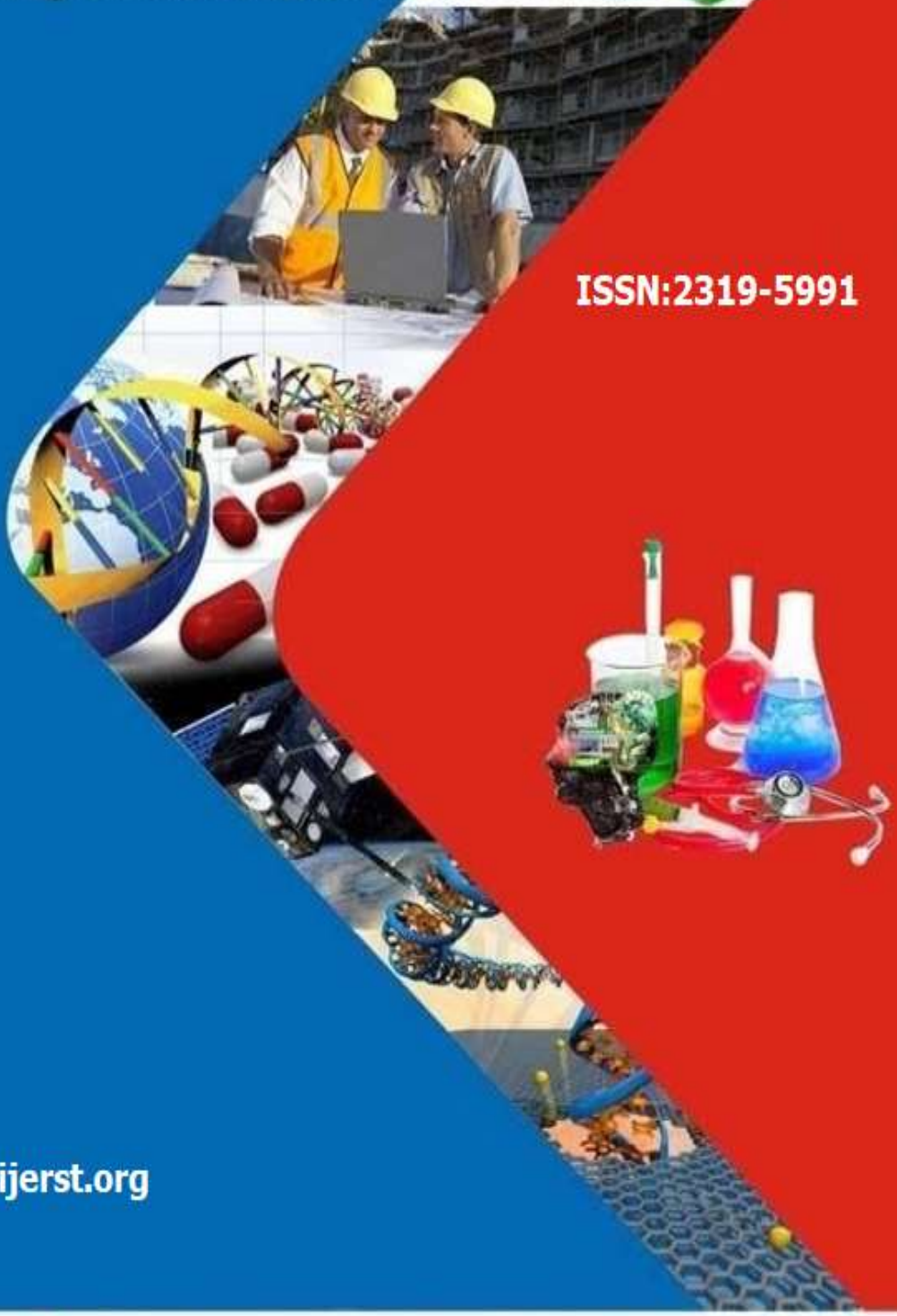
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QR CODE BASED SMART PARKING SYSTEM

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ABSTRACT

In the modern era of rapid growth and development, the demand for cars has increased gradually. With the demand, the problem of finding the appropriate parking space is now a key challenge. To remember the place where one has parked the car in the crowd of 500-600 cars is a troublesome situation for anyone. Unwanted use of parking space because of the lack of feasibility and payment method leads to a huge loss for the vendors of parking space. Finding an appropriate parking space needs a lot of time. The advanced developed parking ecosystem can solve much of the problem mentioned above.

A hassle-free system will help both vendor and user to overcome most of the problem as well as it eases the payment method and saves time. The use of QR(Quick Response) code and a dedicated app can overcome the problems of the existing parking system. In the modern era, it's very difficult to build a new infrastructure for parking. Along with the exponential growth in the automobile industry, parking problems increase at the same pace.

Most of the existing parking system includes various sensors like the ultrasonic sensor, GPS (Global positioning system). The installation cost of these types of sensors needs huge investments along with daily maintenance charges. These types of sensors can't be operated in an open parking space. Most of the sensors are easily affected by rain or sun rays. These types of systems can't solve most of the problems prevailing in the parking industry. The use of hydraulics in modern automated parking systems needs a huge capital as well as electric power investment. The new parking system needs much change in existing infrastructure and is not feasible for a small vendor. The cost of building a new parking space along with sensors is the reason behind the non popularity of the hardware-based parking system. The use of manpower to operate a modern parking system can also be overcome by the new prescribed system.

Keywords: **Cloud Computing, Data Security**

I. INTRODUCTION

In the modern era, it's very difficult to build a new infrastructure for parking. Along with the exponential growth in the automobile industry, parking problems increase at the same pace. Most of the existing parking system includes various sensors like the ultrasonic sensor, GPS (Global positioning system). The installation cost of these types of sensors needs huge investments along with daily maintenance charges. These types of sensors can't be operated in an open parking space. Most of the sensors are easily affected by rain or sun rays. These types of systems can't solve most of the problems prevailing in the parking

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industry. The use of hydraulics in modern automated parking systems needs a huge capital as well as electric power investment. The new parking system needs much change in existing infrastructure and is not feasible for a small vendor. The cost of building a new parking space along with sensors is the reason behind the non popularity of the hardware-based parking system. The use of manpower to operate a modern parking system can also be overcome by the new prescribed system.

II. LITERATURE SURVEY

QR code-based smart parking system that enables users to find and book parking spots using a mobile application. The system utilizes QR codes placed at parking spots, which users scan to check availability and make reservations. The paper discusses the implementation details and evaluates the system's effectiveness in terms of user convenience and parking management.

Smart parking system that employs QR codes for parking spot identification and management. QR codes are used as virtual tokens for reserving parking spaces, and users can make reservations through a mobile application. The study evaluates the system's performance in terms of user satisfaction, ease of use, and parking space utilization.

Smart parking system that combines QR codes with Internet of Things (IoT) technology for efficient parking management. QR codes are used for parking spot identification, while IoT devices monitor occupancy and relay real-time data to a centralized system. The study discusses the system architecture, integration of QR codes and IoT, and potential enhancements

III. SYSTEM ANALYSIS

EXISTING SYSTEM

The advanced developed parking ecosystem can solve much of the problem mentioned above. A hassle- free system will help both vendor and user to overcome most of the problem as well as it eases the payment method and saves time. The use of QR(Quick Response) code and a dedicated app can overcome the problems of the existing parking system.

Most of the existing parking system includes various sensors like the ultrasonic sensor, GPS (Global positioning system). The installation cost of these types of sensors needs huge investments along with daily maintenance charges. These types of sensors can't be operated in an open parking space.

By adopting the new software-based system most of the problems related to the existing parking systems like proper space management, time management, and traffic problems(due to random movement of cars in search of parking space) can be solved easily. Indeed our parking system is also cost effective as compared to the existing parking system. This system can easily be adopted by various small and large parking vendors without much change in the existing parking infrastructure. On further advancement, the system can also be used for two-wheeler parking and provide much more flexibility.

DISADVANTAGES OF EXISTING SYSTEM

Dependency on Mobile Technology:

As the system relies heavily on mobile applications and QR code scanning, individuals without smartphones or those

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facing technical issues with their devices may encounter difficulties in using the system.

Limited Accessibility for Elderly Users:

Elderly users who are not familiar with mobile technology or face challenges in using smartphone applications may find it challenging to adapt to the system, potentially limits its accessibility.

Vulnerability to Technical Glitches:

Technical issues such as app malfunctions, QR code reading errors, or server downtimes could disrupt the seamless operation of the system, leading to user frustration and potential inconvenience.

Susceptibility to Fraud:

QR codes, if not implemented securely, might be susceptible to duplication or manipulation, leading to potential instances of fraud or unauthorized access to parking spaces. Ensuring the integrity of the QR code generation and authentication process is crucial.

Dependency on Stable Internet Connection:

The system heavily relies on a stable internet connection for real-time updates, reservations, and payment processing. In areas with poor connectivity, users may experience delays or may be unable to utilize certain features, impacting the system's reliability.

PROPOSED SYSTEM

The proposed QR Code based Smart Parking System aims to overcome the limitations of the existing parking infrastructure by introducing a comprehensive and user-friendly solution. In this envisioned system, a user-friendly mobile application, seamlessly integrated with Quick Response (QR) code technology, becomes the focal point. The proposed system offers a more inclusive approach, accommodating users without smartphones by providing alternative methods for accessing and paying for parking spaces. To address concerns about technical glitches, robust error-handling mechanisms and regular maintenance schedules will be implemented to ensure the system's reliability. Security measures, such as encrypted QR codes and authentication protocols, will be reinforced to mitigate the risk of fraud. Furthermore, the proposed system will incorporate user-friendly interfaces, ensuring accessibility for all age groups, including the elderly.

To tackle dependency on a stable internet connection, the system will feature offline functionalities, allowing users to perform essential tasks even in areas with intermittent connectivity. This holistic approach aims to create an advanced, user-centric parking ecosystem that is not only technologically adept but also addresses the diverse needs and challenges faced by users and parking space vendors alike.

ADVANTAGES OF PROPOSED SYSTEM

Efficient Space Utilization:

The system facilitates optimized use of parking spaces by providing real-time information on availability. Users can quickly locate and reserve parking spots, reducing unnecessary congestion and ensuring efficient space utilization.

Time-Saving for Users:

With the ability to reserve parking spaces in advance and streamlined entry and exit processes facilitated by QR codes, users experience significant time savings. This contributes to a more convenient and hassle- free parking experience.

Enhanced Payment Convenience:

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The integration of a secure payment gateway within the mobile application simplifies the payment process. Users can seamlessly pay for their parking without the need for physical cash, enhancing convenience and reducing transaction times.

Improved User Experience:

The user-friendly mobile application and QR code scanning process contribute to an overall enhanced user experience. The system's intuitive design and accessibility features cater to a wide range of users, including those less familiar with advanced technology.

IV. IMPLEMENTATION

MODULE DESCRIPTION

1. User app

- Secure user login page where user need to fill up some basic information and its QR code will be generated.Then parking mode will be displayed- online or offline.
- Payments and space allotted history can also be accessible from user app. Current bills and related information is also shown in app.
- Demonstrates two options given to user for booking- Book online and Onsite Booking.

2. Admin app

- This app will monitor online and offline parking space allotment.
- It has access to edit parking allotted space and increase or decrease or shut down the parking space allotment.
- It has access to the payment history of any customer and also enforce penalty customers(if applicable).
- Shows GUI options given to admin.

3. Scanner app

- Scanner app will scan the QR code of the user and allot the nearest available parking space.

V. RESULTS



HOME SCREEN



ADDING PARKING SLOTS DATA



FEEDBACK PAGE

VI. CONCLUSION

By adopting the new software-based system most of the problems related to the existing parking systems like proper space management, time management, and traffic problems (due to random movement of cars in search of parking space) can be solved easily. Indeed, our parking system is also cost effective as compared to the existing parking system. This system can easily be adopted by various small and large parking vendors without much change in the existing parking infrastructure. On further advancement, the

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system can also be used for two-wheeler parking and provide much more flexibility.

FUTURE SCOPE

The QR Code-Based Smart Parking System has significant potential for future advancements, integrating emerging technologies to enhance parking efficiency, security, and user convenience. As urbanization and vehicle density increase, parking management will become a crucial challenge, and QR- based solutions will play a key role in addressing it.

In the future, AI and machine learning can be incorporated into QR-based parking systems to analyze traffic flow patterns and predict peak hours, optimizing parking space allocation. IoT (Internet of Things) integration will allow real-time monitoring of parking occupancy using smart sensors, reducing the time spent searching for available spots. Additionally, blockchain technology can be employed to provide secure, tamper-proof transaction records, ensuring transparency in parking fee payments.

The system can also expand towards automated license plate recognition (ALPR) with QR codes, allowing for a seamless entry-exit process without manual scanning. Cloud-based data storage and analytics will enable remote management of parking facilities, offering real-time insights and reports on parking usage.

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