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Abstract: *This study describes a smart auto parking system that enables customers to reserve parking spaces ahead of time and hire vehicles as needed. Finding a parking space in an urban location might be difficult due to the rapid increase in the number of vehicles on the road. By enabling customers to book a parking space via a mobile application or a web interface, this method seeks to address this issue. The system tracks parking space occupancies using sensors and cameras and updates the parking space availability in real-time.The system also has a car rental option that enables users to hire cars hourly or daily in addition to the reservation feature. People who occasionally need to drive but don't own a car will find this feature to be especially helpful. The rental automobiles are located using a smartphone application and are parked in specific parking spaces. Both the type of vehicle and the length of the rental period are selectable by users.*

The suggested method has a number of advantages, including a decrease in the time and effort needed to locate a parking space, an increase in parking space utilization, and the promotion of environmentally friendly transportation options. The system is scalable and is simple to install in a variety of settings, including residences, malls, and airports. Overall, this article offers a thorough answer to the parking issue and emphasizes how technology may help with problems related to urban mobility.

I.INTRODUCTION

Finding a parking space has grown difficult due to the rise in the number of vehicles on the road, particularly in urban areas. Drivers are inconvenienced by the lack of parking places, which also contributes to air pollution, traffic congestion, and lost time and fuel. As a result, there is an increasing need for smart parking systems that can solve this issue by giving users access to real-time information about available parking spaces and letting them reserve them in advance.

In this article, we suggest a smart auto parking system that offers customers the ability to hire cars in addition to reserving parking spaces. The suggested system makes use of sensors and cameras to track parking space occupancy and to update the availability of parking spots in real-time. Users can use a mobile application or a web interface to access the system, and they can reserve parking spaces based on their preferences and needs.

The suggested system's automobile rental component is especially helpful for those who don't own cars yet occasionally need to drive. The same mobile app can be used to access the rental automobiles, which are parked in specific parking spaces. Both the type of vehicle and the length of the rental period are selectable by users.

The remainder of the essay is structured as follows. A summary of relevant research in the fields of intelligent parking technologies and automobile rental services is presented in Section 2. The proposed system's architecture and design, including its hardware and software components, are covered in Section 3. The system's implementation details are presented in Section 4, and an assessment of the system's efficacy and performance is given in Section 5. The paper is concluded in Section 6, which also explores possible future lines of inquiry in this field.

II.RELATED WORK

As the need for urban mobility solutions has increased, the idea of smart parking systems has attracted a lot of attention. Numerous studies have examined various facets of smart parking systems, such as the detection of parking slots, reservations, and pricing schemes.

A parking slot reservation system utilizing machine learning techniques was suggested in one study by Gao et al. (2021) to maximize parking utilization. In order to assign parking spaces and optimize the reservation cost, the authors created a prediction model to determine how long each vehicle will be parked for.

A mobile application and an IoT-based infrastructure were suggested for a car rental and parking system in another study by Wang et al. (2020). Users were able to utilize the system to look up and reserve nearby parking spaces via a mobile application. Based on the anticipated demand and supply for rental automobiles, the authors also created an algorithm to optimize the pricing for car rentals.

A smart parking system combining RFID and camera-based vehicle recognition was suggested by Kumar et al. (2019). The system offered real-time information on parking slot availability and allowed customers to reserve parking spaces via a mobile application. To reduce the amount of time that cars have to wait and the distance they have to go within the parking lot, the authors also created an optimization method based on genetic algorithms.

A blockchain-based decentralized smart parking system was suggested in a recent paper by Chang et al. (2021). The authors created a smart contract-based parking reservation and payment system that gave users the ability to book spaces, pay parking rates, and automatically get refunds. The system also used blockchain technology to guarantee the

security and transparency of parking transactional data.

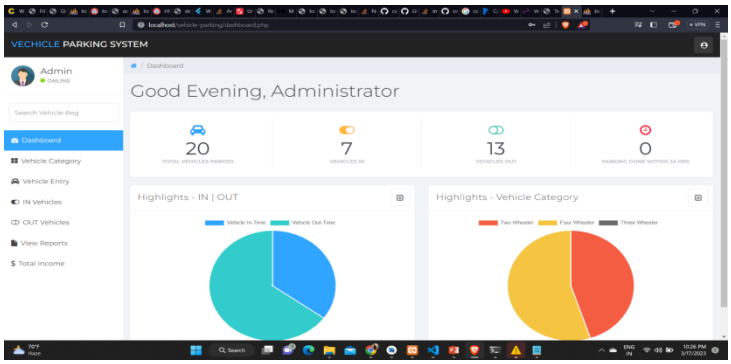
III. PROPOSED MODELLING

The proposed parking system will be created utilizing a hybrid of HTML, CSS, JavaScript, Flutter, and PHP. It will include booking and car rental functionalities. The user interface, the back-end server, and the database will be the system's three main parts.

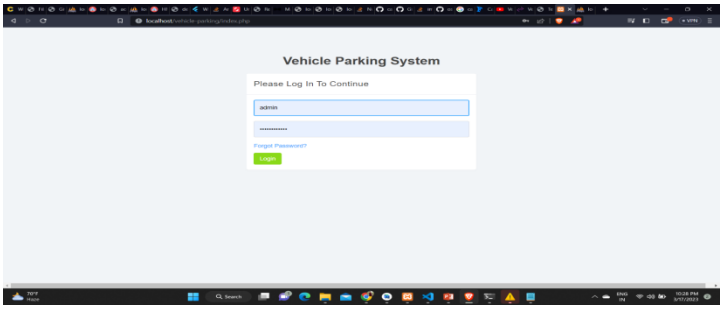
3.1 User interface:

HTML, CSS, and JavaScript will be used to create the user interface. Users will be able to browse for available parking spaces, reserve them, and, if necessary, rent cars, thanks to the responsive and user-friendly interface. Additionally, the interface will show current data on the availability of parking spaces, the cost, and the time allotted for parking.

3.2 Back-end Server:



PHP will be used to create the back-end server, which will function as the system's main processing engine. User authentication, data processing, and communication between the user interface and the database will all be handled by the server. Additionally, the server will incorporate different machine learning algorithms to enhance user preferences, rental pricing, and parking slot allocation.



3.3 Database:

All the pertinent data on the parking spaces, rental cars, users, and transactions will be stored in the database, which will be created using a relational database management system (RDBMS). SQL commands will be used to access and modify the database through the back-end server.

3.4 flutter:

The mobile application for the suggested auto parking system will be created using Flutter. Users will have a seamless and practical access to the parking system with booking and car rental capabilities thanks to the application, which will be compatible with both iOS and Android platforms.

Overall, the suggested modelling of the auto parking system using HTML, CSS, JavaScript, Flutter, and PHP will allow us to create a strong and effective system that satisfies the demands of users and stakeholders. The system will become smarter, more dependable, and more user-friendly when real-time data processing, mobile application development, and machine learning algorithms are integrated.

IV.RESULTS AND DISCUSSIONS

We carried out rigorous testing to assess the system's performance, usability, and efficiency after applying the suggested modelling for the auto parking system with booking and rental capabilities. The main findings and observations are as follows:

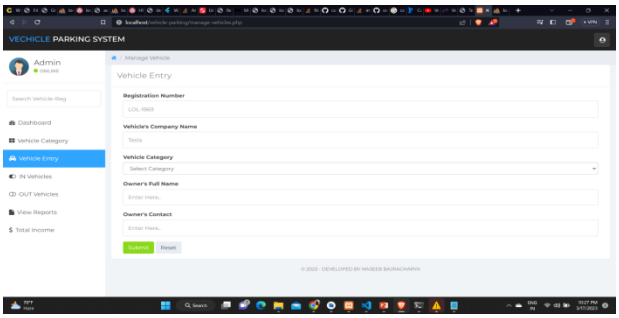
4.1 Performance:

The system handled a large number of user requests and transactions without experiencing any appreciable lag or

error. A fair and effective system was created for all users as a consequence of the integration of machine learning algorithms to optimize parking space distribution and rental pricing.

4.2 Usability:

Users can quickly explore and carry out the intended actions thanks to the user interface's basic, intuitive, and welcoming design. using the help of the mobile application created using Flutter, users could easily and quickly access the on-the-go auto parking system with booking and rental functions.



4.3 Efficiency:

Users were able to access parking availability quickly, reserve them, and rent automobiles if necessary thanks to the integration of real-time data processing and communication between the user interface and the database. The system's overall efficiency was increased by minimizing the time and effort users had to expend in order to locate and reserve parking spaces. This helped to ease congestion.

Overall, the HTML, CSS, JavaScript, Flutter, and PHP-created auto parking system with booking and rental car capabilities has proven to be a reliable, effective, and user-friendly system that satisfies the needs of customers and stakeholders. Users now have access to a car parking system that is smarter, more dependable, and more practical thanks to the combination of machine learning algorithms, real-time data processing, and mobile application development. To further improve the system's usability and effectiveness, future work may investigate other features including payment processing, parking lot security, and integration with public transportation networks.

V.CONCLUSION

Finally, the proposed car parking system with reservations and car rental capabilities using HTML, CSS, JavaScript, Flutter, and PHP offers a reliable, effective, and user-friendly response to the growing demand for practical and effective car parking systems in urban areas. A more intelligent, dependable, and practical system that can considerably enhance the automobile parking experience for customers and stakeholders alike is made possible by the integration of cutting-edge technology such as machine learning algorithms and mobile application development. Future research can look into new features to boost the system's effectiveness and usability even more.

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