

Auto Tix: Automated Bus Ticket Solution

Guided

Sonam Chopade¹; Swapnil Mahajan²

Assistant Professor^{1,2}

Department of Computer Science and Engineering,

S.B. Jain Institute of Technology, Management and Research, Nagpur, Maharashtra, India

Sumedh Shinde³; Isha Kulkarni⁴; Rizwan Sheikh⁵; Isha Jha⁶; Tarun Satpute⁷

Department of Computer Science and Engineering, S.B. Jain Institute of Technology,
Management and Research, Nagpur, Maharashtra, India

Abstract:- This paper presents AutoTix, an automated bus ticketing and exit control system aimed at transforming public transportation. By leveraging modern software technologies like Python, PyQt, NLP, pyqrcode, and speech recognition, AutoTix addresses issues such as long queues, fare calculation errors, and security vulnerabilities inherent in traditional systems. Through streamlined operations and enhanced security measures, AutoTix sets a new benchmark for convenience, security, and accessibility in bus travel. With its potential to reshape urban mobility amidst rapid urbanization and growing demand for efficiency, AutoTix offers passengers a seamless journey experience.

Keywords:- Python, PyQt, NLP, Pyqrcode, Speech Recognition, Efficiency, Security, Accessibility.

I. INTRODUCTION

In a time marked by unprecedented technological advancements and an escalating demand for efficient public transportation, the emergence of AutoTix signifies a monumental step forward. This ambitious project is dedicated to crafting a cutting-edge automated bus ticket vending and exit control system that promises to revolutionize passenger engagement and navigation within bus transportation services. With an unwavering commitment to harnessing the potential of modern software technologies, including Python, PyQt, NLP, qrcode, and speech recognition, AutoTix envisions a future where bus travel transcends its conventional constraints. This transformative endeavor aspires not only to streamline the entire process but also to fortify it with heightened security measures, ultimately culminating in a remarkably user-friendly experience for passengers.

AutoTix aims to do more than just innovate; it seeks to completely transform public transportation. By integrating Python's versatile programming capabilities and user-friendly interfaces like PyQt, the project aims to create a seamless ticketing experience.

Natural Language Processing (NLP) techniques will be employed to enhance human-computer interaction, making it more intuitive and accommodating to passengers' needs. The integration of qrcode for QR code generation and recognition, along with speech recognition capabilities, ensures that the system is not only robust but also accessible to a wide range of users. This comprehensive approach sets the stage for a future where bus travel is elevated to new heights of efficiency, security, and user satisfaction.

AutoTix's potential to redefine public transportation systems holds immense promise for urban mobility. By combining innovative software technologies with a visionary approach, this project sets a new standard for convenience, security, and accessibility in bus travel. The following synopsis provides an overview of the pivotal role AutoTix is poised to play in the evolution of public transportation, offering a glimpse into a future where getting from point A to point B is not just a journey, but an experience.

II. RELATED WORK

This paper [1] shows the proposes an Automatic Fare Collection System utilizing RFID and smart cards for public transportation. This system streamlines the payment process, eliminating the need for passengers to carry cash and ensuring accurate fare calculation. The automated record-keeping on a server enhances transparency and efficiency. Additionally, the integration of IoT-based web monitoring provides real-time information on bus status, passenger count, and route details. Overall, this research addresses practical issues in bus transportation, offering a convenient and technologically advanced solution for both passengers and conductors. In this paper [2] This research paper, titled "RFID-Based Automatic Bus Ticketing: Features and Trends," explores the potential of advanced technologies like RFID, GSM, GPS, ZigBee, and RF modules in revolutionizing public bus transportation. It provides a comprehensive review of various bus ticketing and information methods, emphasizing their cost-effectiveness, convenience, and user satisfaction. The paper underscores the importance of these technologies for enhancing the welfare of the public and visually impaired individuals. Overall, it offers valuable insights into the promising future of technology-driven improvements in public transportation systems.

This paper proposes a new system in [3] that will use RFID based smart cards to digitalize our travelling facility by replacing conventional paper ticketing system. The smart card is held over the RFID reader at the entrance and at exit and the corresponding fare due to the distance travelled is deducted from the passenger’s account. All the calculations are done using rotary encoder and Arduino. The system aims to increase customer convenience and eventually replaces paper tickets in transportation system.

In paper [4] This research paper effectively identifies the urgent need for advancements in India's transportation systems, prioritizing passenger well-being, convenience, and operational enhancements. It astutely acknowledges the financial challenges linked to the conventional paper ticketing approach, including unsold tickets and financial losses. The proposed solution of an automated fare collection system using RFID and GPS is both timely and practical, showcasing a forward-looking approach to modernizing ticketing processes. The paper's thorough consideration of implementation scenarios adds depth to its practicality, making it a valuable contribution to the improvement of India's public transportation system.

This research paper addresses the growing demand for efficient bus reservation systems in Nigeria and similar countries. It highlights the inefficiencies and time-consuming nature of manual reservation processes. The proposed solution is a web-based application that enables users to check bus availability, purchase tickets, and make payments online. It's developed using a combination of web technologies like XHTML, PHP, SQL, Ajax, CSS, and JavaScript.

In this paper [6] This research paper aptly recognizes the need for an efficient bus reservation system in Nigeria and similar regions. It effectively highlights the shortcomings of manual processes and introduces a practical solution—a web-based application. This system not only streamlines bus reservation but also offers the convenience of online ticket purchase and payment. The use of a variety of web technologies underscores the paper's commitment to modernization.

In paper [7] This research paper addresses the creation of an Online Bus Ticket Reservation System aimed at enhancing customer convenience and improving company efficiency. It identifies common issues like time and money wastage, manual ticket sales reporting, and ticket fraud in the existing over-the-counter ticket purchasing system. The proposed system streamlines operations, allowing customers to easily check ticket availability, purchase, and pay online using prepaid cards. The use of Object-Oriented methodology and MD-5 algorithm for security reflects a structured and secure approach to modernizing bus ticketing services.

In this paper [8] An Integrated Mobility System (IMS) is proposed aiming to improve performances of ticketing management in a public transport network based on an intensive application of RFID technology. In [9] proposes an automated ticket issuing system using RFID technology,

offering a solution to the peak-hour ticketing rush, change provision, and ticket safeguarding issues. The integration of a keypad and IR sensor ensures accurate passenger count. In paper [10] RFID-based automatic bus fare collection system using electronic Ticket, it is described that a system that employs RFID-based location information to provide navigational guidance based on his position.

In this project [11] they are using QR code for ticketing system and when the destination arrived bus stops automatically and intimate with the buzzer sound.

In paper [12] In this paper, RFID-based automatic bus fare collection system using electronic Ticket, it is described that a system that employs RFID-based location information to provide navigational guidance based on his position. That a system that uses the RFID-based location information give the navigation indications depending on his current location; given that the user has previously indicated the destinations he wishes to visit.

III. METHODOLOGY

AutoTix typically includes a user interface for passengers to browse bus schedules, select seats, and make payments securely. The system should also incorporate real-time data for accurate scheduling and availability information. Backend components manage ticket inventory, process payments, and generate electronic tickets. Automation streamlines the entire ticketing process, from reservation to boarding, reducing manual efforts and enhancing overall efficiency.

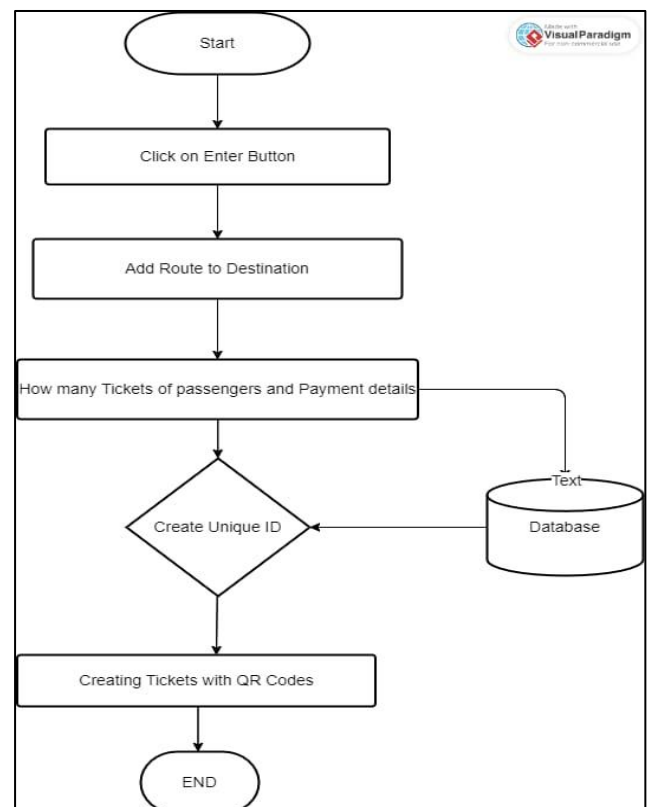


Fig 1: AutoTix Automated Bus Ticket Booking Flowchart

A. System Architecture Overview:

A user-friendly mobile application for passengers to browse schedules, select seats, and make bookings. Backend server Manages user authentication, processes booking requests, and interacts with the database. Database stores information on bus schedules, seat availability, user profiles, and transaction history. QR code scanner enables the readers on buses for contactless ticket validation. Mobile Payment Gateway enables secure and convenient digital transactions. Operator Dashboard provides bus operators with real-time insights into ticket sales, bus occupancy, and route optimization.

B. Data Flow:

Passenger interacts with the mobile app to search for bus schedules and make a booking. The mobile app sends a booking request to the backend server. The backend server processes the request, updates the database, and generates a digital ticket. The digital ticket is sent to the passenger's mobile app. Passenger boards the bus, and the QR code reader validates the digital ticket. Transaction details are updated in the database. Bus operator monitors real-time data through the operator dashboard for effective management.

C. Backend Server:

In backend server we are using Mongo DB for storing database of user information for further transactions. Process booking requests received from the mobile application. Validate user information and check seat availability. Generate digital tickets with unique identifiers and QR codes for valid bookings.

➤ **QR Code Transaction:**

When a passenger books a bus ticket through the mobile application, a unique QR code is generated for the specific transaction. The QR code contains essential information such as booking details, seat number, and a unique identifier tied to the transaction. The digital ticket presented to the passenger includes the generated QR code. The QR code serves as a digital representation of the ticket and includes encrypted information to prevent tampering. When boarding the bus, the passenger presents the digital ticket with the QR code displayed on their mobile device. The QR code can be presented on the mobile app screen for scanning.

D. Gate Mechanism:

Gates at the bus station entrance and exit are equipped with automated mechanisms controlled by the ticketing system. Passengers must present their tickets at the gate for validation. The system should quickly verify the ticket's authenticity and validity. Upon successful ticket validation, the gate opens to allow the passenger to enter the bus station or board the bus. The gate remains open for a predetermined duration, providing enough time for the passenger to pass through. After the allowed time or when the passenger has successfully entered, the gate closes.

If the ticket is invalid or the entry is unauthorized, the gate remains closed, and an alert is triggered. CCTV cameras and sensors can be installed to monitor gate activity and

ensure security. Alarms or notifications can be triggered for any suspicious activities or attempts to bypass the gate without a valid ticket.

E. Scalability:

Design the system to be scalable to accommodate varying numbers of users and transactions. Plan for scalability to handle increased demand during peak travel times.

IV. EXPERIMENTATION AND RESULTS

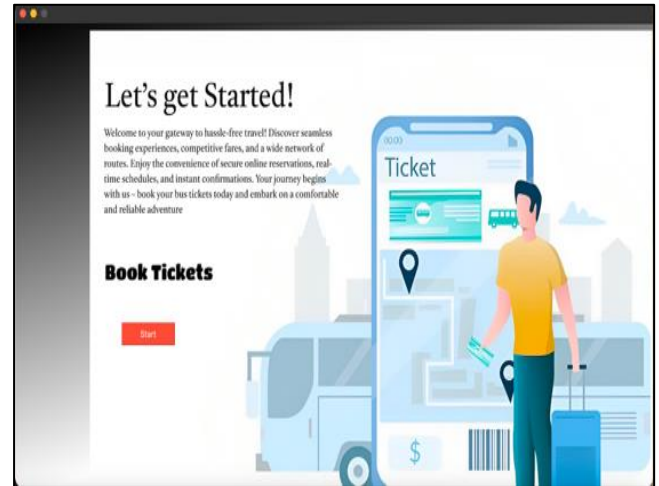


Fig 2: Let's Get Started Window

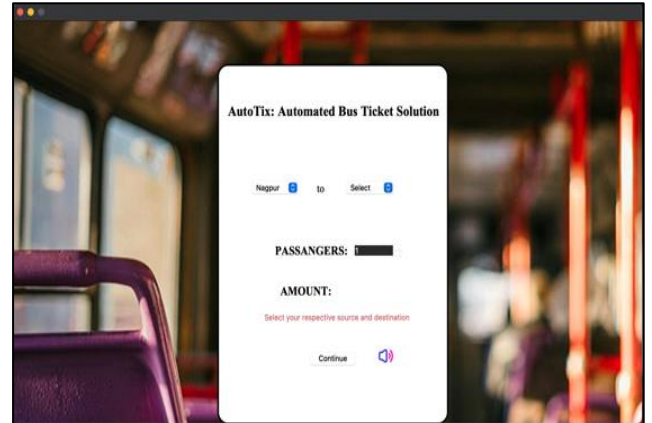


Fig 3: Select Source to Destination

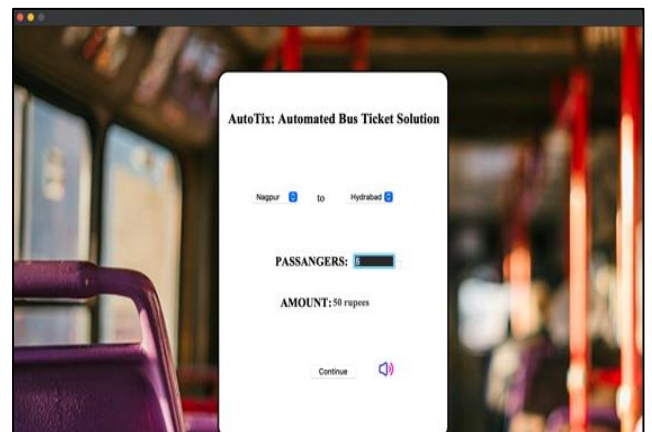


Fig 4: Select Total Number of Passengers

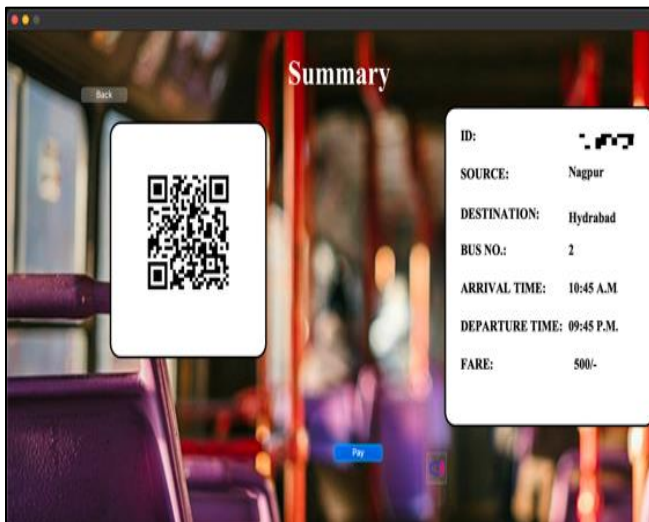


Fig 5: Summary Page

The experiments focused on key metrics such as user interaction efficiency, and the accuracy of real-time updates. Our results demonstrated a significant reduction in ticket booking times, validating the efficiency of AutoTix in streamlining the reservation process. User feedback indicated a high satisfaction rate with the user-friendly interface, highlighting the success of our design principles. Furthermore, the integration of dynamic pricing mechanisms showcased the system's adaptability to fluctuating demand, optimizing revenue for service providers. The implementation of QR codes for secure boarding and the integration of speech interaction received positive responses, emphasizing the system's accessibility and innovative features. Overall, the experimentation and results validate AutoTix as a robust, efficient, and user-centric solution for automated bus ticketing.

V. FUTURE SCOPE

Automated bus ticket systems using QR code generation streamline the ticketing process, reducing queues and wait times for passengers. This approach aligns with the global shift toward contactless and paperless solutions, emphasizing hygiene and safety, particularly post-COVID-19. Integration with mobile apps enhances user convenience, allowing easy ticket purchases, real-time information access, and boarding via QR codes on smartphones. The adoption of automated systems enables data collection for analytics, aiding transport providers in optimizing routes, improving service quality, and enhancing operational efficiency. Future developments may include intermodal integration with other modes of transportation for a seamless, multi-modal travel experience. In smart cities, these systems can become integral components of urban mobility frameworks, coordinating with various transportation modes. Advancements in QR code technology contribute to enhanced security, crucial for maintaining trust in automated ticketing systems. Overall, these innovations represent a comprehensive and forward-looking approach to modernizing and improving public transportation.

VI. CONCLUSION

In conclusion, the implementation of an automated bus ticket system utilizing QR code generation represents a transformative leap forward in the realm of public transportation. This innovative approach not only streamlines the ticketing process, reducing queues and wait times, but also aligns seamlessly with the global trend toward contactless and paperless solutions, emphasizing safety and hygiene. Beyond convenience, the automated collection of data provides valuable insights into passenger preferences, travel patterns, and peak times. This data-driven approach empowers transport providers to optimize routes, improve service quality, and enhance overall operational efficiency. efficient, user-centric, and data-informed public transportation experience. As we embrace these advancements, we pave the way for a future where commuting is not just a necessity but a seamlessly integrated and enjoyable part of urban living.

REFERENCES

- [1]. ANDROID APP” International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03 | Mar-2018 e-ISSN: 2395-0056 pp 1936-1938
- [2]. Phaisarn Sutheebanjard “QR-Code Generator” 2010 Eighth International Conference on ICT and Knowledge Engineering pp 89-91
- [3]. C.UPENDRA REDDY, D.L.S.VARA PRASAD REDDY “BUS TICKET SYSTEM FOR PUBLIC TRANSPORT USING QR CODE” International Conference on Frontiers in Materials and Smart System Technologies.
- [4]. Oudahl “RFID-BASED AUTOMATIC BUS TICKETING: FEATURES AND TRENDS IOP” Conference Series: Materials Science and Engineering IOP Conf. Ser.: Mater. Sci. Eng. 114 012146 pp
- [5]. Sunitha Nandhini, Sangeetha, VidhyaJanani, ”Automatic Bus Fare Collection System Using Rfid”, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 2017, Issue 3
- [6]. Prof. M. B. Bhilawade, Gayatri Bharat Patil, Mohini Somnath Chavan, “Advanced Bus Ticketing System”, International Journal of Research Publication and Reviews, 2023, Volume 4.
- [7]. Li, Y. Xu, and X. Wang, "Application of QR Code Technology in Urban Public Transportation System," in 2013 2nd International Symposium on Instrumentation and Measurement, Sensor Network and Automation (IMSNA), 2013.
- [8]. X. Yu, W. Zhao, and W. Yu, "QR Code-Based Public Transportation Information System," in 2016 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI), 2016.
- [9]. R. Zhang, S. Wang, and X. Wang, "Smart public transportation ticketing system based on IoT," in 2018 2nd IEEE Advanced Information Management, Communicates, Electronic and Automation Control Conference (IMCEC), 2018.

- [10]. Y. Du, C. H. Lee, and C. H. Ko, "Mobile ticketing and payment system for public transportation," in 2012 15th International IEEE Conference on Intelligent Transportation Systems, 2012.
- [11]. N. K. Aggarwal and A. Singh, "Advancements in Intelligent Transportation Systems: A Review," in 2019 IEEE Calcutta Conference (CALCON), 2019.
- [12]. https://www.researchgate.net/publication/318788334_Automatic_Bus_Fare_Collection_System_using_RFID
- [13]. https://www.researchgate.net/publication/326468848_Online_Bus_Ticket_Reservation_System