International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 03 | March - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

City Express: E-Ticket Booking System

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Abstract: Here is an exponential increase in demand for effective public transportation networks as a result of urbanization. In light of this, creating a City Bus Ticket Booking System (CBTBS) seems like the best way to expedite the ticket purchasing process, improve customer comfort, and maximize resource use. An overview of this system, which is intended to meet the changing demands of contemporary metropolitan populations, is provided in this abstract. Bus routes, schedules, and ticket-ticket buses are easily accessible to users with the help of the proposed CBTBS, a web-based application with a mobile interface. With the use of cutting-edge technology like GPS and real-time data analytics, passengers can plan their trips more precisely because the system provides precise information on bus locations, arrival times, and seat availability.

An easy-to-use user interface, safe payment channels, and adjustable booking choices to suit a range of passenger preferences are some of the CBTBS's key features. In addition, the system uses clever algorithms to cut travel times, optimize bus routes, and ease traffic, all of which help to maintain the sustainability of urban transportation infrastructure. The CBTBS ensures a hassle-free travel experience for passengers while improving operational efficiency for transit authorities by enabling online ticket buying and cashless transactions. Furthermore, the system fosters an egalitarian transportation ecology by offering accessible features for senior citizens and people with impairments, so promoting inclusivity. In summary, a revolutionary project meant to completely change urban transportation is the City Bus Ticket Booking System. The system possesses the capacity to mitigate traffic, enhance accessibility, and elevate the general standard of public transportation services in contemporary cities due to its inventive features and user-focused design.

Keywords: Android, Java, API, MYSQL, Android Studio, GPS tracking, React native, Bus route and scheduling

1. Introduction:

In the current era of swift technological advancements and growing urbanization, effective public transit networks are essential for guaranteeing seamless mobility throughout urban areas. Installing user-friendly ticket booking systems is a major step in improving the public transportation experience[1]. In order to provide commuters with the best possible option, this introduction describes the creation and importance of the City Bus Ticket Booking System (CBTBS), which is based on the Android platform and incorporates the most recent research findings[2].

The way people interact with technology has changed dramatically as a result of the widespread acceptance of Android devices and the proliferation of smartphones. By utilizing Android Studio's features, developers may produce user-friendly, feature-rich apps that are suited to the requirements of contemporary commuters. The incorporation of state-of-the-art research findings into CBTBS's functioning. New studies in the fields of mobile application development and transportation engineering offer insightful information about how to make bus ticket booking systems more efficient. In order to improve the efficacy and efficiency of public transportation services, these studies highlight the significance of real-time data integration, user-centric design, and seamless user experiences. The CBTBS hopes to

provide a holistic solution that not only streamlines ticket booking but also improves overall urban transportation by incorporating results from these studies.

Moreover, the Android platform provides an adaptable setting for creating interactive and captivating apps. By offering features like push notifications, GPS integration, and secure payment gateways, CBTBS enables customers to make informed decisions about their travels by giving them access to real-time information about bus routes, schedules, and availability.

In conclusion, utilizing Android Studio to create a City Bus Ticket Booking System that is guided by the most recent research is a big step toward updating the infrastructure supporting urban transportation. CBTBS seeks to transform commuter interactions with public transportation by leveraging technology and integrating research-driven insights, ultimately resulting in more sustainable, effective, and user-friendly urban mobility solutions.

2. Literature Survey:

The examination of the literature on Android-based city bus online ticket booking systems emphasizes how crucial mobile technology is to increasing the efficiency and accessibility of urban transit. Academics highlight how the widespread use of smartphones and the reliance on digital services in urban areas have led to the rising popularity of mobile ticketing solutions.

Researchers stress the benefits of Android apps for bus ticket buying, highlighting the simplicity and user-friendliness of these platforms for travelers. These apps streamline the booking process and do away with the need for physical ticketing infrastructure by enabling customers to book, pay for, and manage tickets from any location[10].

Additionally, the research delves into the nuances of the features included into Android ticketing apps, highlighting their state-of-the-art features including impermeable payment processes and real-time bus tracking[8]. These features improve the user experience as a whole by providing travelers with comprehensive travel information and enabling seamless transactions of the highest standard

The literature also examines the implications of Android ticketing apps for transportation organizations, promoting a new era of deep understanding of customer needs and achieving previously unheard-of levels of service reliability[3].

A paradigm shift towards ultra-efficient operations and unquestionable passenger satisfaction is also ignited by scholars delving into the integration of Android apps heralding the dawn of smarter and deeply sustainable urban transit ecosystems.

In summary, research indicates that Android-powered ticketing apps have had a seismic impact on city bus transit, bringing with them an unparalleled level of modernization and imbuing urban environments with a sense of accessibility, effectiveness, and passenger satisfaction that is almost sublime.

2.1 Need for E-Ticketing and Seat Allotment:

For commuters, an electronic ticket has numerous benefits, such as affordability, flexibility, security, and ease of use. Simultaneously, it offers conventional paper ticket guarantees, including selection of seats and additional flexibility. Additionally, ticket purchasers have less chance of their tickets being lost or stolen.
The qualities listed below sum up why e-tickets are necessary.
Without the assistance of a conductor, commuters can purchase and reserve an electronic ticket online[7].
Travelers can purchase an e-ticket with a digital wallet instead of cash[10].
There is a chance that a physical ticket you purchase could be misplaced. You get complete access to e- and mobile tickets, which is a terrific feature[5].
Not to mention, purchasing an e-ticket or mobile ticket online lessens your carbon footprint. It's the little things that add up to a sustainable future. The commuter does not need to carry the tickets in hand.

2.2 Issues with the current System:

While they are not universal, transportation issues are present everywhere. Moreover, inadequate transportation services and the lack of substitute modes are the primary causes of transport-related issues. There is a perception that public transportation buses are unreliable, despite the fact that they have been offering generally adequate services. The most frequent issues commuters have with the current system are listed below:

1. Undue waiting at bus stops

2. Inadequate time for getting tickets

3. Excessive waste of paper

4. Use of cash

2.3 Proposed System:

Block Diagram:

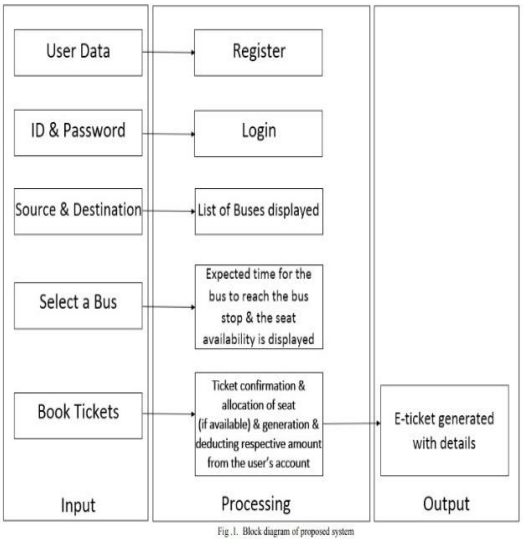


Fig.1

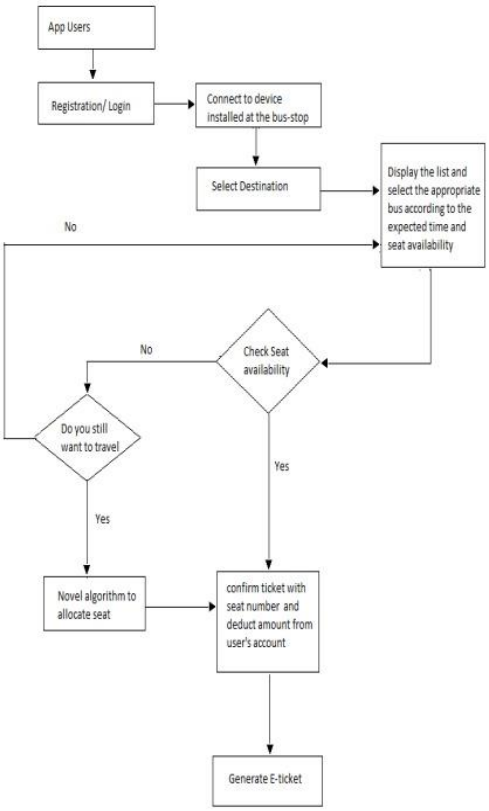


Fig.2

Flowchart:

User-friendly interface for simple navigation: An interface that is easy to use and intuitive to use emphasizes simplicity and ease of use, allowing users to use the program with ease and without confusion. This consists of minimalistic design components, logical arrangement, intuitive icons, and clear labeling. By offering simple paths for navigating, users can quickly locate the functionality they require and finish jobs with little difficulty.

Real-time bus tracking and schedule display: With real-time bus tracking, users can use GPS technology to view the precise location of buses in real-time on their routes. With the use of this function, passengers can more efficiently plan their trips by being informed about bus arrival times, delays, and present locations. Furthermore, real-time schedule displays guarantee that travelers have access to the most recent information, lowering ambiguity.

Integration with digital payment gateways for secure transactions: Integration with digital payment gateways enables users to make secure transactions directly within the application using various payment methods such as credit/debit cards, mobile wallets, or digital payment platforms. This feature enhances convenience for users by eliminating the need for cash transactions and providing a secure and efficient payment process.

Compatibility with various devices, including smartphones: Compatibility with multiple devices ensures that the application can be accessed and utilized by a broad range of users across different platforms, including smartphones, and tablets. This ensures accessibility for users regardless of their

preferred device, enhancing the reach and usability of the application.

3. Methodology:

Android XML for Page Layout Design:
1.XML (Extensible Markup Language): A markup language called XML is used to specify the content and structure of data in a way that is legible by humans. XML is used in Android development to construct layout files that specify how user interface components should be arranged and look.
Layout Design: Elements that represent different UI components, like buttons, text fields, and layouts, are found in Android XML layout files. To construct the appropriate UI structure, these items are organized hierarchically.
XML layout design allows for the separation of concerns between application functionality and UI appearance. It also makes UI layout maintenance and customization simple.

2. Android Platform: The operating system, middleware, and essential apps make up the software stack that is the Android platform. It offers tools and APIs to developers so they may create Android-compatible apps.
Components: Activities, services, broadcast receivers, and content providers are some of the components that go into creating an Android application. Broadcast receivers react to system-wide events, services carry out background operations, activities represent user interface panels and content providers oversee shared data.
The Android SDK (Software Development Kit) gives programmers a collection of tools and libraries to create and test Android applications. It comes with an emulator, debugging tools, the Android Studio IDE, and several APIs for accessing device functionality.4.SDK (Software Development Kit): The Android SDK provides developers with a set of tools and libraries for building and testing Android applications. It includes the Android Studio IDE, emulator, debugging tools, and various APIs for accessing device features.

3.Java Language: Java is a high-level, object-oriented programming language that is well-known for being straightforward and platform-independent. Java is used in Android development to build the logic for the application, manage user input, and communicate with system parts.
capabilities: To create reliable and manageable systems, Java provides capabilities like inheritance, polymorphism, encapsulation, and exception handling.
Benefits: Java is a good choice for Android development because of its vast libraries, tools, and developer community. Because of its platform independence, programmers can create code once and have it executed on several different systems.

4. API Development in PHP:
Application Programming Interface, or API, is a collection of guidelines and conventions that permits interoperability between various software programs. APIs are used in web development to make web server functionality accessible to client applications.
PHP: PHP is a web development-focused server-side programming language. Building dynamic web apps and interacting with databases are two common uses for it.
API Endpoints: Specific operations or data retrieval can be carried out by client applications via these URLs, known as API endpoints. Tasks like user authentication, ticket booking, and bus timetable retrieval would be handled via API endpoints in the bus ticket booking system.

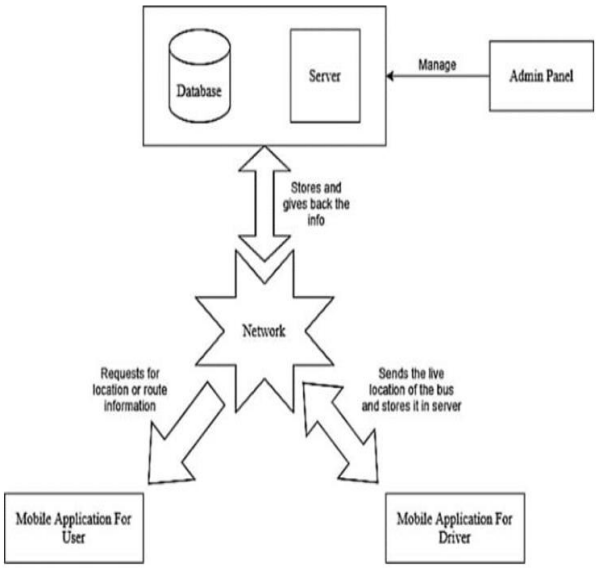


Fig.3

Fig 1: Methodology diagram

5.MySQL Database:
MySQL: For storing and managing structured data, MySQL is a well-liked open-source relational database management system (RDBMS). It queries and

manipulates data using SQL (Structured Query Language).
Database Schema: The table, column, key, and relational relationships within the database are all defined by the database schema. Tables for storing user data, booking specifics, bus schedules, and other data would be included in the structure of the bus ticket booking system.
SQL Queries: To communicate with the MySQL database, one uses SQL queries. Data from the database tables can be selected, inserted, updated, and deleted using these queries.

6. Android Studio:
The official integrated development environment (IDE) for creating Android apps is called Android Studio. It gives programmers the tools they need to create, code, test, and debug Android applications.
Features: The features of Android Studio include code editing with syntax highlighting and auto-completion, tools for designing layouts and user interfaces (UIs) visually, and debugging capabilities for locating and resolving coding mistakes.
Workflow: Creating a new project in Android Studio, designing the user interface with XML layout files or visual designers, writing Java code to implement the application logic, and testing the program on real devices or emulators are the typical steps in the workflow process.
Developers may efficiently use the aforementioned technologies and tools to create the bus ticket booking system for Android by grasping these fundamental principles.

Merits :

1. Enhanced Efficiency: Processes are automated, ticket booking is streamlined, and operational efficiency is increased.

Better trip planning, a user-friendly interface, and real-time bus information all contribute to an improved user experience.

2. Convenience: Mobile ticketing eliminates physical ticket counters and lines, allowing for anytime, anywhere booking. Delays and congestion are decreased because of real-time information, optimized routes, and a reduction in travel time and crowding.

3. Accessibility: Encouraging social fairness by providing inclusive features for elderly and disabled passengers.

4..Environmental Benefits: Promotes the usage of public transportation and lowers pollutants and carbon emissions.

Demerits;

1. The potential exclusion of groups due to lack of internet or smartphone connectivity is known as the "digital divide."

2. Technical Issues: Potential for errors, server failures, and network issues. Privacy Concerns: If data collection and storage are not secure, privacy problems may arise.

3. Dependency on Technology: Difficulties in the event that travelers' devices malfunction.

4. Resistance to Change: Passengers' unwillingness to switch causes a slow acceptance.

5. Cost of Implementation: Development, upkeep, and support come at a high cost.

6. Security Risks: Vulnerability to hackers or fraudulent online payments.

7. Restricted Coverage: Inefficiency if not providing network coverage or covering every route.

8. Challenges with accessibility: Older or disabled travelers may find it difficult to use digital platforms.

Limitations:

1. The difficulties associated with inadequate internet connectivity in remote regions.

2. Dependency on Smartphones: Does not include non-smartphone users.

3. Barriers related to language and literacy: Prevents non-native speakers and those with low literacy from being fully accessible.

4. Initial Setup and Training: Resources are needed for support and training.

5. Concerns about data privacy and security: Potential threats to passenger confidence.

6. Limited Customization: Could not satisfy a range of traveler requirements.

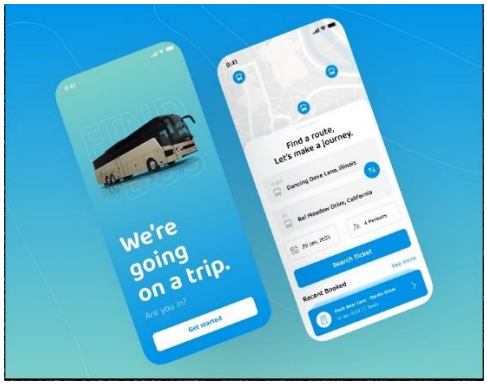
7. Restriction on Coverage: Not available on all routes or areas.

8. Reliance on GPS Accuracy: Reliability may be impacted by inaccurate transit tracking.

Cost implications include high initial and recurring expenses.

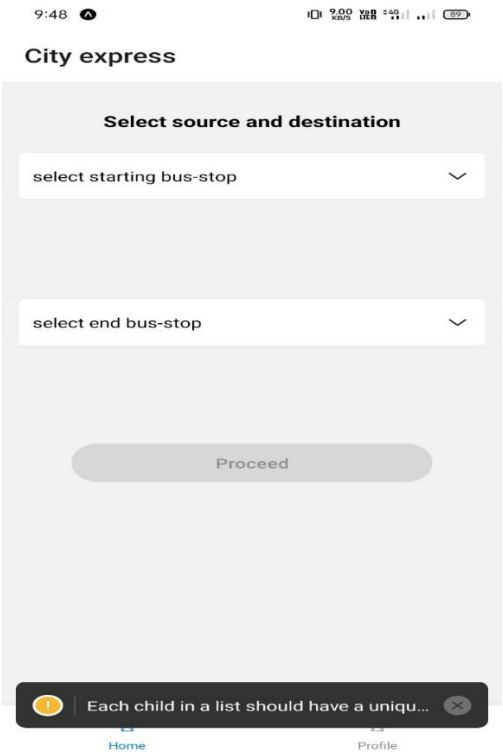
9. Resistance to Change: Stakeholder and passenger resistance has caused a slower acceptance.

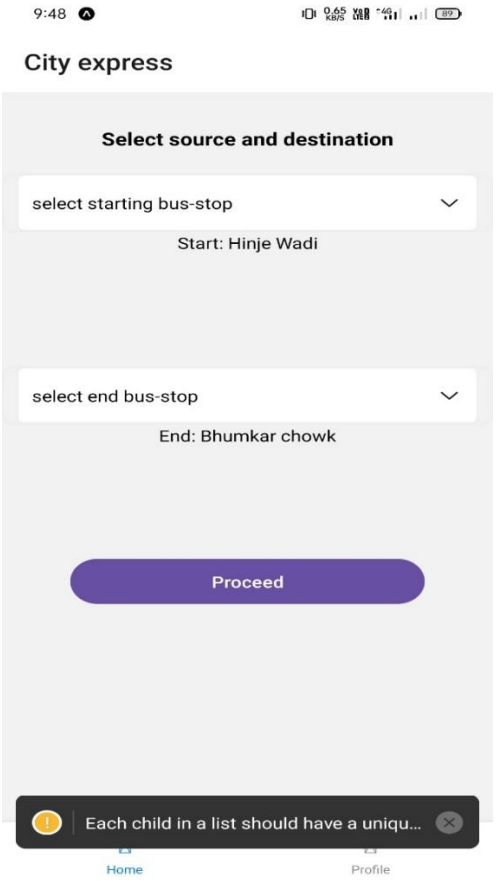
4. Results and Discussion:

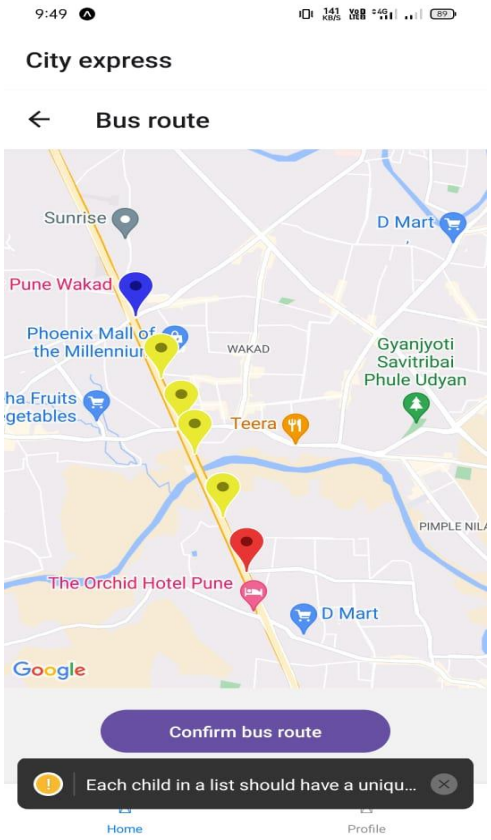


App Interface

QR Code Reader







5. Conclusion & Scope:

To sum up, the City Bus Booking System project improves both the customer experience and operational efficiency by providing a simplified urban transit solution. Its success shows that there is still room for improvement in the field of public transportation technology. In the future, AI-driven route optimization, IoT for real-time tracking, and improved accessibility features might all be included. These kinds of technologies have the potential to be crucial in creating smarter, more sustainable cities if they keep innovating and evolving.

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