Parking Lot Automation

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Abstract

In the current scenario of parking management system, optimal usage of parking space and the abruptness to park vehicles are critical factors. Technology based Parking Management System is an automated and advanced solution that provides management of vehicles right from an entry in the parking area to the exit. Optimizing the parking space for vehicles is still a problematic area for businesses, Government offices, various public places as well as municipalities authorities in multiple cities across India. Our Parking Management System offers a productive implementation of the parking resources.

Societal Impact

1. **Reduces impact on historic areas and buildings – smaller footprint and discrete access**
2. **Increases personal safety at night**
3. **Reduces accidents and car damage**
4. **Minimizes theft**
5. **Increases safety for pedestrians and cyclists**
6. **Reduces noise impact and pollution, acoustic and vibrational impacts**
7. **Provides options such as storage pods or provision for cyclists' bike storage**
8. **Provides accessible parking for all users including disabled and parents with children**
9. **Provides convenience through intelligent software that allows for scheduled vehicle retrieval and optimized waiting times**
10. **Saves users the time of having to drive through a garage to find a space, park and walk out**

Objectives

The aim of implementing Parking Management System is to reduce time and increase efficiency of the current Parking Management System. In overpopulated cosmopolitan zones, parking strategies must be well implemented for management of vehicles. The system provides details of the vacant parking slots in the vicinity and reduces the traffic issues due to illegal parking in the vicinity. It is designed with an objective to meet the requirements of controlled parking that offers effortless parking tactics to the authorities.

The system aims to provide an mobile application which manages the parking system for the user autonomously. The app aims to provide a interactive and user friendly UI/UX to display the available parking slots and enable seamless payments.

The entire process of entering and exiting the parking lot is managed by the app from logging in timestamps and fine detection.

Literature Survey

Versionx:

An integrated smart parking system to automate end-to-end parking processes.It is integrated with visitor management system, FASTag, and access control hardware. Extremely useful for shared parking spaces, the solution automates day-to-day processes such as auto-identifying appropriate parking slots - be it reserved or pay-and-park, auto-generating parking tickets, levying penalties, and many more.

Mantra:

On-Street Parking Control System: Parking management system offers innovative parking solutions that utilize cutting-edge technology for on-street parking system.

In today's world parking lots have become redundant and needs lot of manpower to handle and maintain it. These parking lots are not user friendly and do not provide data regarding availability of free spaces. Many researchers have contributed to this issue and formalized with various methods to better optimize the parking lot to serve the needs. The author proposed smart parking reservation system using short message services (SMS), for that he uses Global System for Mobile(GSM) with microcontroller to enhances security. The ZigBee technique is used along with the GSM module for parking management and reservation. The author uses Global Positioning System(GPS) and Android platform to show available parking spaces. However, reservation for the same is not available.

PARKING ISSUE IN INDIA

A. Need for Cleaning System

The biggest issue with owning a car in a metropolitan city in India is finding a suitable parking space due to a lack of parking space. The number of cars in India is more than 40 million, which corporations and personal individuals own. And the number is increasing day by day because of the affordable prices of cars and the improvement of the economic status of a middle-class person. In recent time there has been an increase in the number of vehicles, but the space for parking has not increased according to the requirements. As a result, around 40% of road space is utilized for parking instead of transport activity. Which increases road accidents.

SOLUTION TO PARKING PROBLEMS

The parking problem can be eliminated by using various parking solutions in this paper; the various parking systems and their advantages & limitations are discussed.

Modular or Puzzle Type

Puzzle-type automated multilevel parking is inspired by the children's game of '15-sliding puzzle'; a 4*4 grid has one empty slot. For parking or removal of the car, shuffling of cars should be done to bring it to its desired location. Major components of this system are shelves/shuttles, a lift for vertical movement in multilevel, AGVs, I/O points. Here shelves/shuttles can be either movable in X and Y direction or stationery. The major drawback is the complicated management of the system. There are various proposed retrieval methods in movable shuttles, such as optimal dual load retrieval and multiple load retrieval methods. Some shelf management strategies are autonomous shelf strategy and AGV powered shelf management strategies.

Proposed Method

- User Side
  - A mobile application where the user can login/register.
  - A payment gateway in the app to enable online transactions
  - Determine the nearest available parking slot and assign it to the user
  - Visualize the Parking level with slots and its occupancy
  - Enable cashless transactions
- Admin Side
  - Manage all the slots in the parking lot
  - Retrieve data from user QR code and send/get data to and from the database
  - Append the number plate registration data recognized using a camera module
  - Calculate the cost and generate a bill

Modules

- UI visualization for the slots in the lot
- User QR code generation
- QR code and number plate recognition and database communication
- Bill calculation and generation
- Find nearest slot available in the particular level/floor

References

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