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CITI-LINK Bus Pass System for Nashik

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Abstract: *The CITILINK Bus Pass System is a digital solution aimed at improving public transportation for Nashik's frequent commuters, including students and employees. The system simplifies the traditional bus pass application and usage process by offering a user-friendly mobile platform where individuals can apply for passes, complete registration, and make payments. Upon successful completion, users receive a QR code, which serves as their bus pass. This QR code is scanned at bus stops for easy and efficient boarding, eliminating the need for physical tickets or manual verification. On the administrative side, the system is equipped with a CodeIgniter-based web application that allows the transit authority to manage users, track pass usage, and monitor bus stop activities in real time. The Flutter-based QR code scanner facilitates quick identification and seamless entry at bus stops, further enhancing operational efficiency. The integration of these technologies ensures smoother operations, reduced paperwork, and a more secure, automated process for both commuters and bus operators. This system modernizes the bus pass management for CITILINK, providing a more convenient, efficient, and scalable solution to meet the needs of Nashik's growing population, all while promoting a smarter public transportation network.*

Keywords: Bus Pass System, QR Code, Flutter, Node js

I. INTRODUCTION

Public transportation systems are the backbone of any developing city, providing affordable and sustainable travel solutions. The CITY LINK Bus Pass System is a step toward digital transformation in the transportation sector of Nashik. Traditional methods of bus pass issuance involve lengthy paperwork, manual verification, and the need for physical visits to the bus authority office. This project introduces an automated solution where users can apply, pay, and obtain bus passes through a mobile application, thus enhancing user convenience and promoting smart city initiatives. With a user-friendly interface, the CITY LINK app allows commuters to seamlessly complete their applications and receive a **QR-based digital bus pass**, making it easy to access public transport services without delays. The system also integrates features like **online payment gateways, automated document verification, renewal reminders, and real-time updates**, ensuring a hassle-free experience for users. **To address these challenges, the** CITY LINK Bus Pass System **introduces a** fully digital and automated **solution that simplifies the bus pass issuance process. This system enables users to** apply, verify, pay, and obtain their bus passes through a mobile application**, eliminating the need for physical paperwork and office visits.**

By leveraging digital technology, the CITY LINK Bus Pass System not only improves efficiency but also contributes to **Nashik's Smart City initiatives**, promoting **sustainable and tech-driven urban mobility**. This initiative aims to enhance convenience, reduce congestion, and make public transport more accessible, ultimately paving the way for a smarter and more connected city

II. SYSTEM OVERVIEW

The CITY LINK Bus Pass System is designed to simplify the bus pass application and management process through two core components: the user mobile application and the administrative web portal. The mobile application, developed using Flutter, serves as the primary interface for users to register, apply for bus passes, make digital payments, and generate QR codes. This user-friendly app eliminates the need for physical visits and paperwork. On the other hand, the administrative web portal, built with Node js, allows transit authorities to manage user data, verify applications, and

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monitor daily pass usage. The portal also provides an interface to generate reports and track transactions, making the entire system more transparent and efficient.

The CITY LINK web portal, built using Node.js, is designed for transit authorities to manage the entire bus pass system. It provides an intuitive dashboard to:

- Verify user applications through an automated and manual approval process.
- Manage user data securely within a central database.
- Monitor pass usage by tracking daily validations through QR-based scanning.
- Generate reports on revenue, active passes, and application trends.
- Track transactions with a secure log of all payments and renewals.
- Issue and manage special passes such as student, senior citizen, and seasonal passes

III. LITERATURE SURVEY

The traditional bus pass systems have long relied on manual processes that require applicants to visit transportation offices, fill out paper-based forms, and wait for approvals. These systems often lead to inefficiencies, delays, and administrative burdens due to the extensive paperwork involved. Manual verification further prolongs the process, making it inconvenient for commuters. Additionally, the lack of a centralized database makes it difficult for authorities to track pass usage, generate reports, and manage user information effectively.

In recent years, several cities have introduced digital solutions for bus pass management, leveraging web- based and mobile applications to streamline the process. Many of these systems incorporate technologies such as QR codes, RFID, and NFC for digital ticketing and validation. Online payment gateways have also been integrated to facilitate seamless transactions, eliminating the need for physical cash payments. Additionally, some systems use cloud storage to securely manage user data and provide real-time updates on pass validity and usage.

Despite these advancements, many existing digital systems still face certain limitations. One of the primary challenges is the lack of a fully automated verification process, which results in delays and requires manual intervention. Moreover, real-time tracking and reporting features are often inadequate, making it difficult for authorities to analyze commuter data and optimize transportation services. Another limitation is the restricted integration with other modes of public transport, preventing users from having a unified pass for multiple transit options. Furthermore, some platforms lack strong security measures, raising concerns over data privacy and the risk of fraudulent activities.

The CITY LINK Bus Pass System aims to address these challenges by providing a fully digital and automated solution that enhances both user convenience and administrative efficiency. With a mobile application and an administrative web portal, the system eliminates the need for physical paperwork and manual verification. The integration of QR-based validation ensures instant and secure pass verification, reducing the chances of misuse. Automated document verification further accelerates the application process, allowing users to obtain their bus passes with minimal delay. Additionally, the system offers advanced analytics and reporting tools that help transit authorities monitor pass usage, track revenue, and make data-driven decisions. By incorporating strong encryption and security protocols, CITY LINK also ensures that user data is protected against unauthorized access and fraud.

Through this literature survey, it is evident that while digital bus pass systems have improved efficiency in public transportation, there is still room for enhancement. The CITY LINK Bus Pass System is designed to bridge these gaps by offering a robust, secure, and user-friendly solution that aligns with smart city initiatives and modern urban mobility needs.

IV. METHODOLOGY

The implementation of the CITY LINK Bus Pass System begins with user registration, where individuals can sign up through the mobile application by providing their basic personal information and uploading identification proof. Once registered, users can apply for bus passes by selecting the pass type, duration, and preferred routes. The payment process is seamlessly integrated with secure payment gateway options, including UPI, credit cards, and debit cards. Upon successful payment, a unique QR code is generated and linked to the user's profile. This QR code serves as the digital bus pass and is scanned by conductors using the Flutter-based application to verify its authenticity. The

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administrative portal allows authorities to monitor user registrations, track payment history, and oversee daily pass usage, ensuring the system runs smoothly.

V. TECHNOLOGIES USED

- Flutter: For cross-platform mobile app development.
- React.js: For admin panel development.
- Node js: For backend development and API services.
- MySQL: For database management

VI. NON-FUNCTIONAL REQUIREMENTS

• Speed: The app needs to be fast and responsive, pages should load quickly. Security: User data must be kept safe and protected.
• Scalability: The app should be able to handle a growing number of users and content without slowing down. User-Friendliness: It should be easy and intuitive for anyone to use, even if they're not tech-savvy.
• Accessibility: We should make the app usable for people with disabilities. Compatibility: It needs to work smoothly on a variety of Android phones and tablets

VII. FUNCTIONAL REQUIREMENTS

1. User Functionalities (Mobile Application)

The mobile application is designed for commuters to apply for and manage their bus passes conveniently.

- **User Registration and Login**: Users must be able to sign up with their email, phone number, or social media accounts and log in securely.
- **Profile Management**: Users should be able to update their personal details, upload documents, and change passwords. **Bus Pass Application**: Users can apply for different types of bus passes (e.g., student, senior citizen, general commuter) by filling out an online form and uploading necessary documents.
- **Document Upload and Verification**: The system should allow users to upload ID proof, student certificates (if applicable), and other required documents, which are then verified by the admin.
- **Online Payment**: Integration with payment gateways for users to pay for their bus passes using UPI, credit/debit cards, net banking, or digital wallets.
- **QR Code Generation**: Once the pass is approved, a unique QR code is generated, which serves as a digital pass for bus conductors to scan.
- **Pass Renewal**: Users should receive notifications before their pass expires and be able to renew it online without re- uploading documents.
- **Transaction History**: Users should be able to view their payment history, including previous pass purchases and renewals.
- **Help and Support**: The system should provide a helpdesk feature, including FAQs, contact support, and a ticket- raising system for user queries.

2. Administrative Functionalities (Web Portal)

The web-based admin portal is designed for transport authorities to manage applications and monitor system operations efficiently.

- **Admin Login and Role-Based Access**: Secure login for different administrative roles, such as super admins and verification officers.
- **User Application Review**: The ability to review and verify user applications, approve or reject requests, and request additional documents if needed.
- **Pass Issuance and Management**: Once verified, the admin should be able to approve the pass, which then triggers the generation of a QR code for the user.
- **Payment Verification**: The system should track and confirm payments before issuing bus passes

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- **QR Code Validation System**: Admins and bus conductors should be able to scan the QR code to validate active bus passes.
- **Usage Monitoring**: The system should track daily pass usage, including the number of times a pass has been used. **Transaction and Revenue Reports**: The system should generate reports on payments received, refunds issued, and overall revenue generated.
- **System Alerts and Notifications**: Automated notifications should be sent to users regarding pass status, expiry reminders, and application updates.
- **Audit Logs**: The system should maintain logs of all activities performed by both users and administrators for security and accountability.

3. QR Code-Based Bus Pass Validation

The system must include a QR code scanning mechanism for verifying active bus passes.

- **Unique QR Code for Each Pass**: Each user should receive a unique QR code that represents their valid bus pass. **Scanner for Conductors**: Bus conductors should be able to scan the QR code using a mobile or web-based scanner. **Real-Time Validation**: The system should check the pass status in real time and display whether it is valid, expired, or fraudulent.
- **Usage Tracking**: Every scan should be recorded, and users should be able to see the number of times their pass has been used.

VIII. CONCLUSION

The CITY LINK Bus Pass System streamlines the process of obtaining and managing bus passes in Nashik, making public transportation more efficient and accessible. The
combination of Flutter, Laravel, and QR code technology provides a scalable and secure solution that aligns with the smart city vision. This project is a step forward in enhancing the overall commuting experience and reducing the administrative burden on transit authorities.

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REFERENCES

[1]. S. Sharma, A. Kumar, and R. Singh, "A Review on Digital Payment Systems in Public Transport", International Journal of Computer Science and Information Technology, vol. 10, no. 4, pp. 25–30, 2022.
[2]. J. Patel, K. Mehta, and S. Desai, "Mobile Application Development using Flutter Framework", International Journal of Scientific Research in Computer Science, vol. 9, no. 2, pp. 45–50, Mar. 2023.
[3]. M. A. Hassan and T. R. Khan, "Role of QR Code Technology in Smart Ticketing Systems", International Journal of Advanced Research in Science and Technology, vol. 11, no. 3, pp. 123–129, 2023.
[4]. R. Gupta and S. Yadav, "Database Management in Public Transport Systems", International Journal of Engineering and Technology, vol. 8, no. 2, pp. 75–80, 2022.
[5]. C. Verma, "QR Code-Based Bus Ticketing System", IEEE International Conference on Smart Systems, pp. 112–117, 2021