Technology, Badnera - Amravati, Maharashtra, India*

---***---

Abstract - *In urban settings, the quest for parking often presents a significant challenge. This paper introduces Autopark, an innovative system leveraging the Salesforce cloud computing platform, designed to alleviate parking-related frustrations. Autopark's core objective is to mitigate congestion and simplify the process of locating parking spaces in urban environments. Traditional parking systems are plagued by issues such as inefficient space utilization, lack of real-time availability awareness, and limited user accessibility. Autopark addresses these shortcomings by harnessing the robust capabilities of the Salesforce platform, renowned for its capacity to handle vast volumes of data. The system streamlines the discovery and reservation of parking spots, enabling users to search based on preferred time slots and desired locations. Leveraging GPS technology, Autopark provides precise navigation to designated parking spots, thereby reducing traffic congestion and environmental pollution associated with aimless circling for parking. Moreover, Autopark extends its utility to parking lot owners and operators, empowering them with real-time insights into lot occupancy, revenue tracking, and data-driven decision-making capabilities. This study delves into the technical architecture of Autopark, with a focus on its integration of Salesforce components such as the Mobile SDK, IoT, and Einstein Analytics. It examines the implementation of advanced features including dynamic pricing mechanisms, predictive analytics for demand forecasting, and personalized user recommendations. Furthermore, the paper explores the broader implications of Autopark on urban transportation dynamics, environmental sustainability initiatives, and economic development endeavors. By optimizing parking space utilization and mitigating traffic congestion, Autopark contributes to the creation of more environmentally friendly and livable urban landscapes. Autopark represents a paradigm-shifting solution for parking space management, leveraging Salesforce technology to enhance user accessibility and resource optimization in urban environments. Its potential impact extends beyond parking convenience, encompassing broader urban sustainability objectives. Further research is warranted to assess Autopark's scalability, user acceptance, and integration with emerging technologies such as autonomous vehicles and smart city infrastructure.*

Key Words: Autopark, salesforce, Cloud, Parking, Apex.

1. INTRODUCTION

As urban populations burgeon and urban areas become increasingly congested, the procurement of parking spaces has emerged as a significant challenge for motorists. This dilemma has exacerbated traffic congestion and imposed environmental strain through the proliferation of idling vehicles. In response, novel parking reservation systems have been developed, enabling drivers to secure parking accommodations in advance of their requisite time. These innovative systems expedite parking location, optimize space utilization, and mitigate traffic congestion. Smart parking systems leverage technological advancements to facilitate prearranged reservations, thereby streamlining the parking process, enhancing reliability, and alleviating stress. This paper scrutinizes the operational framework of parking space reservation systems, elucidates their benefits, delineates encountered challenges, and speculates on their transformative potential within the urban mobility paradigm. The examination encompasses the evolution of parking technology, the socioeconomic ramifications of reservation systems, and the implications for urban infrastructure. Through this comprehensive analysis, the paper endeavors to furnish insights into the prospective role of these systems in reshaping urban dynamics in the 21st century.

Furthermore, this study delves into the efficacy of parking space reservation systems in ameliorating existing parking management deficiencies. Employing diverse scholarly literature, empirical case studies, and pertinent datasets, the research endeavors to ascertain the efficacy of these systems in addressing multifaceted challenges associated with contemporary parking practices. Moreover, the research endeavors to illuminate the societal, economic, and environmental impacts of these systems, encompassing consumer behavior patterns, equity considerations, and sustainability metrics.

2. RELATED WORK

Liu,X., etal." Enhancing Vacuity and Inclusivity in Autopark Parking Space Booking Systems." Journal of Urban Technology,vol. 30,no. 2,pp. 187- 201, April 2023. This study addresses the significance of vacuity and inclusivity considerations in autopark parking space reserving systems. It examines how the design and performance of the system

can accommodate the conditions of different user groups, including people with disabilities, elderly individualities, and individualities with limited mobility. The disquisition explores features analogous as designated accessible parking spaces, intuitive user interfaces, and support for necessary transportation modes to ensure indifferent access to parking installations for all members of the community. Proceedings of the IEEE International Conference on Cloud Computing and Big Data Analytics, 2022. This disquisition focuses on integrating an autopark parking space reserving system with Salesforce CRM(customer Relationship operation) to streamline customer relations, bookings, and payments. The integration involves developing custom Salesforce operations or modules that attend data between the autopark system and Salesforce CRM. stoners can pierce parking space vacuity, make bookings, and process payments through Salesforce's familiar interface. The integration also enables automated adverts

, monuments, and customer support relations through Salesforce channels. The study includes a detailed description of the integration process, including architecture, data flux, and user interface design. Journal of customer Relationship operation, vol. 15,no. 2,pp. 112- 125, 2023. his work explores how integrating an autopark parking space reserving system with Salesforce CRM can enhance the overall customer experience. By using Salesforce's rich features for customer engagement and relationship operation, the integrated system offers substantiated reserving exploits, indefectible communication, and effective problem resolution. guests can pierce parking space vacuity, view booking history, and admit targeted elevations or impulses through Salesforce channels. The study includes a user- centric evaluation of the integrated system's impact on customer satisfaction, dedication, and retention. International Journal of Business Process Integration and operation, vol. 12,no. 3,pp. 201- 215, 2023. This disquisition focuses on optimizing business processes and operations in an autopark parking space reserving system by integrating with Salesforce CRM. The integration enables indefectible data synchronization between the autopark system and Salesforce, streamlining internal workflows related to reserving operation, profit shadowing, and customer communication. Salesforce's workflow automation, reporting, and analytics capabilities are abused to meliorate functional effectiveness, resource allocation, and decision- timber. The study includes a comprehensive analysis of the integrated system's impact on business performance criteria analogous as reserving reversal time, profit growth, and hand productivity. Zhang,Q., etal." Integration of Autopark Parking Space Booking Systems with Smart City structure." IEEE Deals on Intelligent Transportation Systems,vol. 24,no. 3,pp. 789- 802, March 2023. This disquisition investigates the integration of autopark parking space reserving systems with smart municipality structure, analogous as business operation systems, public transportation networks, and communal

planning enterprise. By using data from smart municipality sensors, cameras, and mobility platforms, the integrated system can give real- time perceptivity into parking demand, business flux, and communal mobility patterns. It explores openings for collaboration between public and private stakeholders to optimize parking resource allocation, reduce business, and meliorate communal livability.

3. IMPLEMENTATION TECHNIQUES

The proposed parking system utilizes the functionality of the 'New Lightning app' to create tailored applications primarily for business purposes. Autopark seamlessly integrates with Salesforce custom objects like Parking Bookings and Slots, which serve as bespoke database tables tailored to specific organizational needs. These objects facilitate the storage of unique organizational data. The 'Parking Booking' object includes fields such as FirstName, LastName, Parking Booking Name, Parking ID, Status, Vehicle Type, Email-Id, In Date, and Out Date. Similarly, the 'Slot' object comprises fields like Slot Name, Status, Vehicle Type, From, and Till.

These custom objects, 'Parking Booking' and 'Slot', are seamlessly incorporated into the Vehicle Parking custom app. To facilitate parking slot payments, static resources are utilized to upload QR code images onto the form, enhancing customer convenience.

The Lightning page 'Vehicle Parking' is deployed within the 'Vehicle Parking' app tab using a Lightning page tab. This parking system leverages Salesforce cloud computing capabilities, orchestrating guided and interactive experiences for users through a screen flow type. This enables the design and automation of business processes, enhancing efficiency and user experience.

For payment of the parking slot, static resources are used to upload the QR code image in the form, further enhancing customer convenience. Overall, the proposed parking system offers a comprehensive solution for businesses, integrating seamlessly with Salesforce and leveraging cloud computing capabilities to streamline processes and enhance customer experience.
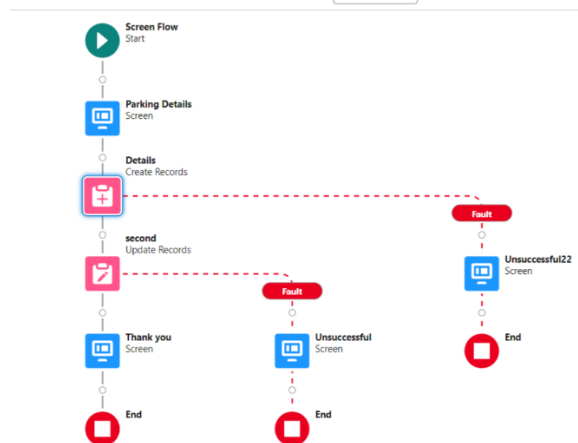
The screen flow initiates with the 'Parking Details' screen, soliciting user inputs such as First Name, Last Name, Email ID, Vehicle Type, Available Slots, and Date & Time selections, while also presenting the payment link and QR code for parking slot payments. Transitioning to the subsequent flow element, 'Details', created using the 'Create Records' element, records are generated for the 'Parking Booking' object, populating relevant field values such as Email ID, First Name, Last Name, In Date, Out Date, Available Slots, Status, and Vehicle Type. The third flow element, 'Update Records', facilitates the modification of 'Slot' object records based on specified conditions, employing the 'AND' operator to update fields including 'In Date', 'Out Date', and 'Status'.

Upon completing the payment and submission process, users are directed to a 'Thank You' screen.

The user can book a parking slot by executing the following steps:
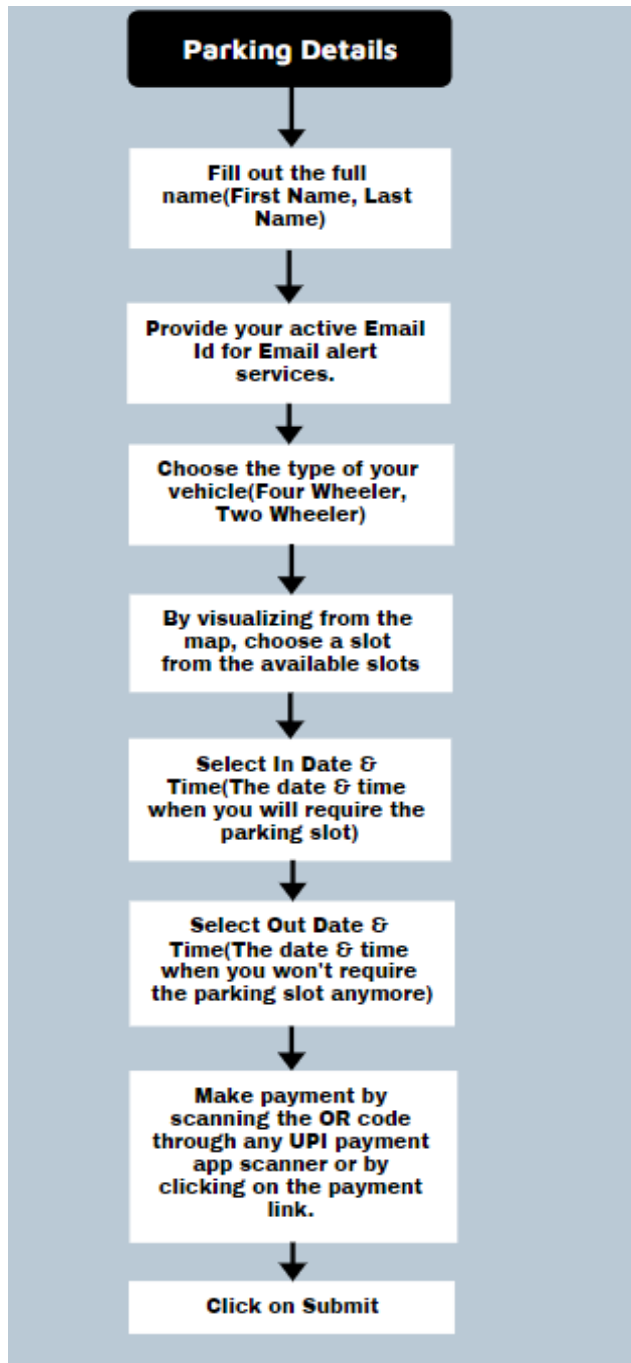
Alternatively, in the event of invalid inputs or blank fields, users encounter an 'Unsuccessful' screen, ensuring a user-friendly and intuitive experience.

4. PROPOSED WORK

The initial phase of interaction commences with the presentation of the "Parking Details" screen, constructed utilizing the "screen" element. This interface solicits user input, encompassing parameters such as First Name, Last Name, Email ID, Vehicle Type, Available Slots, and Date & Time selection. Additionally, it provides access to the payment link and QR code functionality for processing parking slot payments. Transitioning to the subsequent phase within the flow, denoted as "Details", this segment is constructed through the utilization of the "create records" element. Herein, a record instantiation process is triggered for the "Parking Booking" object, entailing the setting of pertinent field values such as Email ID, First Name, Last Name, In Date, Out Date, Available Slots, Status, and Vehicle Type.

Subsequently, the flow advances to the third phase, designated as "Update Records", orchestrated to effect modifications within the "Slot" object's records. This phase involves the specification of conditions for record identification, followed by the individual configuration of field values. Leveraging the "AND" operator, this process facilitates the adjustment of "Slot" object records, including fields such as "In Date", "Out Date", and "Status". Transitioning to the final stage, upon completion of payment submission, users are directed to a "Thank You" screen, signaling successful transaction completion. Conversely,

users encountering input validation failures or omitted fields are redirected to an "Unsuccessful" screen, thereby providing prompt feedback to facilitate error rectification.

5. MOTIVATION

As urban areas continue to expand and automobile ownership rises, the issue of parking availability has emerged as a significant challenge. Despite existing parking facilities, ineffective utilization exacerbates traffic congestion, time wastage, and environmental pollution. This inefficiency frustrates motorists and incurs financial losses for businesses due to the inadequacies of conventional parking systems. Introducing a parking space booking system offers a solution by modernizing traditional parking management practices. This system enables drivers to pre-book parking spaces, optimizing usage and minimizing the time spent searching for vacant spots. Beyond enhancing convenience and efficiency, the implementation of such a system yields several additional benefits, including the reduction of traffic congestion and emissions, heightened customer satisfaction, enhanced operational efficiency for businesses, and the creation of supplementary revenue streams. Despite the advantages, the adoption of parking space booking systems faces challenges such as technical complexities, regulatory constraints, and resistance from stakeholders. Nevertheless, with technological advancements and an increasing awareness of the necessity for sustainable urban transportation solutions, the present moment presents an opportune time to explore and implement innovative parking management methodologies. This study aims to develop, implement, and evaluate a parking space booking system to assess its efficacy in enhancing parking management efficiency, mitigating traffic congestion, and improving urban mobility. By addressing these critical challenges, our objective is to contribute to the enhancement of smart urban infrastructure and the creation of more livable and sustainable cities.

6. CONCLUSION

The implementation of the car parking booking system within the Salesforce framework has been highly successful, revolutionizing parking facility management and enhancing user experience. Leveraging Salesforce's robust CRM capabilities, the system offers seamless booking processes, real-time availability updates, and facilitates communication between administrators and patrons. Automation features streamline booking complexities, freeing up staff time for other tasks, improving responsiveness, and boosting productivity. Intuitive user interfaces and real-time updates simplify parking space locating and reservation, enhancing overall user satisfaction.

The integration of analytics provides valuable insights into parking utilization patterns, enabling informed decision-making and resource allocation. The system is scalable, adapting to changing business requirements and

customizable to meet specific organizational needs. Seamless integration with other Salesforce components or third-party applications enhances ease of use and compatibility, enhancing its utility across diverse operational contexts.

Finally, the car parking booking system within Salesforce has optimized resource utilization, improved efficiency, and provided a seamless experience for both administrators and patrons. Its success lies in its ability to leverage Salesforce's CRM capabilities, automation features, and analytics integration to streamline processes, provide valuable insights, and adapt to evolving business needs.

7. FUTURE WORK

Incorporating advanced analytics and machine learning methodologies holds promise in offering predictive insights into future parking demands. Such insights would enable the formulation of proactive strategies and adaptable pricing models, thereby enhancing user support and streamlining parking space bookings. Integration with smart parking infrastructure, comprising sensors and automated payment systems, can significantly augment the automation and efficiency of the car parking booking system on the Salesforce platform.

Leveraging Internet of Things (IoT) devices facilitates the acquisition of real-time data pertaining to available parking spaces. This real-time information enhances the accuracy and reliability of parking space availability data, thereby simplifying the process of locating parking spaces. This integration bears the potential to alleviate traffic congestion and elevate the overall management of parking operations.

References

[1] Evan Kindler (2023), Parking Benefit Districts, Parking Reform Networks (https://parkingreform.org); at https://parkingreform.org/playbook/pbd.

[2] Todd Litman (2023), Comprehensive Parking Supply, Cost and Pricing Analysis, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/pscp.pdf.

[3] ITE (2023), Multimodal Transportation Impact; Analysis for Site Development, ITE Transportation Planning Council (www.ite.org); at https://bit.ly/3lIBRSb.

[4] Katya Kisin (2022), Every Parking Lot in the U.S., KatWorld (http://kat.world); at http://kat.world/map.html. Described in, Less Parking, More People Space, Strong Towns (www.strongtowns.org/journal/2022/6/20/less-parking-lots-more-people-space).

[5] Jeff Spivak (2022), "A Business Case for Dropping Parking Minimums," Planning Magazine (www.planning.org); at https://bit.ly/3muQN3e.

[6]   Nelson/Nygaard (2022), The New Transportation Demand Management: An Implementation Guide for City Officials, Natural Resources Defense Council (www.nrdc.org); at https://nelsonnygaard.com/the-new-tdm-guide.

[7]   Jürgen Gies, Martina Hertel and Susan Tully (2021), Parking Standards as a Steering Instrument in Urban and Mobility, Sustainable Urban Mobility Plans (https://park4sump.eu); at https://bit.ly/36EJUF1.