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City Bus Ticket Booking App – Smart QR Approach

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ABSTRACT: This research paper explores the implementation and impact of Smart QR in the public transportation sector. The concept of a "Smart QR for Buses" uses Quick Response (QR) codes with bus transportation systems to enhance efficiency, convenience, and user experience for passengers. Each bus is equipped with a unique QR code that represents its identity and route information. The QR code can be placed on the exterior of the bus, near the entrance, or on digital displays inside the vehicle. Passengers can use their smartphones or other QR code scanning devices to scan the QR code before boarding the bus.

KEYWORDS: Digital tickets, Contactless payment, Route optimization, Smart city, Ticketing system, Convenience, Quick Response (QR).

I.INTRODUCTION

The Project is a Simple Interface ticket booking System for City Bus. The prototype is designed for PMPML Transportation which operates in Pune. By using QR Technology the app allows users to book tickets immediately for the bus on which the QR is placed. Easy UI and quick response make the system useful in City bus travel. Smart QR for buses is an innovative technology that revolutionizes the way passengers interact with public transportation systems. It combines the convenience of Quick Response (QR) codes with advanced features to enhance the overall bus riding experience. Smart QR codes are unique, scannable codes that provide instant access to various services and information related to bus travel.

Smart QR codes also enable passengers to access real-time information about bus schedules, routes, and delays. Through a dedicated mobile application or a web portal, passengers can stay updated on bus arrival times, route changes, and other relevant information. This helps passengers plan their journeys more efficiently and reduces waiting times at bus stops.

Furthermore, Smart QR for buses facilitates seamless integration with other transportation systems. Similar applications can be made for other transportation modes by doing some simple changes. This integration promotes a more interconnected and sustainable transportation network, encouraging the use of public transit and reducing reliance on private vehicles.

Overall, Smart QR for buses represents a significant advancement in the public transportation sector. It streamlines ticketing processes, provides real-time information, enables multimodal integration, and offers additional services to enhance the overall bus-riding experience. By leveraging the power of QR codes and mobile technology, Smart QR for buses transforms the way passengers interact with and benefit from public transportation systems.



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II. LITERATURE REVIEW

The public transport system (PTS) is a major source of income in most developing countries like India. However, PTS faces severe malfunctions and some security problems. There is a lot of confusion among the passengers regarding fares which causes chaos. This application aims to make this process fully automated, reliable, transparent, and convenient. GPS is used in many applications. This system gives knowledge about vehicles' position and routes traveled by vehicle, and this can be monitored from any remote place or location. This system depends on GPS. There is no application depending on mobile devices to track and get a real-time and current view of the target or vehicle [1].

Kidwell's algorithm for predicting bus arrival times works by dividing each route into zones and recording the time it takes for each bus to pass through each zone. The algorithm then uses this information to predict the arrival time of the next bus at given stop. The predictions were based on the most recent observation of the bus's location, which was when it passed through each zone. However, this algorithm was not suitable for large cities where both travel time depends on a variety of factors [2].

Tracking systems are scarce in the market, and those that are available are often ineffective or expensive. The above-stated system is much more economical than other systems that are currently available now in the market. This suggested system helps to get information and the location of college buses by using a mobile or smartphone. There is no real-time view of the location of the bus and there is no application based on mobile for Tracking [3].

III. METHODOLOGY

The methodology of Smart QR for buses can be divided into the following main steps:

Data collection: Identify relevant bus route information and schedules for PMT. Gather data on ticketing and payment systems used in public transportation from the control unit. Investigate location tracking technologies suitable for buses, like GPS modules, etc.

App construction: For constructing this app we have used MIT App Inventor Software. MIT App Inventor is a drag-and-drop programming environment that makes it easy for anyone to create Android apps. It was developed by the Massachusetts Institute of Technology (MIT) and released in 2009 as a web-based tool for beginners and non-programmers. App Inventor enables users to build fully functional Android apps using a block-based programming approach. Instead of writing code in a traditional programming language, users can drag and drop visual blocks that represent different functionalities and behaviors. This visual programming paradigm makes it accessible to people without prior programming experience, allowing them to create their mobile apps without the need to learn complex syntax or programming concepts. The platform provides a variety of components and features that users can use to build their apps, including buttons, text boxes, sensors, media playback, location services, and more. It also features the integration of Google Maps and Firebase for additional functionality.

App Inventor apps can be tested in real-time on connected Android devices using the MIT AI2 Companion app, which is available on the Google Play Store. Once the app is complete, it can be packaged and downloaded as an APK file, ready for installation on Android devices. MIT App Inventor aims to empower individuals, especially students and novice programmers, by making app development accessible and approachable. It provides a platform for creativity and innovation, enabling users to bring their ideas to life and develop their programming skills in a visual and user-friendly manner.

Implementation: Develop the software modules for bus route information retrieval and display. Integrating ticket scanning functionality into the system Implementation of location tracking using GPS or other suitable technologies tracking the user's location using mobile GPS. Test and debug the app components. With a little modification can be used in Metros and Locals too. Used to check Bus Routes.

App design: System requirements and functionalities which are required for this app. Designing user interfaces for bus route information display and ticket scanning, building the architecture of the app, and establishing communication protocols and data-formats.

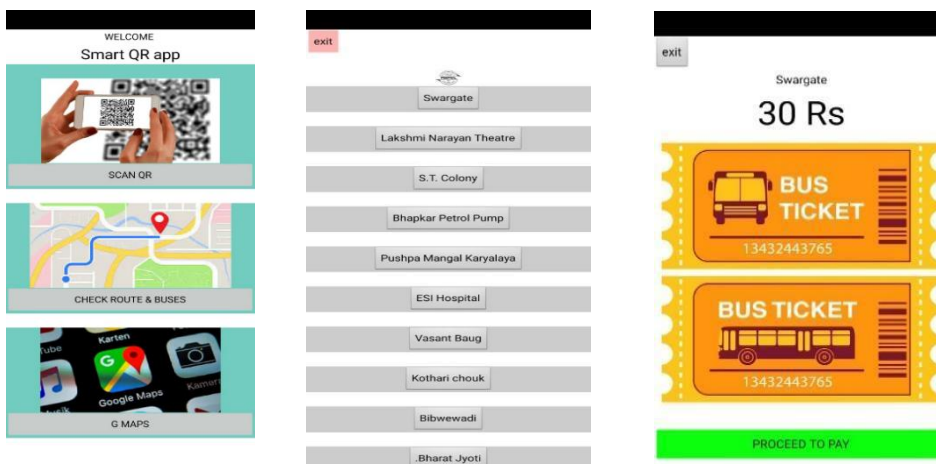


Figure 1: Opening Page Figure 2: Selecting Destination Figure 3: Payment

IV.RESULT AND DISCUSSION

The results of implementing Smart QR for buses demonstrate improved ticketing efficiency, enhanced passenger satisfaction, and increased operational efficiency. The implementation of Smart QR codes reduced ticketing time and costs, providing a convenient and seamless ticket-purchasing experience for passengers. Real-time information updates through Smart QR codes reduced waiting times and improved bus scheduling. Integration with other transportation modes and smart city initiatives showcased the potential for a connected and efficient multimodal travel experience. Additionally, the adoption of Smart QR for buses contributed to environmental sustainability by reducing paper usage and promoting public transportation usage. Discussions revolve around the scalability of Smart QR systems, security and privacy considerations, and strategies for widespread adoption and further improvements.

V.CONCLUSION

In conclusion, the Smart QR for Buses project aims to develop a user-friendly mobile app that allows users to scan QR codes on buses for instant access to important information. This includes bus routes, ticket costs, and arrival timings at different stops. By eliminating the need for physical schedules and signage, the app enhances convenience and reduces confusion. With its intuitive design and simplified QR code scanning process, the project improves the overall user experience. By providing accurate and real-time information, the Smart QR for Buses app revolutionizes public transportation, making it more efficient and accessible for passengers.



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VI.FUTURE SCOPE

Advanced Ticketing Systems: The future scope of Smart QR for buses includes the development of more advanced ticketing systems. This could involve integrating mobile wallet platforms, blockchain technology, or digital identity verification to enhance the security and convenience of ticket purchases. Passengers may be able to purchase and store tickets directly on their smartphones, eliminating the need for physical tickets. Furthermore, personalized ticketing options, such as flexible passes or dynamic pricing based on demand, could be implemented to offer a more tailored and cost-effective experience for passengers.

Smart Infrastructure Integration: Smart QR for buses can be integrated with smart infrastructure systems to create a more connected and efficient transportation network. For example, QR codes can be used in bus stops or shelters to provide real-time information about bus arrivals and departures. Additionally, the integration of Smart QR with smart traffic management systems can enable intelligent routing and traffic optimization, reducing congestion and improving overall travel times. This integration can also facilitate seamless transfers between different modes of transportation, such as buses and trains, by providing synchronized schedules and fare integration.

Passenger Engagement and Experience: The future of Smart QR for buses lies in enhancing passenger engagement and experience. The app can be expanded to include features such as real-time passenger feedback, interactive maps, and personalized recommendations for nearby attractions or services. Gamification elements, loyalty programs, and rewards for frequent bus riders can also be incorporated to incentivize public transportation usage. By creating a more enjoyable and interactive journey for passengers, Smart QR for buses can help increase ridership and improve overall satisfaction.

Big Data Analytics and Predictive Maintenance: As Smart QR for buses continues to gain traction, it will generate vast amounts of data that can be leveraged for analytics and predictive maintenance. By analyzing passenger patterns, traffic data, and operational metrics, transit authorities can gain valuable insights to optimize routes, improve bus schedules, and enhance maintenance practices. Predictive maintenance algorithms can be developed to identify potential issues before they occur, reducing downtime and improving the reliability of bus services. This data-driven approach can lead to cost savings, operational efficiencies, and a more seamless and reliable public transportation system.

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