

ANALYSIS AND SYSTEM DESIGN FOR TICKETING SYSTEM FOR SMART CITY BUSES

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Abstract — The majority population of India uses the public transportation system every day. Improvements in the existing public transportation are driving demand for intelligent transportation systems. Passenger safety, accessibility, and time convenience are the key factors for development. The project aims to design an online system for bus ticketing which will generate the fare amount of your travel. It will be completely secure and easy to use. It will reduce the usage of paper and will also serve the purpose of reducing manual efforts and time.

Keywords— Online Bu<mark>s Tic</mark>keting, QR Scanning, Bus pass, User registration, App Screen Design.

I. INTRODUCTION

An online bus fare collection system is an application-based platform that enables users to easily get their tickets without the conductor's need in the bus. Our scope is to determine:

- Requirement Gathering
- Feasibility Study
- Propose Solution
- Use Cases for User Types
- Process Flow Design
- App Screen Design

In this design, we have focused on how we can reduce the paperwork in the existing system. Also, people travel for free which is wrong. To avoid this, we have created this system. Everything is accessible through the user's mobile. Our system is highly accurate and efficient and provides users with travel history.

II. LITERATURE REVIEW

Smart city buses have been one of the most significant developments in the transportation sector in recent years. The use of technology in these buses has helped improve the quality of transportation, increase efficiency, and reduce environmental impact. In this literature review, we will examine the different aspects of ticketing systems for smart city buses.

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Ticketing systems are an essential component of smart city buses. They allow passengers to purchase tickets, board the bus, and pay fares seamlessly. There are several types of ticketing systems available for smart city buses, such as smart card-based systems, mobile-based systems, contactless payment systems etc.

1. [1] describes a system for managing QR-code-based passes using QR codes. The system is designed to replace the traditional paper-based bus passes, which are often lost or damaged.

The system works by generating a unique QR code for each student bus pass, which can be scanned by the bus driver using a smartphone or other mobile device. The QR code contains information about the student's name, school, and bus route, which is used to verify the student's eligibility to ride the bus.

The article discusses the benefits of the QR-code-based system, including increased efficiency and reduced costs compared to the traditional paper-based system. The system also allows for easier tracking of student bus usage and provides real-time data on bus occupancy.

2. The article [2] presents a system for managing bus tickets using QR codes in an Android app. The system aims to improve the efficiency and convenience of bus ticketing systems.

The system works by generating a unique QR code for each ticket, which can be scanned by the bus driver using a smartphone or other mobile device. The QR code contains information about the ticket holder, the ticket type, and the bus route, which is used to verify the ticket's validity.

The article discusses the QR-code-based system's benefits, including reduced costs, increased efficiency, and improved accuracy compared to traditional paper-based systems. The system also allows for easier tracking of ticket usage and provides real-time data on bus occupancy.

3. The article [3] describes a system for collecting bus fares using GPS and RFID technology. The system aims to improve the efficiency and accuracy of fare collection and reduce fraud and revenue leakage.

The system works by installing GPS and RFID devices on buses and at bus stops. The GPS devices track the bus's location and transmit the data to a central server,

which is used to calculate the fare based on the distance travelled. The RFID devices are used to detect when passengers board and exit the bus, and to deduct the fare automatically from their accounts.

The article discusses the benefits of the system, including increased efficiency, improved accuracy, and reduced fraud and revenue leakage. The system also provides real-time data on bus occupancy and passenger behaviour, which can be used for planning and optimization purposes.

The authors describe the implementation of the system using a web-based application and mobile devices. They also discuss the security measures put in place to protect passenger information and prevent fraud.

These systems use different ways to make ticketing in city buses convenient and easy. We felt a need to have a travel transaction history in the app which will allow the user to refer to his past travels anytime.

III. METHODOLOGY

The methodology for developing an online bus fare collection typically involves several key steps including: -

- 1. **Requirement analysis:** We analyzed the existing bus ticketing system by visiting the Upper Depo bus stand, near Bibwewadi. We interviewed Sandesh a bus conductor. We found that the ticketing system is based on fixed stages which are decided by RTO. The distance between the two stages is almost equal and the price of tickets between the stages is fixed. Some everyday challenges faced by him, are timely ticketing, giving change to the passengers and managing the crowd.
- 2. **Design and prototyping:** Based on the requirement analysis, the system is designed and prototyped, typically using wireframes and mockups to visualize the system's features and interface. We created a prototype in C language, which had login, and sign-up features and it also stored the history of the passenger.
- 3. **Development:** We designed the UI/UX in Figma to show how our application should look. We also developed a QR code that will direct the user to the payment gateway where the amount to be paid is kept fixed for the user.
- 4. **Deployment and integration:** Once the system is ready for testing, it is deployed on an app and integrated with other systems such as payment gateways.
- 5. **Maintenance and support:** After deployment, the system is monitored and maintained to ensure that it remains secure, functional, and up to date. This may involve providing user support and resolving issues that arise during operation.

To access online bus ticketing, the user must go through several steps and processes:

- 1. User has to log in or sign up in the mobile app. During login/signup, the user has to enter his/her username and password, whereas the new user must enter his/her name, mobile number, username, password, bank details, Aadhar number, date of birth, gender, and email address.
- 2. After entering these details, the app will authenticate the user.
- 3. While travelling, on entering the bus, the passenger has to scan a QR code and scan once again at the exit.
- 4. The total fare of the travel is generated. The passenger must pay it through online mode. He will be redirected to the home page. Here the passenger can access all the information he has entered. He should be able to access his travel transaction history also.

IV. RESULT AND DISCUSSION

Online bus fare collection systems are designed to allow customers to pay for their bus tickets conveniently over the internet from anywhere and at any time. Some of the key benefits of online bus ticketing include:

(1) Convenience: Customers can pay for their bus tickets at their convenience, without having to physically pat the ticket counter or conductor in the bus/city bus.

(2) Accessibility: Online bus ticketing systems are accessible from anywhere with an internet connection, making it easy for people to pay even if they are travelling orlocated far away from the bus station.

(3) Timesaving: Online ticketing systems save time for both customers and ticketing staff. Customers can quickly pay for their tickets without waiting in long queues by entering the boarding and dropping point.

(4) Data management: Online ticketing systems also provide an efficient way to manage customer data, ticket sales, and other important information, making it easier for bus companies to track their performance and optimize their services.

V. CONCLUSION

In conclusion, the online bus fare collection system is a valuable platform that provides customers with a convenient and efficient way. Bus operators can also benefit from the system by managing their bus schedules, routes, and ticketing services more efficiently. The online bus fare collection system has the potential to expand into various areas such as AI, AR, and VR, which would enhance the user experience further. The future of this system is bright, and it will continue to evolve as technology advances and the travel industry becomes more connected. In summary, the online bus ticketing system will revolutionize the way people pay for bus tickets, making it a valuable addition to the transportation industry.

VI. FUTURE SCOPE

The online bus fare collection system has a bright future and vast growth potential. Here are some of the potential areas for future scope:

- 1. Integration with other transportation modes: One possible area of expansion for the online bus ticketing system is to integrate with other transportation modes, such as trains, flights, and taxis. This will make passengers' travel more convenient.
- 2. Artificial Intelligence (AI) and Machine Learning (ML): AI and ML are the tools that can be used to enhance the user experience of the online bus ticketing system. For example, chatbots can be used to provide customer support and answer common questions, and predictive analytics can be used to recommend routes and timings based on the passenger's travel history.
- 3. Augmented Reality (AR) and Virtual Reality (VR): To provide a more mesmerizing experience for customers, AR and VR can be used.
- 4. Integration with smart city initiatives: As more cities become smart cities, the online bus ticketing system can be integrated with smart city initiatives, such as real-time traffic monitoring and route optimization. This would help improve the bus service's efficiency and provide a more convenient and comfortable experience for customers.

5. Expansion into international markets: The online bus fare collection system can be expanded into international markets, providing a platform for customers to book cross-border bus services. This would require integration with different payment systems and language support.

Overall, the online bus fare collection system has a vast potential for growth and expansion, as technology continues to evolve, and the travel industry becomes more connected.

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