

E- Ticket Booking System for Public Transportation using QR Code

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Abstract: *The advent of digital technology has revolutionized the way we travel, with online transactions becoming the cornerstone of cashless ticket generation. The local transportation system strictly focuses on cashed transactions but it poses a problem for the travelers as it is not always convenient. We address the challenge of creating a seamless and efficient process for ticket issuance and validation by leveraging online transactions and QR code technology. In particular, our focus revolves around designing and deploying a website that incorporates extensive traveler and trip data.*

Keywords: QR, Ticketing system, Transportation facility

I. INTRODUCTION

In the era of using cashless transactions, we have the need to update our local transportation ticketing system in order to provide convenience to both passengers and the bus driver or conductor.[1] To obtain a bus pass under the current bus pass system, a user had to go to the bus depot. Bus pass registration and renewal were offline under the current system. User has to type the necessary information onto paper. To receive a bus pass, the user had to wait a few days. A lot of paperwork was involved. For the offline process, a lot of labor was necessary, users had to stand in a queue. The process took a long time. Bus pass processing took a long time, and customers encountered numerous difficulties during the registration and renewal processes. It was quite difficult to store a lot of data and retrieve data with the current system.

The Purpose of the proposed system is to provide use of new technology in the travel sector. There are many issues to passengers regarding the time of buses; many times they do not get proper guidance to travel.[2] To overcome this issue, we have presented a solution aimed at enhancing accessibility to local public transportation services, thereby providing greater convenience to the general public.

In this research paper, we introduce an innovative system designed to simplify the ticket booking process for individuals. Our proposed system centers around the utilization of unique QR codes, which play a pivotal role in obtaining trip details and validating the authenticity of a passenger's journey. By employing these QR codes, travelers can conveniently access pertinent information related to their trips and enable transportation authorities to efficiently verify the validity of their travel. This novel approach not only enhances the overall travel experience but also streamlines the ticketing process, making it more efficient and user-friendly.

In a comprehensive breakdown of our system, the initial step involves user authentication, where individuals are required to log in using a unique identification and password for security purposes. This authentication process ensures that only authorized users have access to the system.

Once successfully logged in, the user proceeds to select their desired source and destination for their trip. This crucial step enables the system to generate the appropriate ticket and initiate the journey processing. It's through this selection that the system calculates the fare and other trip-related details.

Subsequently, the transaction is processed, typically involving payment confirmation. After the transaction is successfully completed, the system promptly generates a digital ticket in the form of a QR code. This QR code serves as a digital representation of the passenger's ticket, containing vital information about their

To facilitate the journey itself, the driver or conductor of the vehicle is equipped with a QR code scanner. During the course of the trip, the driver or conductor scans the passenger's QR code. This scanning action serves to validate the passenger's ticket and record the journey's details in the system's database, ensuring that the passenger's journey remains documented and secure. The real-time data capture not only aids in passenger management but also contributes to improved operational efficiency for transportation authorities.

II. LITERATURE REVIEW

In [3], the passenger can track the bus using QR code placed at the bus stop and through the application passenger gets to know the availability of bus at a particular bus stop as well as the arrival time and can also purchase an E-ticket by using a QR Code. If the bus is delayed due to any reason, such as traffic, bus failure, weather condition then the estimated arrival time will be conveyed to the passenger via an application or SMS. The passenger can track the bus using QR code placed at the bus stop and through the application passenger gets to know the availability of bus at a particular bus stop as well as the arrival time and can also purchase e-ticket by using a QR Code. If the bus is delayed due to any reason, such as traffic, bus failure, weather condition then the estimated arrival time will be conveyed to the passenger via an application or SMS. The paper does not mention any potential privacy or security concerns related to the use of smartphones, GPS, and Google maps technology in the integrated bus. Moreover, QR codes at the bus stop can be tampered.

In [4], Android Application based Smart Bus Transportation System was introduced to guide passengers in booking bus tickets, provide updates on bus location, send alert messages, and send precautionary instructions to passengers. Passengers could book available seats through an Android App, check seat availability, make cash payments, receive messages and generate online tickets. On every occasion when the first IR sensor is being detected and after that second IR sensor is being detected, then the system comes to a conclusion that one passenger has entered the bus. In another scenario, when the second sensor is detected first and then the first sensor is detected next, it indicates one passenger has left the bus. By this way, the number of seats available in the bus can be determined. The passengers can book the available seats in the bus through Android App after checking the seat availability and cash payment process. After booking the seat, the message will be sent to the registered mobile number and an online ticket will be generated and it will be stored in Application itself. It still has some limitations that cash payment is used as the payment form and IR temperature sensors for monitoring passenger health are not accurate.

In [5], the method used in this research is to conduct a literature review, by reading many journals that have the same research as this research. The purpose of this research is to raise the issue of the effectiveness of the QR Code, in the application of purchasing E-Tickets in all modes of transportation that have developed into smart transportation, with the development of the system that will be able to help the public in using public transportation. The QR e-ticket system is mainly for buying the most challenging bus tickets. This bus pass ticket can be purchased only with a smartphone application, where they can carry their smart phone bus pass tickets as QR (Quick Response). Customers can register for the pass by specifying the source and destination. This application will generate a QR code according to the information entered by the user and which will be used by the conductor or authorized person to scan the ticket. Each user's information is stored in SQLite database for security purposes. The ticket checker is also equipped with an examiner application to search and check user tickets for inspection purposes. The paper does not compare the effectiveness of QR codes with other existing ticketing systems or technologies and does not provide any empirical evidence or data to support the effectiveness of using QR codes for E-ticket payments.

In [6], development of an android application based on QR code in which issuing tickets just scans QR code when a passenger enters into the bus then this application shows the destination locations and he simply selects the destination location and generates a ticket in their mobile. Using a QR code system for booking tickets is also improving the traveling experience. The paper does not discuss any specific security measures implemented in the QR code system to ensure the authenticity and integrity of the tickets. The paper does not address potential challenges or limitations of using QR code technology in a bus ticketing system, such as compatibility issues with different mobile devices or potential difficulties in scanning QR codes in crowded or fast-paced environments.

In [1], the focus of the paper is on the development and implementation of a smart e-bus pass system using QR codes. The paper highlights the limitations of the current bus ticketing system, such as long wait times and administrative

burdens, and proposes a solution that allows passengers to obtain or renew their bus passes online. The system utilizes an Android app as a graphical user interface, connecting to a database where data is controlled. The use of QR codes allows for easy identification of passengers, prevents pass misuse, and enables students to carry their bus passes conveniently. The paper emphasizes the advantages of the proposed system, including reduced wait times, online renewal capabilities, and notifications for pass expiration.

In [7], the user's information is stored in a database and can be accessed by logging in with their credentials. The bus driver can scan the QR code on the user's pass to obtain details about the pass, such as the username ID, source, location, start date, and expiration date. The QR code scanning generates a message indicating the validity of the bus pass and provides details if it is valid. The system demonstrates a trustworthy relationship between users and administrators. The paper does not discuss any potential security concerns or measures implemented to protect user information and prevent unauthorized access to the system. There is no mention of scalability or the ability of the system to handle a large number of users or bus passes. It does not provide any information on the reliability or robustness of the system, such as how it handles errors or system failures.

In [8], the proposed method involves creating an Android application for selecting the travel route and generating the ticket amount. Passengers scan the QR code from the conductor in the bus, and the amount is automatically deducted from their wallet and transferred to the conductor's account maintained by the transport system. The collected ticket money by the conductor is automatically stored in a database along with the details of the tickets collected. The paper lacks detailed information on the technical implementation of the proposed QR code ticketing system. The paper does not discuss potential security concerns or measures to protect against fraudulent use of the QR code tickets. The system enables direct transfer of funds from the user's wallet to the transport corporation based on the conductor's ID, eliminating the need for cash transactions. The system provides an SMS alert as proof of ticket payment and allows the transport corporation to calculate the amount details for each conductor and overall revenue for buses.

In [9], the paper discusses the Smart City Bus Application with QR Code, which provides real-time bus information in Malaysia using GPS technology. The paper highlights the need to reduce the usage of private transport and introduce a better systematic public transport system in the country. It mentions that existing Android bus applications in Malaysia lack crucial features, such as providing only the names of places for bus stops without the exact desired location. The paper discusses possible solutions to enhance existing related products. The literature review indicates that central server, GPS, notification, mobility, and secure QR payment are important features in public transport applications.

In [10], the contactless e-ticketing solution presented in the paper allows passengers to purchase tickets in a contactless manner, addressing the current scenario's demands. The paper also mentions the opportunities for third-party vendors to develop similar solutions, suggesting the potential for further advancements in contactless e-ticketing in public transport. The technical constraints, user acceptance, or integration with existing systems, is not provided in the available sources.

III. CHALLENGES IN EXISTING SYSTEM

Transportation issues are prevalent across various locations, stemming primarily from limited alternative transportation modes and insufficient service provision. While public sector buses often offer reasonably satisfactory services, they are often perceived as unreliable. The following are some of the most common issues faced by commuters in the current system:

Ticketing Delays:

Obtaining a bus ticket can be a tiring process during peak hours when buses are overcrowded and travel distances are short. Passengers often struggle to find the conductor and acquire tickets, leading to chaotic situations.

Unresolved Balance:

On occasion, passengers and conductors may lack change. In such cases, conductors might not refund the balance to passengers. Additionally, many commuters do not cooperate by providing the exact fare, which can be particularly irksome to conductors, especially in crowded buses.

Excessive Paper Usage:

The current system generates a considerable amount of paper for bus tickets. Almost all passengers receive paper tickets, leading to a significant waste of resources. Transitioning to e-tickets could substantially reduce this paper waste.

Cash-Dependent Transactions:

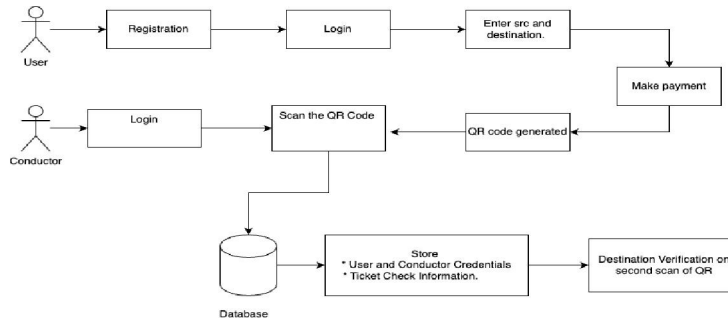
Passengers are limited to purchasing tickets with cash, which contradicts the aim of transitioning to a cashless economy. There are no alternatives to cash when buying tickets from conductors, which runs counter to the Indian government's initiative for a cashless economy.

Monthly Pass System:

The requirement for physical monthly pass cards poses the risk of loss or theft, leading to potential financial losses. To mitigate this issue, a more convenient and secure approach involves implementing monthly pass QR codes on mobile devices

IV. PROPOSED SYSTEM

The proposed solution entails the development of a comprehensive ticketless travel booking system that leverages QR code technology. This system will empower commuters to effortlessly access and utilize public transport services by using QR codes to book and validate their journeys. Each QR code will be intricately timed to align precisely with the journey's duration, expiring upon journey completion. The underlying mobile based application will provide users with real-time information, streamlined booking processes, and a user-friendly interface.



Registration and Login:

- Users must register with the system.
- Conductors will be provided with the credentials for login..
- They provide necessary personal information for registration, including name, contact details, and a unique username and password.
- Data is securely stored in a database.
- After registration, they can log in using their credentials.

User Booking Process:

- Once logged in, the user can initiate the booking process.
- The user enters the source and destination locations.
- The system automatically adds the current date and time to the ticket details.
- The user specifies the number of tickets required.
- The system calculates the fare based on the selected source and destination.

Payment Processing

- The user proceeds to make the payment using various payment methods (credit/debit card, digital wallets, etc.).
- Payment gateways are integrated for secure transactions.

QR Code Generation:

- The QR code is generated and displayed on the user's device screen.
- Once the payment is successful, the system generates a unique QR code containing the booking details.
- The QR code contains information such as the user's name, ticket details, source, destination, date, and a unique booking ID.

Conductor Verification:

- The conductor, equipped with a QR code scanner, can scan the passenger's QR code during boarding.
- The conductor's device decodes the QR code and displays the passenger's booking details.
- The conductor can check the passenger's name, destination, and other information for verification.
- The app connects to the database to check ticket validity

Destination Verification:

- An automated announcement system on the bus announces when the destination is approaching.
- Before reaching the destination, the conductor can scan the passenger's QR code again for destination verification.
- If the passenger's destination matches the destination location stored in database, a green tick is shown on the conductor's device, indicating that the destination is verified.

Database Management:

- User profiles, booking information, and transaction history are stored in a secure database.
- Regular data backups are maintained to prevent data loss.
- Data security is a top priority.

Security Measures:

- Robust security measures are in place to protect user data and financial transactions.
- QR code integrity is ensured using packages to prevent fraud.

V. CONCLUSION AND FUTURE SCOPE

In conclusion, the E-Ticketing System with QR Code Integration represents an exciting step forward in the ticketing industry. By seamlessly replacing traditional paper-based tickets with digital QR code technology, the system not only streamlines the ticketing process but also significantly reduces the risks associated with fraudulent activities and operational inefficiencies. There is scope of research and development and it will pave the way for a more secure, efficient, and user-friendly future in ticketing and event/service provision.

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