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Smart Parking System for Institute

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ABSTRACT

As the number of vehicles on roads continues to rise, businesses are more likely to encounter a range of issues. To address such challenges, the "Smart Parking System" has been developed as an intelligent and automatic solution for parking vehicles. This system is designed to alleviate problems faced by urban areas on their roads. However, precisely tracking the availability of parking spots across different locations and times remains a significant difficulty. Nonetheless, the Smart Parking System enables parking attendants to easily locate empty parking spaces. Moreover, implementing this smart parking system can help minimize energy consumption and pollution levels in cities, ultimately contributing toward the country's economic growth.

Keywords - Smart Parking System (SPS), automatic, slots.

I. INTRODUCTION

The modern world is witnessing a rapid transformation due to scientific discoveries and technological advancements, leading to the development of various smart devices, appliances, and systems such as home automation, robots, intelligent vehicles, smart transportation systems, sensor networks, communication systems, and other gadgets. The concept of creating smart cities has evolved significantly with a primary focus on reducing operational costs, improving city management, increasing efficiency, and enhancing productivity. One important aspect of this is Smart Parking System (SPS), which plays a crucial role in the transportation system, as the lack of parking space can lead to significant time waste, increased traffic congestion, energy wastage, motorist frustration, and air pollution. The economic impact of business traffic is substantial, estimated at $100 billion by 2020, with an expected $13 billion spent on health costs in 2020 and $17 billion by 2030.

The paper is structured as follows: Section (II) LITERATURE SURVEY provides a review of various journal papers on smart parking systems, highlighting different concepts and their limitations. Section (III) SYSTEM ARCHITECTURE describes the block diagram, working principle, and flowchart of the proposed system. Section (IV) PROPOSED METHODOLOGY outlines the overall strategy and rationale. Section (V) FUTURE APPLICATIONS discusses potential applications of the system, while Section (VI) APPLICATIONS details the various potential uses of the system. Section (VII)

CHALLENGES outlines the potential challenges of implementing the proposed smart parking system, such as data privacy and security concerns, interoperability issues, and public acceptance. Section (VIII) ANDROID RESULTS presents the output of the accompanying app, while Section (IX) COMPARISON compares the proposed system with other existing apps. Finally, Section (X) CONCLUSION summarizes the project and its findings, with Section (XI) REFERENCES listing the papers used as references.

II. LITERATURE SURVEY

Our First paper is "An Intelligent Parking Management System Based on RS485 and RFID" by Huayu Zhou; Zhihua Li. This paper presents a design for an intelligent parking management system, based on the integrated RS485 and RFID. In this system, a vehicle can quickly and easily be accessible to the car park.[1]
Our Second paper is "Intelligent Parking System for Car Parking Guidance and Damage Notification" by Sanaa Alfatihi; Soukaina Chihab; Yassine Salih Alj. This paper presents an innovative intelligent parking system (IPS) that has two functions: Car parking guidance and car damage notification. IPS is an advanced automatic driving system that consists of car guidance that proposes oriented assistance for drivers while parking.[2]
The paper we are referring to, entitled "Wireless Mobile-Based Shopping Mall Car Parking System," was written by Soh Chun Khang, Teoh Jie Hong, Tan Saw Chin, and Shengqiong Wang. Typically, in Malaysia, drivers need to search for an empty parking spot without any explicit guidance from the system. As a result, this often leads to wasted time and effort on the part of drivers who circle around the parking space looking for a spot, which causes traffic congestion. [3]
Our Fourth paper is "Smart Parking with Reservation in Cloud-Based Environment" by M. Karthi; Preethi Harris. In many cities, car drivers search for a parking slot during peak hours or in traffic congestion. This paper presents an efficient method to check the availability of the parking slot and to reserve a slot. Existing work focuses on the availability of the parking slot only.[4]

III. SYSTEM ARCHITECTURE

3.1 Block diagram

Modules Auto Parking System substantially consists of three modules. They are

3.1.1 User Module
3.1.2 Administrator Module
3.1.3 Booking Module

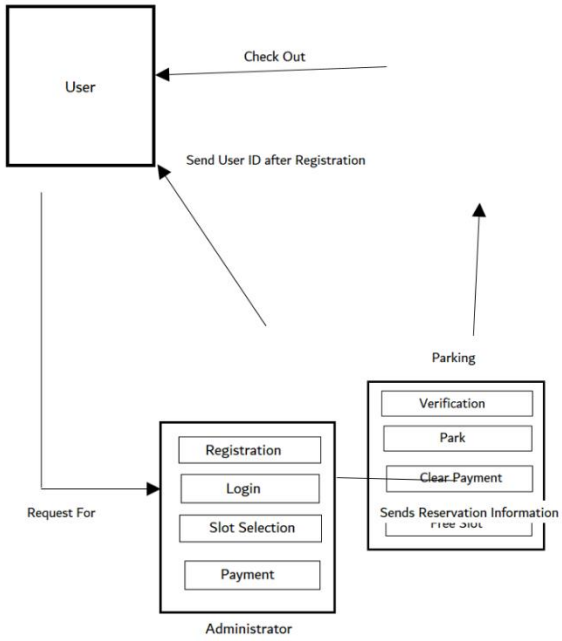

Fig 1. System Architecture

3.1.1 User Module

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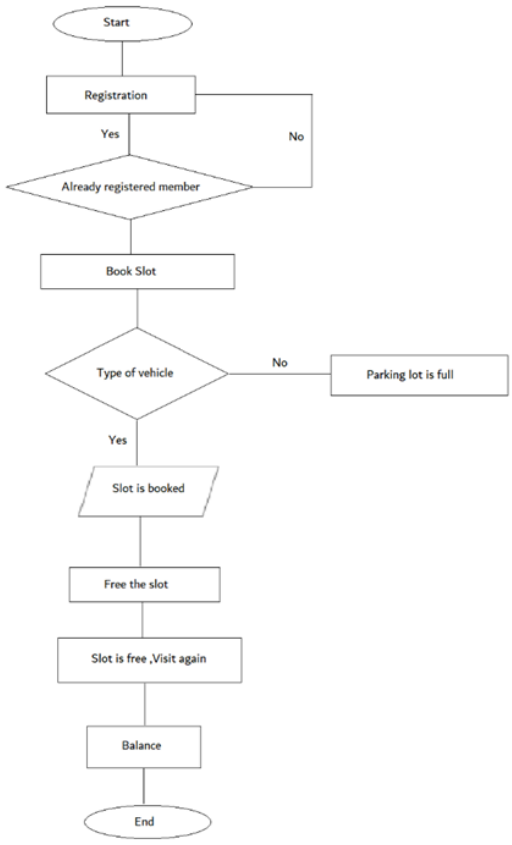
3.1.2 Administrator Module

This module operates at the backend to manage the database and carry out various actions on it, acting as the foundation of the operation. The director enters each user's information into the database after they register. The database includes information about available and reserved parking spaces, together with the relevant booking costs and user information. This information may only be revised by the director. The director also makes it easier for users to use the payment system.

3.1.3 Booking Module

The essential element of the operation, this module makes it possible to reserve parking spaces. The booking module becomes active and gives the user all the information they require as soon as they indicate an interest in making a reservation. This contains information about the positions/slots that are available, related costs, and all processing needed to make a successful reservation. The booking module is in charge of overseeing all aspect of parking reservations.

3.2 Flow chart



III. PROPOSED METHODOLOGY

Defining the project's scope and its objectives is the first step. Next, determine the project's goals and objectives. This involves figuring out the dimensions of the parking lot, the kinds of sensors that will be utilised, and the data that will be made available to users.Conduct a feasibility study: To ascertain the project's technical, financial, and operational viability, a feasibility study should be carried out. This involves evaluating the sensor availability, network capacity, and implementation costs.Create a system architecture: A system architecture that lists the hardware and software elements of the system should be created. The data storage system, connection protocols, and sensor kinds must all be identified.

Create the user interface: The user interface should be created to give users access to real-time parking availability information. To do this, information on parking availability and occupancy status can be shown on a website, a mobile app, or digital signage.

Put the system in place: The system should be put into operation in accordance with its user interface and system architecture. This include mounting sensors, establishing the network, and setting up the software.Validate and test the system: To make sure the system works as planned, it should be tested. To make sure they are functioning properly, this includes testing the sensors, communication protocols, and user interface. Deploy the system: The parking lot is where the system should be put into use after it has been tested and verified. In addition to providing ongoing support and maintenance, this also entails instructing users and staff on how to utilise the system.

To make sure the system is fulfilling its aims and goals, it should be assessed frequently. To find areas for improvement, this includes examining usage data and user input.

V. FUTURE SCENARIO

The future of smart parking looks promising as it facilitates efficient usage of space, thus enhancing the

parking experience for both motorists and agencies accountable for managing this vital resource in urbanized areas. The idea of smart cities has been a long-standing vision, and our forthcoming objective is to develop an automated parking system that can function as a platform in a smart metropolis. The auto parking system center will have high-level authorization to obtain information for operational and control purposes, such as a tracking center, emergency center, business control center, and police center. The installed sensors in the parking area will collect data on the available parking spaces and transmit it to the parking measures, which will, in turn, send the simplified information to the central information hub.

VI. APPLICATIONS

The system is designed to facilitate car parking and minimize traffic congestion effectively. It can be implemented in diverse locations, such as malls, hospitals, and multi-story buildings, with optimal performance. Additionally, the configuration process is optimized to reduce waiting time, making the booking experience more convenient. Furthermore, the payment method is manual, which eliminates any concerns regarding online transactions.

VII. CHALLENGES

Parking customers will have many payment choices to select from, will find empty parking spaces quickly, and will save time and gasoline.

Users of parking spots won't have to wait in lines to enter or exit the space because the system will be ticketless and utilise automatic vehicle identification.

VIII. ANDROID RESULTS

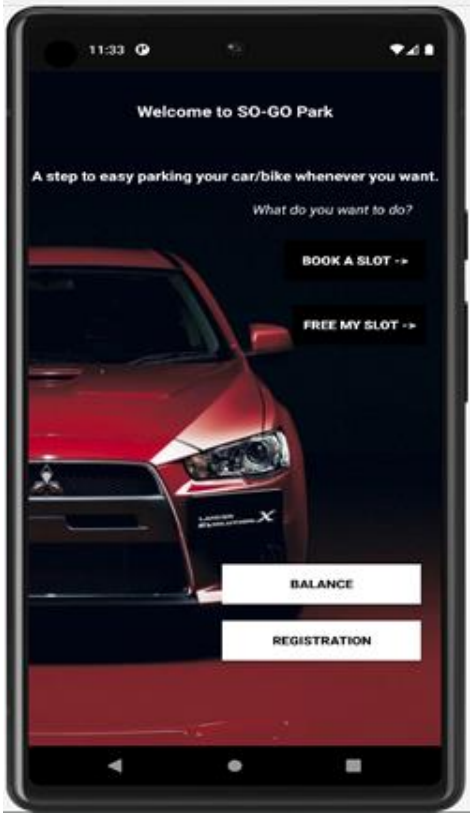


Fig. Login page at customer side

Fig. Registration tab

Fig. Booking Page

Fig. Slot freeing tab

Fig. Booking Tab

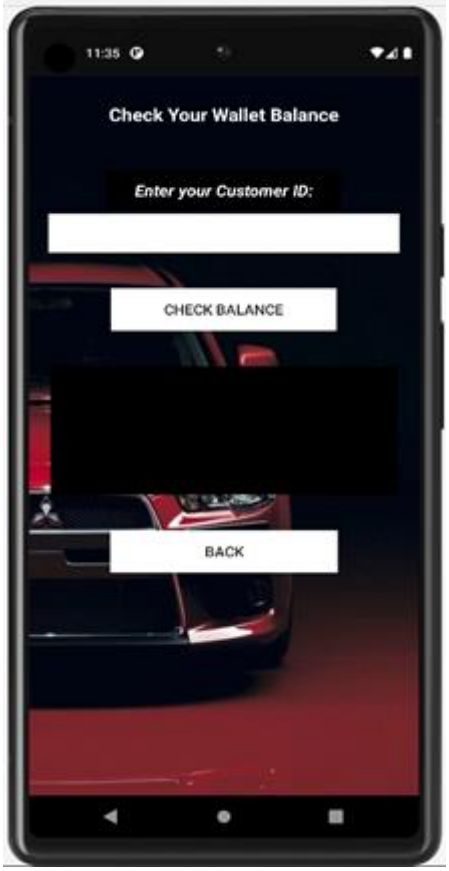


Fig. Wallet balance tab

IX. COMPARISON

PARAMETER	REQUIREMENTS	VEHICLE	WORKING	APPLICATION	LIMIT	FLEXIBILITY
Paper 1	RS485 RFID	CAR	ONLY PARKING	PARKING SLOT	300	RELIABLE AND CHEAP
Paper 2	CAMERA SHOCK SENSORS	CAR	DAMAGE NOTIFICATION	MAIN CITY	NOT MENTIONED	HIGH MAINTAINANCE AND EXPENSIVE
Paper 3	WIRELESS MOBILE BASED	CAR	TICKET AND SMS SERVICE	MALL	500	HIGH MAINTENANCE
Paper 4	CLOUD BASED	CAR	ONLY PARKING	PARKING SLOT	NOT MENTIONED	CHEAP AND UNRELIABLE
Project	ANDROID	BOTH	PARKINGAS PER TIME SLOT	INSTITUTE / ANYWHERE	500(flexible)	RELIABLE AND CHEAP

Paper 1 consists of 300 parking slots, but also has only car parking.

Paper 2 has not mentioned the parking limitation but sends the damage notification in the main city area.

Paper 3 has mentioned space for 500 cars for a mall, and this system is bit confusing at messaging and parking.

Paper 4 has also not mentioned the parking limitations and is cloud based service.

After going through these papers we came up with the idea of implementing such project in the institute which can also be applied at hospitals, malls, etc. with flexible parking slots and which is more cheaper and reliable.

X. CONCLUSION

The Smart Parking System (SPS) allows users to reserve parking spaces easily using their Android devices. This feature enables users to check for available parking spaces conveniently, thereby allowing them to make advance reservations and avoid any complications that may arise from inefficient business operations. Mobile computing has played a significant role in database and data management, making it possible to operate the SPS efficiently on the Android Mobile OS. Because of its user-friendly and efficient nature, the SPS operation can be implemented in various locations and corners.

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