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WEBSITE BASED ADVANCE PARKING BOOKING SYSTEM WITH NUMBER PLATE DETECTION

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Abstract— **In majority cases vehicle users randomly park their vehicles on the busy roads not aware of the available parking centres near to their location. To address this issue, Smart Parking System with online reservation can be a valuable solution. This smart parking system provides real time information about parking spaces, helping drivers to find parking spots quickly and allows drivers to book parking spaces in advance ensuring they have a spot when they arrive at their destination. Implementing this system also ensures whether the users have parked their vehicles on the respective space allocated to them.This system may regulate the parking spaces efficiently .**

Keywords — **Finding parking places, Reservation, Number plate detection, Customer verification.**

I Introduction

Nowadays due to an increase in population, there are a lot of vehicles on the road and less parking spaces are leading to traffic and difficulty in parking. It is a bottleneck situation for vehicle users to find appropriate space for parking. Traditional parking systems have struggled to keep pace with the increasing demand for parking spaces, necessitating the development of innovative solutions to alleviate this problem. To solve this problem, the online parking booking system can be a great solution. This paper aims to provide a comprehensive overview of this system, focusing on its principles, features, benefits, and the impact it has on city centric lifestyle. Historically, parking management relied heavily on manual processes and rudimentary systems, leading to various inefficiencies. Finding parking spaces involved circling congested areas, leading to increased traffic congestion, pollution, and frustration among drivers. Parking operators struggled with inefficient space allocation, revenue collection, and the lack of real-time data to optimise operations. These systems leverage modern technology, including mobile applications and web platforms, to streamline the entire parking experience, users can conveniently locate, reserve, and pay for parking spaces in advance, reducing the uncertainty associated with traditional methods. This paper will explore the core features that make online parking booking systems effective. These include user-friendly websites, real-time availability updates, secure payment gateways, and integration with navigation tools. The adoption of online parking booking systems has far reaching implications for urban living. Not only does it alleviate the stress associated with finding parking spaces, but it also promotes sustainable transportation options by encouraging shared rides and reducing the need for unnecessary driving. This paper is structured to provide a comprehensive understanding of online parking booking systems. To solve this problem, our concept is to create a website based online parking reservation system. After the reservation of the vehicle, to identify the vehicle we have included an object detection concept by detecting the vehicle's number plate using an open CV. Real-world case studies and success stories will be examined to illustrate the system's practical impact. Additionally, the paper will discuss the future prospects and potential innovations in online advance parking booking system.

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II Related Work

The research conducted by Anusha, Arshitha M S,Anushri, Geetanjali Bishtannavar, Ms. Megha D Hegde in their paper entitled “Smart Parking System”[1] have explained that the system consists of an onsite deployment of an slot module that is used to monitor and Indicate whether each parking space is currently available. Additionally, a mobile application is offered, enabling users to check for parking availability and reserve a spot in accordance with that availability. Because smart parking reduces pollution and fuel consumption in metropolitan areas, it can boost the economy. In the seminal work by Awad Alharbi, George Halikias, Mohammad Yamin, Adnan Ahmed Abi Sen in their paper [2] have highlighted that parking in some streets and vital places in cities is an important factor in traffic congestion and also have introduced the idea of an intelligent system to solve this problem by enabling the automatic pre-reservation process for vacant spots by users prior to arriving at the location, and then modifying the procedure depending on the composite plate's automatic detection through the use of a suggested web application that uses the OCR algorithm.In the context of this topic the authors Bhoyar K, Avatade M, Gavhane SV, Bhoyar K in their paper [3] have proposed a system that helps users automatically find free parking space at the lowest cost using new performance metrics to determine the cost of parking for users taking into account both the total number of free spaces in each parking lot and the distance. This expense will go towards providing the user with a way to request a parking spot and a way to recommend a new vehicle. [4]In their article, Hwan Jung, Jae Moon Lee, and Kitae Hwang described a vehicle number identification system that is based on a Raspberry system and leverages OCR technology. It was feasible to successfully track the car as a moving object inside the parking lot and eventually pinpoint the parking spot by using the vehicle number recognised at the parking lot entry as an Object ID. The YOLO with CNN deep learning technology is used to detect accidents. [6] In the research conducted by the authors Moh Sukron Mufaqih, Emil R. Kaburuan, Gunawan have proposed a Smart Parking System (SPS) through the use of Internet of Things (IoT) that enables online booking systems, paperless tickets, cashless payments and automated guided parking. The system's goal is to improve the existing online parking management system using IoT design so that it can be referenced for parking management in shopping centres.[8] In the context of this research the authors Mohammad M. Abdellatif, Noura H. Elshabasy, Ahmed E. Elashmawy, Mohamed AbdelRaheem in their paper have highlighted the idea of an three image processing stages to achieve licence plate identification with high accuracy which are pre-processing, segmentation, and character recognition. The licence plate and automobile edges are located using contour detection, masking techniques, and the clever edge detection approach with different thresholds. In the pioneering study the authors Quang Huy Bui, And Jae Kyu Suhr in their paper [12] have introduced a two-stage parking slot detection method using region-specific multi-scale feature extraction. It first uses the region proposal network (RPN) to locate parking slot entrances and then employs the slot detection network (SDN) and slot classification network (SCN) for precise estimation. The approach extracts features from specific regions to enhance accuracy, utilising multi-resolution feature maps for positioning and classification. Finally, it combines positions, types, and occupancies to determine the final parking slots.The authors namely Takuya Nakazato, Yuto Fujimaki, Toru Namerikawa in their paper [14] have introduced a prior reservation system for parking reallocation based on waiting times. Driver preferences are adjusted using waiting times from parked and reallocated drivers. Our parking allocation algorithm covers rematching, stability, and strategy-proofness. And also proposed a dynamic parking fee system, addressing "full" "congested" and "available" statuses to optimise utilisation and parking managers' profit.

III Existing System

In Existing system, the parking centre owner registering the slot booking

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for vehicles manually so that will cause inefficiency, lack of payment process, human errors. As technology demand increases, some parking centres are still using manual notebooks for new entry of vehicles that will cause inadequate record keeping.

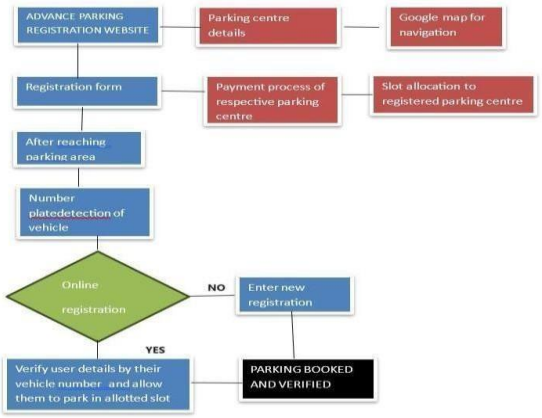
Disadvantages

- Inefficiency
- Human errors
- Inadequate record keeping
- Limited security

Proposed System

Proposed system consist more information about available parking centre near to the location and it also provide advance parking slot booking feature to reduce the time for search available parking space and customer no need to spend time for registration and for pay money at the entrance or exit of the parking centre. This system stores theinformation of customer details in database so that the security of confidential information will be more and human errors can be avoid.

IV System Architecture



V Implementation

Front Work

1) User Registration and Authentication :This system allows users to create accounts through google, facebook, instagram and log in securely. To verify the user's information, authentication of their account will be implemented.

2) Parking Management: Dashboards for parking facility operators to manage their facilities and tools for setting pricing, defining parking zones, and monitoring occupancy are provided with real- time updates on reservations and payments.

3) Parking Space Search: Users are allowed to search for real time available parking spaces based on location, date, and time and book parking spots in advance.

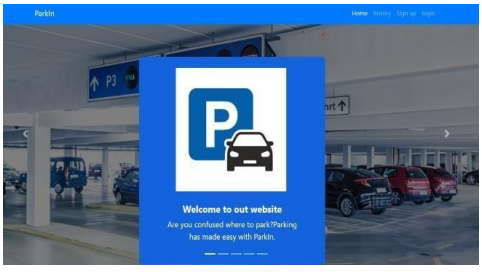
4) Booking Slot [Reservation]: Users can book their available parking slots at particular parking centre by providing their details [Name,phone number,address,emailid, vehicle number]. After the reservation user will be assigned with the slot number at the respective parking centre.

5) Navigation and Integration :Integrate with mapping and navigation services (e.g., Google Maps) to guide users to their reserved parking spots. provide directions to the nearest available parking facility.

6) Payment Processing: This system is integrated with secure payment gateways to facilitate online payments for reservations and provides support for various payment methods, including credit/debit cards, digital wallets, and payment processing services.

7) Reviews and Ratings: Allows users to give reviews and ratings for parking facilities and display user feedback and ratings to help others make informed decisions.

8) Admin Dashboard: Admin dashboard for system administrators to manage user accounts, monitor system health, and handle disputes.



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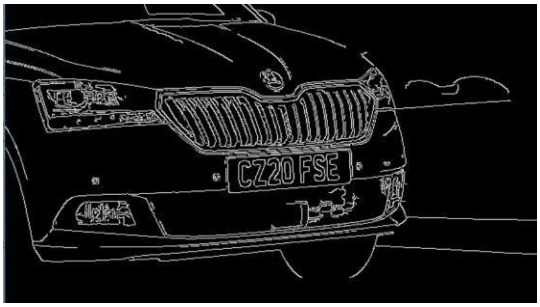
Number Plate Detection

1) Taking an Image of a car as input The program accepts the vehicle as an input to identify the licence plate.

2) Input Processing: With our advanced processing technology, you can easily detect the licence plate of any vehicle from the input image.

3) Recognizing The values of the detected licence plate are extracted from the number plate image.

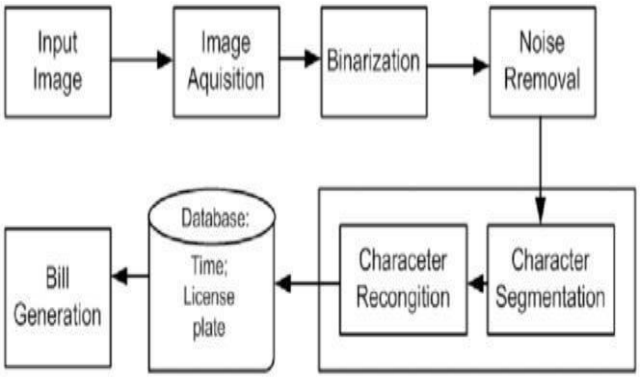
Actual License Plate	Predicted License Plate	Accuracy
OLA1208	OLA1208	100%
OYJ9557	OYJ9557	100%
PJG0783	PJG0783	100%
OUP9563	OUP9563	100%
OLC4728	OLC4728	100%
ODJ1599	ODJ1599	100%
GWT2180	GWT2120	86.0%
OKV8004	QKV8004	86.0%
PJB2414	PJB2414	100%
AYO9034	AYO9034	100%
JSQ1413	JSQ|413	86.0%
OKS0078	OKS0078	100%
NTK5785	NTK5785	100%
PJD2685	PJD2685	100%
NZW2197	NZW2197	100%
PJB7392	PJB7392	100%
NYY1710	NYY1710	100%
OCX4764	OCX4764	100%



Back work

1) Database Connectivity: To store the user and vehicle information, we will be creating a SQLITE database. The frontend and the backend of our application can be connected using the flask library by using some packages, from flask import Flask; from flask_sqlalchemy import SQLAlchemy.

2) Crud Operation: After detecting the number plate through object detection methodology, we will be matching the vehicle number with the registered vehicle number in the database to recognize whether the registration is an online manual registration.



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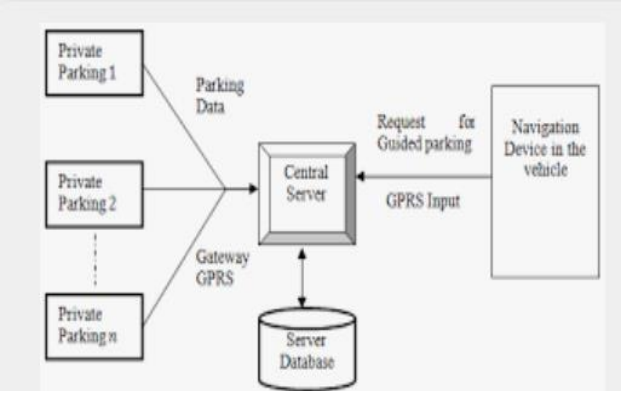

VIII Conclusion

In conclusion, the integration of number plate detection and user verification within an online reservation parking system represents a significant advancement in parking technology which enhances the convenience of online parking reservations by providing the information of parking centres prior to the user's location and navigating them to the centre. On reaching the centre the registered user's number plate is verified through object detection and makes their payments online. This innovative approach not only modernises the parking experience but also contributes to more efficient traffic management and a safer, more secure urban environment.

In the future, we have decided to add additional features to our system by integrating sensors to ensure the occupancy and availability status of the parking space. Using sensors we can indicate to the parking centre manager about occupancy of vehicles in the particular slot assigned to them. If the vehicle users have parked in some random space instead of parking the vehicle in the assigned parking space then this will be indicated through alarm or notification.

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