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AI Driven Car Parking Automation

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Abstract*—Present-day car parking has become a major issue in urban areas with a lack of parking facilities. It is complicated and frustrating to find a parking space in most metropolitan areas, especially during rush hours. To solve this problem the proposed application provides an easy way to reservation of parking slots. In this application, users can view various parking areas and also consider whether space is available or not. If the booking space is available, you can book it for a specific time slot. Also, this system provides an additional feature where, for security purposes, the car identity is monitored via its registration number at the entry/exit area.*

***Keywords*—** *Android Application, slot allocation, smart parking, parking management, AI(Artificial Intelligence).*

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I. INTRODUCTION

In most big cities, it's challenging for drivers to find a parking spot, especially during peak hours. Car damage may occur while parking in a disciplinary manner. Therefore, it is necessary to give enough of slots and enough parking spots so that the user may park his automobile safely [1]. Parking systems are basically one of the smart city solutions that are most widely used and expanding quickly. Currently, the majority of parking lots do not have a well-organized system. Most of them are inefficiently run and manually managed [2].

One of the big unsolved challenges to making Smart Cities a reality is the provision of Smart Parking applications. The overall objective of Smart Cities is to improve city life, so the provision if smart and sustainable parking solutions is becoming a key priority [3]. In fact, several studies made it evident how the problem of searching for a parking space in highly populated urban areas is a source of traffic congestion, increased carbon emission, and, not least, a very frustrating and time-consuming experience for motorists [4]. Several industry efforts have already produced solutions in this direction by making use of advanced Information and Communication Technologies including vehicle sensors, wireless communications, and data analytics in order to improve urban mobility [5]. Some cities have adopted these solutions in pilot areas installing wireless sensors able to detect parking space occupancy in real-time. In addition, smart parking meters, allowing for a wide variety of available payment methods, are being developed in conjunction with the dissemination of parking availability information [6].

In order to offer a comprehensive solution that answers the needs of both the consumers and the owners of the parking lot, this project seeks to eliminate the costs and inefficiencies connected with manual parking systems [7].

II. RELATED WORKS

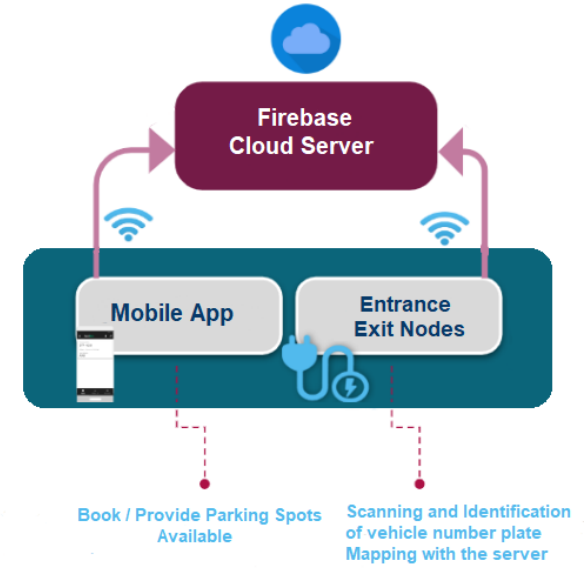
AnujaDeokar, Nidhi Sharma, Shristhi Nayak, and RuchitaBhoye The paper, "Online Parking Booking System," intends to provide consumers with an online reservation system that allows them to view different parking lots and choose a place that is open. If the requested space is available, the user may reserve it for a certain time period. The reserved slot will be highlighted in red and unavailable to others for the duration of that period. The system also includes the ability to cancel reservations. The user may cancel their reserved space at any moment. You can make a payment online. A notification with a specific parking number will be sent to the user's phone after payment has been received[1].

"Mobile-based Smart Parking Reservation System with Rate Display Occupancy Using Heuristic Algorithm and Haversine Formula," by RizkaRifdatusSafitri, Aries Pratiarso, and Ahmad Zainudin, In this paper, an urgent issue is highlighted, and a smart parking reservation system is suggested, with SORAY standing for Rate Display Occupancy. Our system optimises the queuing technique by taking into account three parameters, including the driver status (member or non-member), distance, and parking duration, using a simulated annealing-based heuristic approach. When calculating the distance from the vehicle's current location to the parking lot at the time of receiving the reservation request, this system also employs the Haversine formula. Quick Response Code is used by SORAY as part of the verification procedure for proof of reservations. To forecast the number of vehicles in the parking lot, the occupancy rate graph is shown. Results demonstrate that compared to the traditional approach for looking for parking spaces, this technology successfully reduces the amount of time needed to make a reservation by almost 20 times. In accordance with the simulation results, the heuristic method yielded the lowest cost: 1.97 under the condition that the driver making the reservation was a member and had an hour to park over a distance of 5.4 kilometres. The findings indicate that the average computation time for the Java SHA-256 algorithm used to generate random OTP is 4.10 seconds[2].

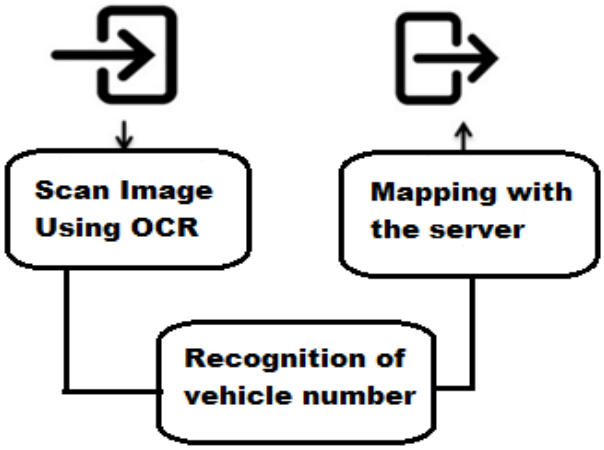
Preethi Harris and Karthi.M "SMART PARKING WITH RESERVATION IN CLOUD BASED ENVIRONMENT," a practical way to determine whether a parking space is available and to reserve one. Only the parking space's availability is the subject of the current study. Drivers, however, are unable to determine whether a parking space is immediately available in this fast-paced society. Smart parking with a reservation option using a cloud-based environment is suggested as a solution to this drawback. This helps drivers park their cars more easily and reduces traffic congestion. Using the reservation app on an Android smartphone, drivers can make requests to see if a parking space is available. A driver can reserve a spot through an online payment method if it is available. Additionally, vehicles can cancel the allocated parking space using the proposal system. The amount will be returned following cancellation fees. As a result, the use of a sensor, Arduino, and Android on a cloud platform is suggested for a low-cost smart parking prototype with reservations [3].

III. METHODOLOGY

In general, this system combines a website with a smart parking, smart reservations, and smart administration system. The concept of slot allocation as the user must first register on our website using his vehicle's RC and email address. The database will then have empty spaces available. Also, Slots have been reserved on the user side and are reserved in the database for the next 30 minutes. If the registered car enters the building within the allotted time and the photo capturing device recognizes it, the slot will be listed as occupied. The number plate will be recognized using AI for data management and security purposes. When the user leaves the area, the slot will be listed as open.



We provide a client and a consumer space to reserve and deliver parking spots using a mobile application. A cloud-based database will house the registered data.
The camera would take a picture and transmit it as input to the admin app, where it would be scanned using OCR, the license plate would be recognized, and mapping with the server would be done to validate for security.



A. Optical Character Recognition

It is a technological advancement that can recognize text in digital photographs. Using OCR software, a document or image may be converted into a text-based, searchable electronic version. But we use OCR technology to extract text from images for keyword identification and pattern detection.

B. Mapping with server

The following step is to map the text with the server's existing data database after it has been identified.

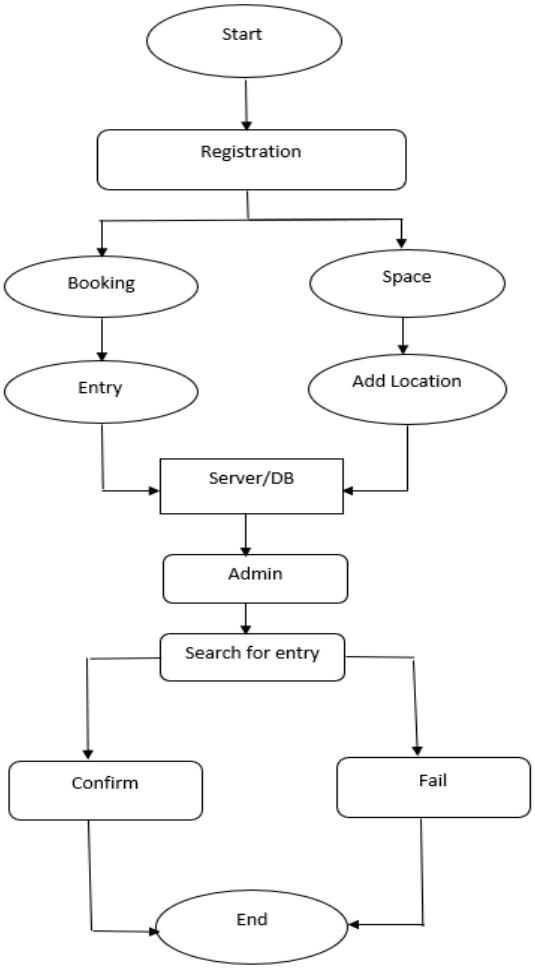
C. Recognition of a vehicle

The authority to identify the vehicle using pattern recognition is given after ORC and mapping are complete.

IV. IMPLEMENTATION

Registration has completed for the needed service. If a booking is made, the information is entered and saved in a database. The slot supplier enters information about available parking places, which is subsequently saved in a database, similarly to when making a reservation.

The vehicle number is compared to the input made during the slot booking on the administrative side. If there is a match, confirmation output is produced; otherwise, failure output is produced.



Language: Java is a high-level, all-purpose, object-oriented, and secure programming language that was used to create the application.

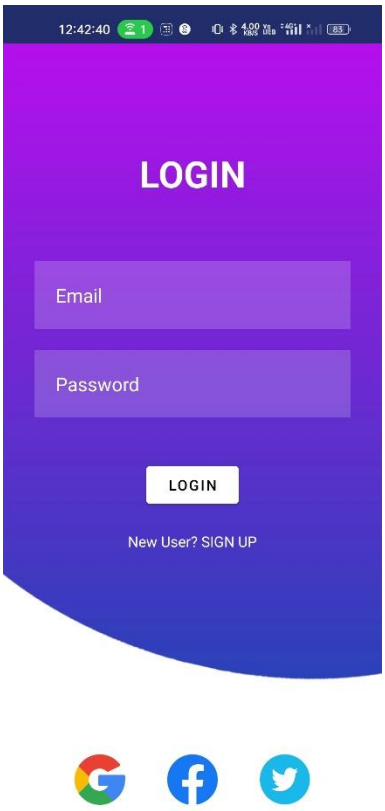
Library: A set of programming tools called OpenCV is primarily focused on real-time computer vision. It was initially created by Intel and then backed by Willow Garage and Itseez. The Apache 2 License for Open-Source Software makes the library cross-platform and freely used. EasyOCR: An picture may be converted to text using the EasyOCR Python module.

Developmental Tool: The integrated development environment (IDE) for Google's Android operating system, known as Android Studio, was created exclusively for Android development.

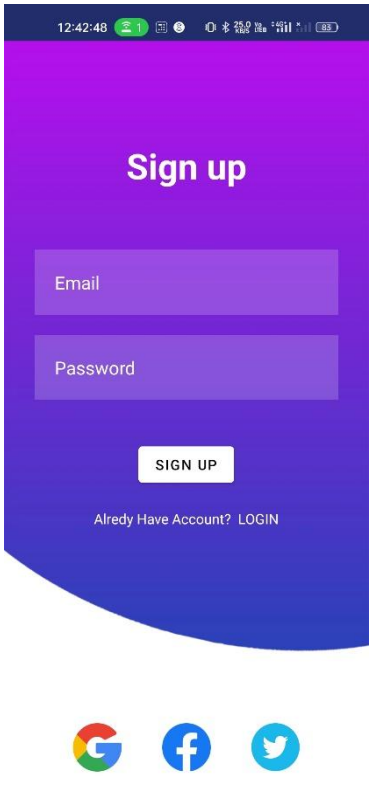
V. RESULT

The outcomes of the model application are:

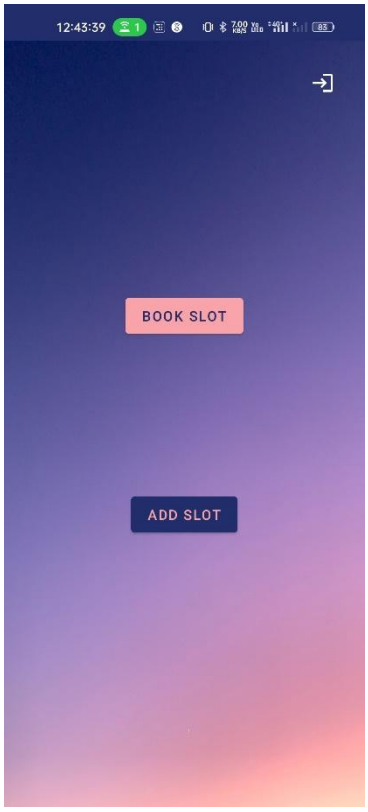
1. Login


12:42:40
LOGIN
Email
Password
LOGIN
New User? SIGN UP

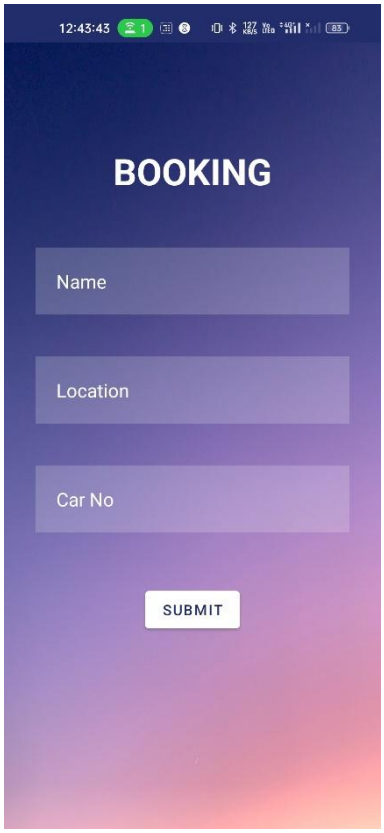
2. Sign up


12:42:48
Sign up
Email
Password
SIGN UP
Alredy Have Account? LOGIN

3. Slot Booking



4. Booking



VI. SOCIAL IMPACT

Parking management systems have grown in importance as a result of the development of parking technology for both parking operators and parking users. Nowadays, managing parking without a parking management system is difficult or perhaps impossible. When it comes to managing the movement of automobiles in a parking lot, automated parking is quite practical and adaptable. This will allow you to take advantage of a variety of parking options and guarantee excellent outcomes.

A. BETTER PARKING EXPERIENCE

Customer satisfaction increases with better parking management. Automated parking improves the client experience by giving them a streamlined process. Your users can easily locate available parking spaces with an effective parking management system, saving time and fuel and raising customer satisfaction.

B. INCREASED SECURITY

By giving you access to cutting-edge security technologies, you can stop anyone from misusing your parking lot and engaging in questionable conduct. Parking management offers enhanced security, privacy, and safety so that car owners may feel secure in the protection of their vehicles.

C. REDUCED TRAFFIC AND POLLUTION

The majority of city traffic is caused by cars that circle an area in search of available parking. Furthermore, spending a lot of time driving about or waiting for a parking spot to open up results in daily emissions and fuel consumption. A good parking management system makes it possible for parking to be completed more quickly, which greatly decreases city traffic, travel time, vehicle emissions, and carbon footprint.

VII. CONCLUSION

By listing the closest parking spot and available slot, the suggested method lessens traffic and driving annoyance. There is a lot of room for innovation and implementation through data standardization and management, mobile phone integration, hardware and software integration, as smart parking systems boost operational service levels. The number plate will be recognised using AI for data management and security purposes. In general, smart auto parking systems assist to streamline the sometimes arduous process of parking by saving time, money, and space.

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