International journal of imaging science and engineering

ISSN: 1934--9955 www.ijise.net

Vol-20 Issue-01 April 2025

SMART BUS TICKET USING QR CODE SCANNER

Masula Bhanu Teja [1], Mohammad Thoufeeq [2], Thali Raju [3], Dr. S. Leela Krishna [4]

[1, 2, 3] UG Scholar, Dept. of CSD, St. Martin's Engineering College,
Secunderabad, Telangana, India, 500100

[4]Associate Professor, Dept. of CSD, St. Martin's Engineering College,
Secunderabad, Telangana, India, 500100

Abstract:

Public transport is the cheapest and has therefore, always been popular with the masses. The advancement in transport system has been increasing in day-to-day life. The transport plays a vital role in individuals life, in making it efficient we are introducing an android application. The android application has the bus ticket system using QR reader. The android mobile has a great part in human life, it helps the people to be stay connected with web. In this project, we are proposing QR reader for bus ticketing system. The QR code (Quick Response code) becomes popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. The proposed system provides web application as well as android application for the passengers to buy their tickets online. During the travel time, we can get the ticket by entering their location details and make payment. Message alert will be notified to the passenger. By this application, we can minimize the usage of paper Tickets and there will not be any problem in getting change. The Smart Bus Ticketing System using QR code technology is an innovative approach to modernizing the traditional ticketing process in public transportation. This project aims to enhance efficiency, convenience, and transparency while reducing manual intervention, fraud, and paper waste associated with conventional ticketing systems. High demand of the usage of public transportations leads to many establishment of transportation companies to satisfy the demands. One of the famous and demanding public transportation is the express buses. This public transportation commonly is a big help when someone is travelling far away. Some passengers find it more convenient travelling with the express buses rather than driving that leads to so many possibilities of incidents such as dozing off while driving and involving car crashes. Smart Bus Ticket Using QR Code is a mobile application where customers can buy tickets via mobile. Every ticket purchased will be given QR code for verification process. The QR code is essential during the boarding process where customer need to show their QR code before on board to the bus. Bus driver will then scan customer QR code to update the availability of the passenger.

KEYWORDS: Smart Bus Ticketing, QR Code Ticketing, Digital Bus Pass, Contactless Ticketing, Smart Transport System, E-Ticketing System, Public Transport App, Bus Fare Payment

1.INTRODUCTION

Buses are the foremost wide used public transportation in many cities nowadays. To improve the standard of Bus Company, a period system that can monitor and predict the rider Flow of the running buses is useful. Here, rider Flow denotes the number of on-board passengers of a bus that varies over time and house. The rider flow will partly mirror the collective human quality on a route and therefore the quality of bus service in term of comfort. From a programming perspective, it tells you the way many folks travel or need to travel on a route. This data will guide the operators to allot and schedule the route and timetable dynamically in fine granularity. Current follow in Bus Transit System operators demonstrates that manual data-collection efforts area unit expensive and usually applicable solely in little scale. The utilization of automatic data-collection systems grow speedily and show nice potential. Automatic Fare assortment (AFC) devices that may record payments of rider's exploitation revolving credit, and a GPS embedded On Board Unit (OBU) that may track the bus area unit wide deployed. With the mature of massive knowledge systems, we've got the chance to estimate and predict the rider flow of each bus in urban wide BTS. To depict the matter additional clear, we will think about a concrete example as shown in Figure one. Many buses operate in a line of route wherever we tend to assume that no passing happens among them on their whole journeys. Passengers get on and off at every station, that changes the rider flows of the buses over time and site. The solid lines and circles illustrate the segments and stations that the buses already travelled before current time, and therefore the dash lines represent the rest of the trips they'll travel. the matter is that given the time data of AFC dealing records and therefore the OBU traces of the buses, the way to estimate the quantity of riders on every bus and how to predict the quantity within the remainder of the trip within the near future. Public transportation systems are the backbone of urban and rural mobility, offering an affordable and efficient means of travel for millions of people. As cities grow and populations increase, there is a pressing need to improve the efficiency, convenience, and sustainability of public transportation systems. Traditional bus ticketing methods, which rely heavily on printed paper tickets, have long been fraught with various challenges such as ticket loss, long queues at ticket counters, the risk of counterfeit tickets, and environmental concerns due to paper waste.

International journal of imaging science and engineering

ISSN: 1934--9955 www.ijise.net

Vol-20 Issue-01 April 2025

In recent years, digital technology has played a pivotal role in transforming various aspects of our daily lives, including the way we travel. One such technological advancement is the use of Quick Response (QR) codes. Originally developed in 1994 for tracking automotive parts during manufacturing, QR codes have since found applications in diverse fields ranging from retail and marketing to healthcare and transportation. QR codes are two-dimensional barcodes that can store a significant amount of data, which can be easily scanned and interpreted by devices with camera capabilities, such as smartphones and tablets.

Recognizing the potential benefits of QR code technology, the Smart Bus Ticket System aims to address the limitations of traditional ticketing methods by introducing a modern, digital approach to bus ticketing. This innovative system seeks to enhance passenger convenience, streamline the ticket validation process, and promote eco-friendly practices by reducing the reliance on printed tickets.

2. LITERATURE SURVEY

- Z. Wei, Y. Song, H. Liu, Y. Sheng, X. Wang, "The research and implementation of GPS intelligent transmission strategy based on on board Android smartphones", Computer Science and Network Technology (ICCSNT) 2013 3rd International Conference on, pp. 1230-1233, 2013. Smartphones have been widely integrated with GPS receiver, which may provide accurate location information of vehicles without cost increase. Traditionally, LBS applications obtain vehicle locations then using the Hypertext Transfer Protocol (HTTP) protocol uploaded to central servers with a fixed frequency. In this paper, we exploit an intelligent strategy of GPS sensing and transmitting. Explicitly, we implemented a platform to collect real-time GPS data from vehicles. A common Android Smartphone serves as a GPS sensor in a vehicle. Client Application software is designed to generate GPS location updates with adaptive time stamps once it executed. In the final comparison, MQTT push technology is introduced into GPS transmission in order to effectively reduce mobile traffic.
- Y. Chen, T. Kunz, "Performance evaluation of IoT protocols under a constrained wireless access network", 2016 International Conference on Selected Topics in Mobile & Wireless Networking (MoWNeT), pp. 1-7, 2016. One of the challenges faced by today's Internet of Things (IoT) is to efficiently support machine-to machine communication, given that the remote sensors and the gateway devices are connected through low bandwidth, unreliable, or intermittent wireless communication links. In this paper, we quantitatively compare the performance of IoT protocols, namely MQTT (Message Queuing Telemetry Transport), CoAP (Constrained Application Protocol), DDS (Data Distribution Service) and a custom UDP-based protocol in a medical setting. The performance of the protocols was evaluated using a network emulator, allowing us to emulate a low bandwidth, high system latency, and high packet loss wireless access network. This paper reports the observed performance of the protocols and arrives at the conclusion that although DDS results in higher bandwidth usage than MQTT, its superior performance with regard to data latency and reliability makes it an attractive choice for medical IoT applications and beyond.
- K. Tanaka, K. Naito, "Demo: Implementation of unconscious bus location sensing system with smartphone devices and beacon devices", 2016 13th IEEE Annual Consumer Communications & Networking Conference (CCNC), pp. 280-281, 2016. This paper demonstrates a new unconscious sensing system for bus location. Our system is a new type of application based on participatory sensing systems. However, it can perform sensing operation without users' operation. Therefore, we can employ the mechanism to realize practical application such as bus location systems. Our sensing system consists of a beacon device, a smartphone application and a cloud service. The beacon device is installed on a bus to activate the smartphone application. The smartphone application can upload a bus location to the cloud service when the smartphone application detects the beacon device. The cloud service manages the bus 25 location and distributes them for smartphone applications. The demonstration shows a prototype system for a bus location system based on the new participatory sensing mechanism.
- J. Gong, M. Liu, S. Zhang, "Hybrid dynamic prediction model of bus arrival time based on weighted of historical and real-time GPS data", 2013 25th Chinese Control and Decision Conference (CCDC), pp. 972-976, 2013. Advanced traveler information systems (ATIS) are one component of intelligent transportation systems (ITS), and a major component of ATIS is travel time information. Global positioning system based automatic vehicle location (AVL) systems have been adopted by many transit agencies for tracking their vehicles and predicting travel time in real time. It is a very important subject to improve the precision and reliability of the prediction model which can attract additional ridership, reduce passengers' anxieties and waiting times at bus stop, and increase their satisfaction. Furthermore, it can promote the development of city public transportation. This paper presents an improved approach to predict the public bus arrival time based on historical and real-time GPS data. After analyzing the components of bus arrival time systematically, the bus arrival time and dwell time at previous stops are chosen as the main input variables of the prediction model. At first, the algorithm of data interpolation and processing is designed to get the real-time GPS data as the input variables of the prediction models. Secondly, the statistical model is obtained based on the historical data of average running time of each link and dwelling time of each stop at given time-of-day and day-of week, respectively. Thirdly, a hybrid dynamic prediction model is proposed to predict the bus arrival time. Finally, Actual GPS data from bus route 244 located in Shenyang, CHINA are used as a test bed. The index of Mean Absolute Percentage Error (MAPE) is used to evaluate the three models. The results show that the improved model outperforms the historical data based model in terms of prediction accuracy.
- L. Singla, P. Bhatia, "GPS based bus tracking system", Computer Communication and Control (IC4) 2015 International Conference on, pp. 1-6, 2015. In this fast life, everyone is in hurry to reach their destinations. In this case waiting for the buses is not reliable. People who rely on the public transport their major concern is to know the real time 26 location of the bus for which they are waiting for and the time it will take to reach their bus stop. This information helps people in making better travelling decisions. This paper gives the major challenges in the public transport system and discuses various approaches to intelligently manage it. Current position of the bus is acquired by integrating GPS device on the bus and coordinates of the bus are sent by either GPRS service provided by GSM networks or SMS or RFID. GPS device is enabled on the tracking device and this information is sent to centralized control unit or directly at the bus stops using RF receivers. This system is further integrated with the historical average speeds of each segment. This is done to improve the accuracy by including the factors like volume of traffic, crossings in each segment, day and time of day. People can track information using LEDs at bus stops, SMS, web application or Android application. GPS coordinates of the bus when sent to the centralized server where various arrival time estimation algorithms are applied using historical speed patterns

International journal of imaging science and engineering

ISSN: 1934--9955 www.ijise.net

Vol-20 Issue-01 April 2025

3. PROPOSED METHODOLOGY

- The proposed methodology for the Smart Bus Ticketing System begins with identifying the challenges faced in traditional bus ticketing systems. Manual processes often lead to inefficiencies such as long waiting times, errors in fare collection, and lack of transparency. By leveraging QR code technology, these limitations can be addressed effectively. The system aims to provide passengers with a more streamlined and user-friendly experience while enhancing operational efficiency for bus operators.
- The first step involves analyzing the system requirements in detail. On the hardware side, the project requires QR code scanners or smartphones equipped with scanning capabilities. Conductors or bus operators will use these devices to validate tickets. A centralized server and backend infrastructure will handle data storage and processing. On the software front, the system will feature a mobile application for passengers. This app will enable users to book tickets, generate QR codes, and store them securely for future use. Additionally, a backend system with a robust database will ensure real-time synchronization and secure storage of passenger details, ticket data, and journey information.
- The design of the system includes several core components. A QR code generation module will create unique codes for each ticket, embedding critical information such as ticket ID, passenger details, and journey data. These codes will be encrypted to prevent duplication or misuse. A user-friendly mobile app will allow passengers to browse bus schedules, make payments, and access their QR tickets. Simultaneously, the conductor interface will enable staff to scan and validate QR codes using dedicated scanning devices or their smartphones. The backend system, powered by APIs, will facilitate communication between the app, the conductor interface, and the central server.
- The implementation phase begins with the development of the QR code ticketing module. The system will generate and distribute QR codes upon successful ticket purchase. The passenger app will then be developed, ensuring it meets user expectations for ease of use and reliability. The QR code scanning system will be integrated with buses, and conductors will be trained on how to use the scanning devices effectively. Backend services will handle secure payment processing, ticket validation, and real-time database updates. High-priority security measures, such as data encryption and secure communication protocols, will also be implemented to protect user data.
- Once the components are developed, the testing phase will follow. Unit testing will evaluate individual modules, including QR code generation and scanning functionalities. Integration testing will ensure seamless communication between the app, backend system, and scanning devices. Performance testing will simulate high-traffic scenarios to validate system stability, while user acceptance testing will involve real-world trials with passengers and bus staff. Feedback collected during this phase will be used to address any remaining issues and improve the system further.
- Deployment will occur in a phased manner, starting with a pilot run on selected bus routes. Conductors and passengers will receive training to familiarize themselves with the new system. During this period, feedback will be gathered to refine the system and address any potential issues before scaling it to a broader audience. Once fully deployed, the system will be monitored regularly for performance, and maintenance tasks such as fixing bugs, improving features, and updating security measures will be carried out as needed.
- The proposed system offers numerous advantages over traditional ticketing methods. QR codes enable faster transactions, eliminating the need for manual fare collection and reducing waiting times for passengers. The system promotes cost-efficiency by minimizing the use of paper tickets and manual resources. Additionally, it ensures higher security, as encrypted QR codes are resistant to tampering and duplication. Passengers benefit from a convenient, hassle-free experience, while operators enjoy improved transparency and operational efficiency.
- Finally, the Smart Bus Ticketing System has significant potential for future enhancements. Features like GPS integration for real-time bus tracking, AI-based analytics for optimizing bus routes, and support for offline ticket validation can be added to enhance its utility further. By adopting this system, public transport networks can achieve a more efficient, secure, and sustainable mode of operation, benefiting both passengers and operators.

Applications

- The **Smart Bus Ticketing System using QR Code Scanners** finds application in various aspects of public transport operations, improving efficiency and convenience for both passengers and operators. This system caters to urban and rural areas, ensuring accessibility and inclusivity. It simplifies the process of ticket generation, validation, and monitoring while addressing common challenges faced by conventional ticketing methods. Below are some prominent applications:
- **Public Bus Services**: The system is ideal for city buses operating on fixed routes. It allows passengers to purchase tickets online, reducing the reliance on paper tickets and manual cash transactions. QR code validation by conductors ensures hassle-free boarding, even during peak hours, thereby enhancing the travel experience.
- **Long-Distance Bus Travel**: For intercity or long-distance buses, the system provides passengers with the ability to book tickets in advance. Unique QR codes embedded with journey details help streamline boarding and reduce confusion related to seat allocation or ticket verification.
- **Tourist Transport Services**: Tourists often use bus services to explore cities or travel to popular destinations. The QR code-based ticketing system simplifies ticket booking for travelers who may not speak the local language. Integration with digital payment platforms ensures that foreign tourists can also access these services seamlessly.
- **Event Transport Services**: During events such as sports tournaments, festivals, or concerts, large-scale transportation is often required. QR code-based tickets help manage crowd movement efficiently, ensuring that ticket verification and boarding processes remain quick and organized.
- **Private Shuttle Services**: Companies or institutions offering shuttle services to employees or students can benefit from QR code-based ticketing. Pre-generated QR tickets enable systematic boarding while preventing unauthorized access.
- **Smart City Projects**: Many modern cities aim to integrate digital technologies into public infrastructure. QR code-based ticketing aligns with the goals of smart city projects, promoting cashless payments and sustainable transportation.
- **On-Demand Transport Services**: In scenarios where passengers request buses on-demand (e.g., ride-sharing or shuttle pooling), the system facilitates instant ticket generation and validation. This ensures flexibility while maintaining efficiency.

International journal of imaging science and engineering
ISSN: 1934--9955 www.ijise.net
Vol-20 Issue-01 April 2025

- **Environmentally Friendly Initiatives**: Governments and organizations focusing on sustainability can integrate this system into eco-friendly transport initiatives. The reduction in paper waste contributes directly to environmental preservation.

Advantages

- The adoption of a QR code-based ticketing system offers several advantages, revolutionizing the way public transport operates. These benefits span across various dimensions, including operational efficiency, passenger convenience, and environmental sustainability. Below are the key advantages:
- **Ease of Use for Passengers**: Passengers can book tickets with just a few taps on their smartphones, eliminating the need to visit ticket counters or carry cash. The digital storage of QR codes ensures that passengers do not have to worry about losing their tickets.
- **Reduced Waiting Times**: The system enables quick ticket validation through QR code scanning, significantly reducing delays during boarding. This is especially beneficial during rush hours when buses are crowded.
- **Cost Efficiency for Operators**: By eliminating paper tickets and manual processes, the system reduces operational costs for bus operators. The savings can be reinvested into enhancing other aspects of the transport service.
- **Improved Security**: QR codes are encrypted, making them resistant to tampering or duplication. This ensures that only authorized passengers can board the bus. Additionally, the system maintains a digital record of all transactions, aiding in dispute resolution and fraud prevention.
- **Enhanced Transparency**: Digital records of ticket sales and passenger information provide operators with valuable insights into travel patterns. This data can be used to optimize bus routes, schedules, and pricing strategies.
- **Environmental Sustainability**: By reducing the reliance on paper tickets, the system contributes to environmental conservation. It aligns with global efforts to minimize waste and adopt eco-friendly practices.
- **Real-Time Updates**: The system enables real-time updates on ticket availability, bus schedules, and passenger counts. Operators can use this information to manage resources more effectively, while passengers benefit from up-to-date travel information.
- **Accessibility and Inclusivity**: The system is designed to accommodate passengers with diverse needs, including those with disabilities. Voice-enabled features and intuitive interfaces ensure that the system remains user-friendly for all.
- **Scalability**: The system is highly scalable and can be implemented across various types of transportation networks, from small fleets to city-wide operations. Its modular design allows for easy integration with existing infrastructure.
- **Support for Multiple Payment Methods**: The system supports a wide range of payment options, including credit/debit cards, mobile wallets, and UPI. This ensures convenience for passengers from different demographic and economic backgrounds.
- **Data-Driven Decision Making**: The digital nature of the system allows operators to analyze passenger trends and operational data. This information can be used to improve service quality and make informed decisions.
- **Integration with Smart City Initiatives**: The system aligns with the vision of smart cities, where technology is used to enhance the quality of life. By enabling cashless transactions and digital ticketing, the system supports the development of smart and sustainable urban transport solutions.
- **Future-Proof Design**: The system is designed to accommodate future advancements in technology. Features such as GPS integration for real-time tracking, AI-based analytics for route optimization, and offline validation for remote areas can be added as needed.
- **Reduction in Fraud**: The unique nature of QR codes prevents unauthorized duplication or misuse, reducing the instances of fraudulent ticketing.
- **Passenger Convenience**: The app-based system ensures that passengers have access to all necessary travel information at their fingertips. Notifications about bus timings, route changes, or delays keep passengers informed and prepared.

4. EXPERIMENTAL ANALYSIS

The Fig 1 showcases a **login screen** for the **"Book My Bus"** platform.

At the bottom Fig 2 , there's a **"Register" button** for users to complete the sign-up process. Additionally, a line of text reads: **"Already have an account? Login,"** with the "Login" part likely serving as a clickable link for existing users.

International journal of imaging science and engineering
ISSN: 1934--9955 www.ijise.net
Vol-20 Issue-01 April 2025

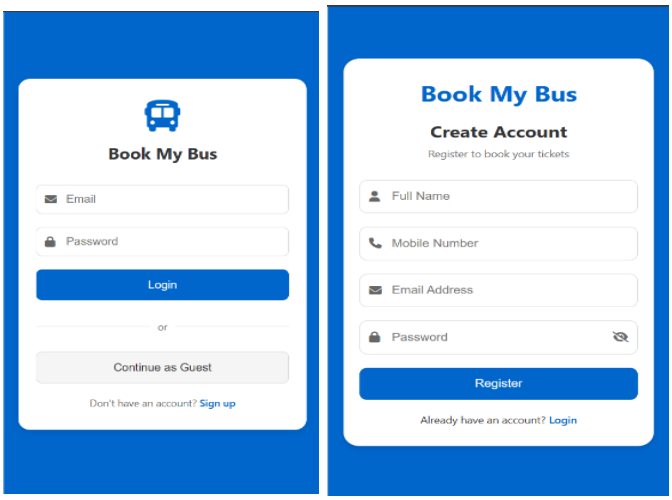

Fig 1: Login Screen **Fig 2: Register Screen**

The Fig 3 a user interface for a bus ticket booking system called **"BOOK MY BUS."** The interface has a clean and functional design, focusing on simplifying the ticket booking process. Key features include:

Fields for Input: Users can specify their **departure city** and **destination city**, making it easy to define travel details. Additionally, there is an option to select the **journey date** from a calendar and input the **number of passengers** (adults and children separately).

Search Functionality: A prominent **"Search Buses"** button is available to proceed with the search for bus options based on the entered details.

Government Initiatives: Below the booking section, there are two highlighted sections

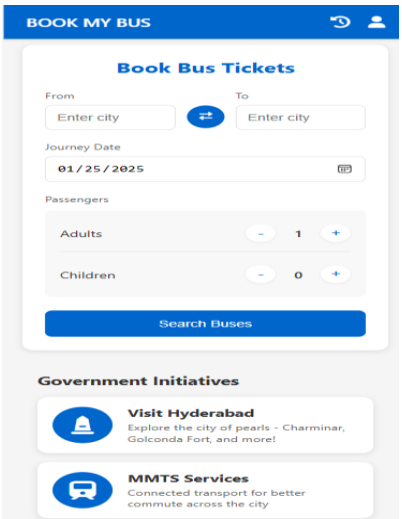

Fig 3: Home Screen

The screen displays a bus booking interface for the route **Kompally to Miyapur** on **January 25, 2025**. It provides a list of bus options, showing details such as the type of bus, departure time, arrival duration, and fare for each service:

An **Ordinary Bus** departing at **11:30 AM**, arriving in **4 minutes**, with a fare of **₹35**.

A **Metro Express Bus** departing at **12:00 PM**, arriving in **8 minutes**, with a fare of **₹55**.

A **Metro Electric Bus** departing at **12:30 PM**, arriving in **6 minutes**, with a fare of **₹65**.

International journal of imaging science and engineering
ISSN: 1934--9955 www.ijise.net
Vol-20 Issue-01 April 2025

Another **Ordinary Bus**, but its details for departure time and fare are not clearly visible.

This screen is designed to help users make informed decisions by comparing bus types, timings, and fares for their travel needs

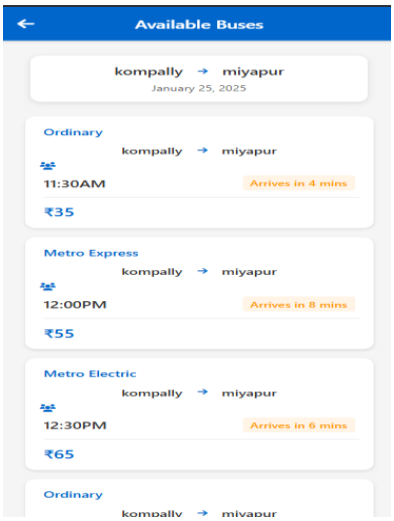

Fig 4: Buses List Screen

The screen shows a **payment interface** designed for completing a transaction. It features options to add a **debit/credit card** or choose **UPI payments** using platforms like Google Pay, Paytm, and PhonePe. Below these options, the total amount of **₹35**, inclusive of **GST**, is displayed. At the bottom, there's a prominent blue button labeled **"Proceed to Pay"** for finalizing the payment. The layout is straightforward and user-friendly, ensuring a smooth payment experience.

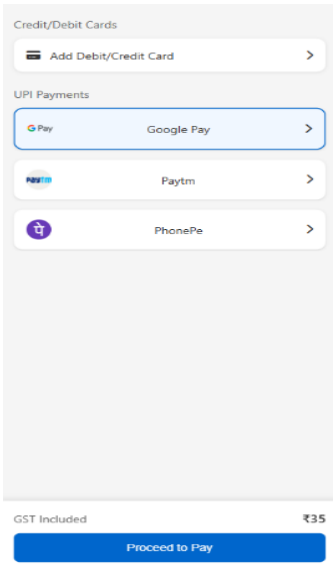

Fig 5: Payments Screen

The screen displays a **bus ticket booking confirmation** for a journey from **Kompally (KOM)** to **Miyapur (MIY)** on **20 May 2024**. The departure time is **11:30 AM**, and the arrival time is **12:04 PM**. At the center of the screen, there's a **QR code** with instructions to **"Scan this code to get on the bus."** Below the QR code are two buttons: one to **download the ticket** and another to **share the ticket**.

International journal of imaging science and engineering
ISSN: 1934--9955 www.ijise.net
Vol-20 Issue-01 April 2025

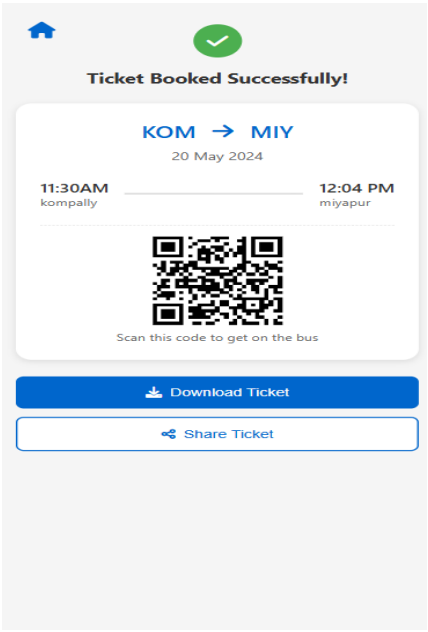

Fig 6: QR Ticket Screen

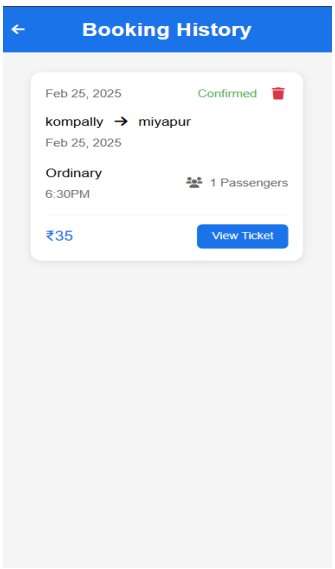

Fig 7: Booking History Screen

The screen displays the **"Booking History"** section of a mobile application. It shows a confirmed booking for a journey from **Kompally** to **Miyapur** on **February 25, 2025**, at **6:30 PM**. The booking is for an **Ordinary** bus class and includes **1 passenger**, with a fare of **₹35**. There are two interactive options: a **"View Ticket"** button for accessing the ticket details and a **trash icon** to delete the booking.

International journal of imaging science and engineering
ISSN: 1934--9955 www.ijise.net
Vol-20 Issue-01 April 2025

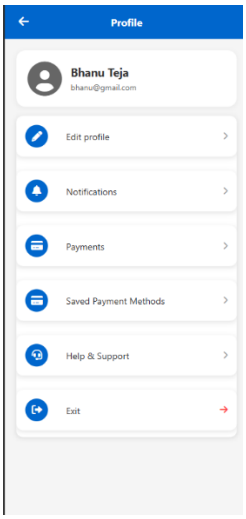

Fig 8: Profile Screen

The screen displays the **user profile page** for , with the email address . It includes six menu options for managing account settings and preferences:

Edit Profile: To update personal details like name, email, or other information.

Notifications: To customize alert preferences and app updates.

Payments: To view payment history or manage transaction settings.

Saved Payment Methods: To manage stored credit/debit cards or UPI accounts.

Help & Support: For accessing assistance regarding issues or queries.

Exit: For logging out or leaving the profile section.

5. CONCLUSION

The implementation of a smart bus ticketing system using QR code technology has revolutionized the way passengers interact with public transportation. By digitizing the ticketing process, this system eliminates many challenges associated with traditional ticketing methods, such as long queues, paper wastage, cash handling, and ticket fraud. The adoption of QR code-based tickets ensures a seamless and cashless travel experience, making it more convenient for commuters while improving efficiency for transit operators. One of the significant advantages of this system is its ability to provide a quick and contactless transaction process. Commuters can generate digital tickets via a mobile app, which they can scan while boarding the bus, reducing the overall boarding time and improving fleet management. This eliminates the dependency on paper tickets and manual fare collection, thereby making public transportation more environmentally friendly and reducing operational costs for bus operators. Moreover, real-time ticket validation ensures that only valid passengers board the bus, minimizing fare evasion and revenue losses. The use of QR code-based ticketing also enhances security and transparency. Since tickets are generated digitally and stored in an encrypted format, the chances of counterfeiting and duplication are significantly reduced. Furthermore, integrating digital payments within the ticketing system allows passengers to use various payment methods such as UPI, credit/debit cards, and mobile wallets, ensuring a more flexible and secure transaction process. This is particularly beneficial in an increasingly digital world, where contactless and cashless transactions are becoming the norm. In conclusion, the smart bus ticketing system using QR codes has transformed urban mobility by making public transportation more accessible, efficient, and secure. With continuous technological advancements, this system can be further refined to meet the evolving needs of passengers and transit authorities. By embracing innovation and leveraging emerging technologies, cities can create smarter and more sustainable transportation ecosystems that benefit both commuters and service providers.

International journal of imaging science and engineering

ISSN: 1934--9955 www.ijise.net

Vol-20 Issue-01 April 2025

REFERENCES

1. GSM and GPS Based Vehicle Location and Tracking Systemdz, BaburaoKodavati, V. K. Raju, S. SrinivasaRao, A.V. Prabu, T. AppaRao, Dr. Y. V. Narayana, International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 1, Issue 3, pp.616-625 2000.

2. DzPredicting Transit Vehicle Arrival Timesdz. Kidwell,B, Geographic Laboratory, Bridgewater State College, Bridgewater, Mass., 2001.

3. Public Transport System Ticketing system using RFID and ARM processor Perspective Mumbai bus facility B.E.S.Tdz, SaurabhChatterjee, Prof. BalramTimande, International Journalof Electronics and Computer Science Engineering., 2012.

4. A User-Centered Design Approach to Self-Service Ticket ending Machinesdz. KARIN SIEBENHANDL, GUNTHERSCHREDER, MICHAEL SMUC, EVA MAYR AND MANUEL NAGL. IEEE TRANSACTION OF PROFESSIONAL COMMUNICATION, VOL. 56, NO. 2, JUNE 2013.

5. Vehicle Tracking and Locking System Based on GSM and GPSdz, R. Ramani, S. Valarmathy, Dr. N. SuthanthiraVanitha, S. Selvaraju, M. Thiruppathi, R. Thangam, MECS I.J. Intelligent Systems and Applications, 2013, 09.

6. DzTaking an Electronic Ticketing System to the Cloud: Design and Discussiondz. Filipe Araujo, Marilia Curado, Pedro Furtado, Raul Barbosa CISUC, Dept. of Informatics Engineering, University of Coimbra, Portugal filipius@uc.pt, marilia, pnf, rbarbosa@dei.uc.pt 2013.

7. Bus Tracking & Ticketing using USSD Real -time application of USSD Protocol in Traffic Monitoringdz, Siddhartha Sarma, Journal of Emerging Technologies and Innovative Research (JETIR) www.jetir.org , Dec 2014 (Volume 1 Issue 7).

8. Urban public transport service co-creation: leveraging passengerʒs knowledge to enhance travel experience. Antoniodz A. Nunesa, Teresa Galvaoa, Joao Falcao e Cunhaa 2015

9. Tao Jing, XingWei, WeiCheng, LiranMa, YanHuo, Xiuzhen Cheng, DzAn Efficient scheme for tag information updates in RFID system on roadsdz,IEEE, issue

10. Thimmaraja Yadava. G, Prem Narayankar, Beeresh H.V, DzAn Approach for RFID ticketing used for personal navigator for a public transport systemsdz, International Journal of Technical Research and Applications, issue 3, vol.2, 2014, pp.109-112.