QR CODE BASED SMART PARKING SYSTEM

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Abstract

The QR Code Based Smart Parking System aims to automate and optimize vehicle parking by integrating QR code technology with real-time monitoring. Traditional parking systems suffer from inefficiency, time delays, and manual errors. This project introduces a smart solution where users can book, enter, and exit parking lots using dynamically generated QR codes, scanned at entry and exit points. The system maintains a digital log, enables slot availability tracking, and reduces human intervention, ensuring secure, contactless, and efficient parking management.

I. INTRODUCTION

Urban areas face increasing challenges in managing limited parking spaces, resulting in congestion, time waste, and environmental concerns. Manual ticketing and parking systems are not only outdated but also vulnerable to fraud and operational inefficiencies.The QR Code Based Smart Parking System brings innovation to traditional parking through a combination of mobile/web applications and QR-based access control. Users can pre-book parking slots or scan at the entrance for spot allocation. QR codes serve as unique, encrypted identifiers tied to the user's vehicle, reducing misuse and enabling seamless parking experiences. The system also records time of entry/exit, automates billing, and monitors slot availability in real-time.

II. LITERATURE SURVEY

1. Jain et al. (2020) – Introduced QR-enabled access for vehicle parking using IoT and cloud-based tracking.
2. Patil et al. (2019) – Designed a mobile app-based smart parking system integrating slot sensors and RFID.
3. Kumar et al. (2021) – Proposed a cloud-based parking system using QR code verification and payment integration.
4. Singh & Sharma (2018) – Reviewed intelligent parking systems and their impact on traffic decongestion.

5. Ravi et al. (2020) – Developed a contactless QR-code-enabled entry/exit system post-COVID-19.
6. Mahajan et al. (2017) – Suggested a model for real-time parking availability tracking using mobile tech.
7. Ali et al. (2019) – Evaluated the use of smart tokens and barcode technologies in automated parking.
8. Zhang et al. (2021) – Utilized computer vision and QR decoding for smart vehicle management systems
9. Deshmukh et al. (2022) – Integrated Android app with dynamic QR generation and smart gate controls.
10. Gandhi et al. (2023) – Implemented a machine-learning-based parking occupancy predictor with QR access control.

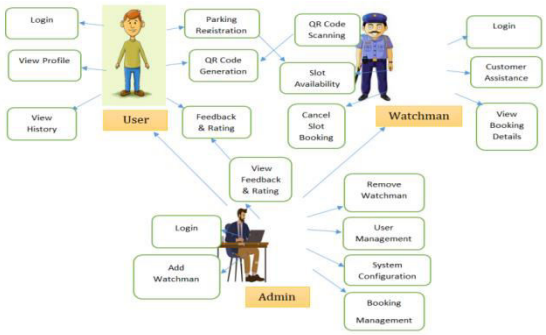
III.EXISTING SYSTEM

Traditional parking systems often rely on manual ticketing, paper tokens, and visual inspection, which are prone to errors, delays, and security issues. Some modern systems use RFID or license plate recognition, but these come with high costs, setup complexity, and limited flexibility for everyday users or small parking areas.

IV.PROPOSED SYSTEM

The proposed QR Code Based Smart Parking System introduces a cost-effective, scalable, and contactless method for managing parking facilities. Users can book a slot via a mobile app, which generates a unique QR code used for gate entry. At the entrance, the QR code is scanned to authenticate the booking and allocate a slot. On exit, the same code is verified, and the duration is calculated for billing. The system integrates a real-time slot availability monitor, a database to track user entries, and admin control for managing parking zones. It enhances speed, transparency, and automation in urban parking management.

V.SYSTEM ARCHITECTURE



System Architecture Explanation:

The diagram represents a role-based functional architecture for a QR Code Based Smart Parking System, involving three main actors: User, Watchman, and Admin. The User can log in, register for parking, generate

a QR code, check slot availability, cancel bookings, view booking history and profile, and submit feedback or ratings. The Watchman handles QR code scanning at the parking gate, monitors slot availability, views booking details, cancels slots if needed, and provides customer assistance. The Admin oversees the entire system, with capabilities to log in, add or remove watchmen, manage users, configure the system, view user feedback, and control overall booking management. This architecture ensures smooth coordination, secure access, and efficient automation in parking operations through real-time monitoring and QR-based entry.

VI.IMPLEMENTATION

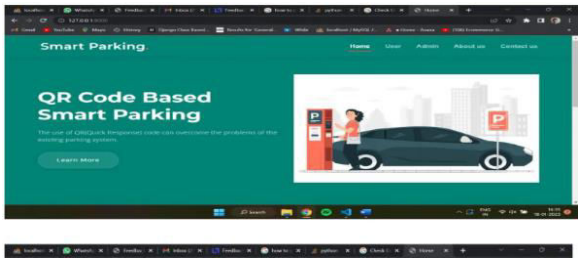


Fig 6.1 Home Page

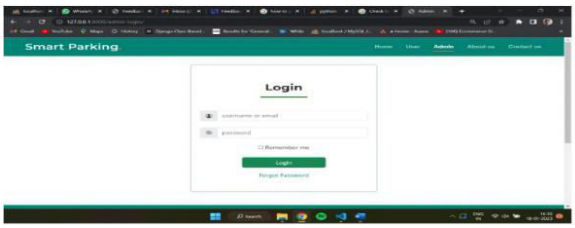


Fig 6.2 Login Page

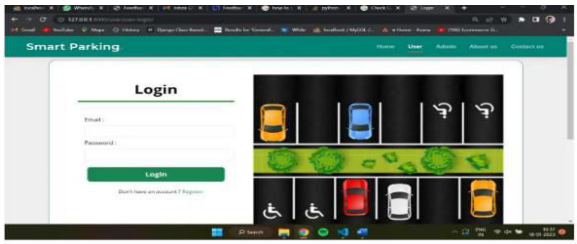


Fig6.3 After Login

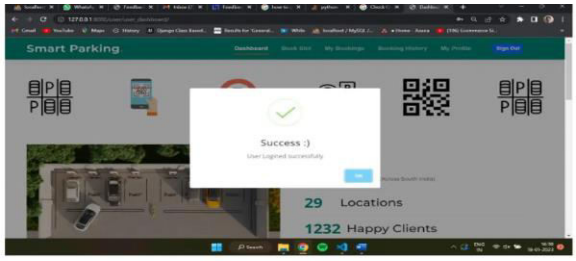


Fig6.4 SuccessLogin

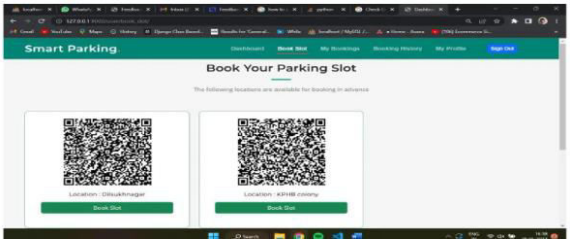


Fig6.5 Scanners

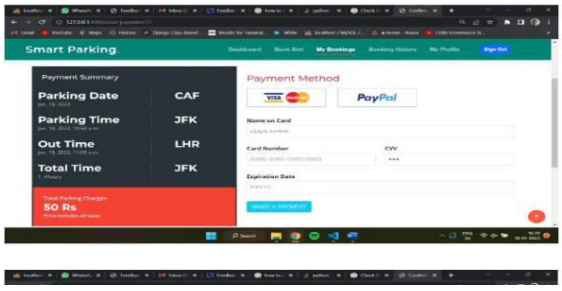


Fig6.6 Parking Details

VII.CONCLUSION

The QR Code Based Smart Parking System provides a robust, secure, and user-friendly alternative to traditional parking solutions. It significantly reduces the operational burden, eliminates the need for manual supervision,

and offers an improved user experience through instant access and billing. By automating parking entry and exit using QR technology, this system promotes digitalization and improves urban mobility management.

VIII.FUTURE SCOPE

In future iterations, the system can integrate GPS-based slot suggestion, dynamic pricing, ANPR (Automatic Number Plate Recognition), and mobile payment gateways for seamless billing. Additional features like real-time occupancy heatmaps, voice-based interactions, and integration with electric vehicle (EV) charging stations can make the system more versatile. The solution can also be expanded to support multi-level parking complexes and event-based dynamic slot reservation.

IX.REFERENCES

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