

Mobile App for Purchasing Tickets: Setram Tickets Ouargla, Algeria

Azzaoui Nadjat, Bessedike Zakaria, Touhami Mohammed Lazhar, Osmani Youcef, Koudia Souhil

LINATI Laboratory, Department of Computer Science and Information Technology, Faculty of New Technologies of Information and Communication, University of Kasdi Merbah, Ouargla 30000, Algeria

* Corresponding Author: **Azzaoui Nadjat**, Email: azzaoui.nadjat@univ-ouargla.dz.

Abstract:

This project presents the design and implementation of "Setram Go", a hybrid mobile application for purchasing public transport tickets and managing subscriptions in Ouargla, Algeria. During the conception phase, several UML diagrams were used — including use case diagrams, class diagrams, and activity diagrams — to model the system architecture, user interactions, and core functionalities. The application aims to solve problems related to manual ticketing, the absence of electronic payments, and limited accessibility. Developed using React Native (frontend), Express.js (backend), and MongoDB, the app supports electronic wallet recharge, QR code validation, bilingual interface (Arabic/English), and real-time station mapping. Functional testing confirmed the application's core capabilities, with future work planned to integrate real payment gateways, offline functionality, and improved security.



Access this article online

Keywords: Bilingual interface, Electronic payments, Hybrid mobile application, Public transport tickets, QR code, React native, Setram go, UML

1. Introduction

IN recent years, the world has witnessed a significant digital transformation, affecting nearly all sectors including public transportation [1, 2]. While many countries have adopted smart solutions for daily services—especially in areas like ticketing and payments—Algeria, and particularly the city of Ouargla, still lags behind in fully embracing this transformation [1, 3].

Public transport in Ouargla, especially services like Setram, continues to rely heavily on traditional paper-based ticketing systems and cash payments. This method comes with a number of challenges. Paper tickets are easily damaged or lost, and passengers often experience difficulties in purchasing tickets due to the unavailability of

sellers, electronic distributors, or even exact change [1, 4]. In some cases, passengers miss their tram due to the time required to acquire a ticket, especially during peak hours.

This situation reflects a pressing need for a more practical and modern solution that aligns with the country's ambition toward digitalization. Hence, the motivation for our project stems from this reality—the lack of modern, electronic-based services in our city—and the desire to bridge this gap by proposing a mobile application for ticket purchasing and subscription management [4, 5].

The main objective of this project is to digitize the ticket purchasing process and reduce the dependency on manual transactions. Our solution integrates essential features such as electronic payment support, QR code authentication, bilingual interface (Arabic and English), and a user-friendly

Received September 20, 2025; Revised October 15, 2025; Accepted November 20, 2025; Published December 31, 2025

<https://doi.org/10.57238/csj.2025.10014>

© 2025 by the authors. licensed under Creative Commons Attribution 4.0 International (CC BY 4.0).

experience, making it suitable for all categories of users, including students, workers, and tourists.

Although The project represents a step forward in aligning Ouargla's public transportation system with international standards and improving accessibility for citizens. In the coming sections, we will provide a detailed analysis of the current ticketing system, review similar solutions, describe the design and features of our application, and discuss the future potential of this initiative [4, 6].

The overall interaction between the user and the system functionalities is clearly modeled using a use case diagram, as illustrated in Figure 1.

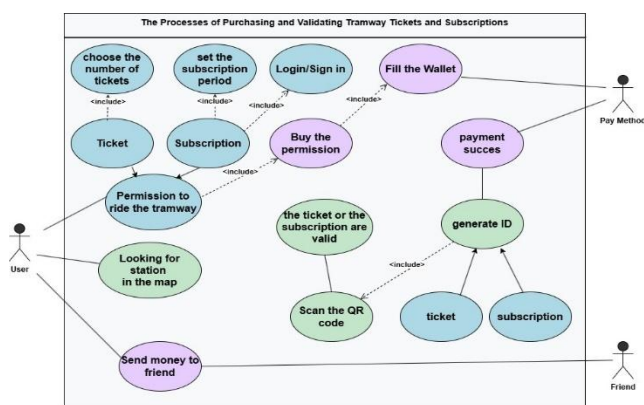


Figure 1. Use case diagram

2. Background

2.1 Challenges of Public Transport in Algeria

Public transport services in Algeria, such as Setram, operate primarily through manual ticketing and cash transactions. This outdated system presents several problems, including long queues, lack of accessible ticket vendors or electronic dispensers, and dependence on exact change [1, 4]. Moreover, paper tickets are susceptible to damage or loss, which impacts reliability and customer satisfaction.

Passengers often face delays or miss their tram due to the time required to purchase tickets, particularly during peak hours. The limited availability of real-time information, such as station data or ticketing options, further exacerbates these issues.

2.2 Digital Transformation in Public Services

Digital transformation refers to the strategic use of digital technologies to improve service efficiency, accessibility, and transparency in public administration [2, 3]. In the transportation domain, this transformation includes the integration of ICT tools that enable automation, reduce human error, and enhance user experience.

<https://csj.nabea.pub>

Despite Algeria's efforts to digitize its economy, public transport services—especially outside the capital—remain largely analog [1]. In cities like Ouargla, the absence of integrated, mobile-based ticketing and payment platforms reveals a critical gap in modernization efforts.

2.3 Mobile Ticketing (Concept and Benefits)

Mobile ticketing enables users to purchase, store, and validate transport tickets electronically via mobile devices, replacing traditional paper tickets and cash payments. Advantages include increased accessibility, reduced transaction times, real-time service updates, lowered operational costs, and improved data collection. For users, mobile ticketing offers enhanced convenience and reduces the risk of missing transport due to ticketing delays [4, 5, 7].

2.4 Enabling Technologies

Core technologies supporting mobile ticketing systems include:

- QR Code: Facilitates secure and rapid ticket validation.
- Mobile Payment Systems: Allow users to complete payments electronically through mobile wallets or banking apps.
- Cross-Platform Development Tools: Frameworks such as React Native enable app deployment on both Android and IOS platforms, optimizing development resources.

The interaction between these enabling technologies requires a well-defined operational flow to ensure usability and reliability, which is reflected in the application workflow and user interaction process illustrated later in Figure 2.

3. Related Work

Research Multiple studies have investigated the adoption and performance of mobile ticketing systems across different regions. Chen et al. (2022) emphasized the significance of usability and user trust in influencing the adoption of mobile ticketing in developing countries [4]. Their study demonstrated that resistance to innovation could be minimized through intuitive interfaces and transparent processing.

Similarly, Aristio et al. (2022) reported notable improvements in public transport efficiency and user satisfaction after deploying mobile ticketing systems in Indonesia [5]. Gracz (2023) also found that in Poland, localized design and familiarity with transport services were key to successful user engagement [8].

CyberSystem Journal, vol. 2 no. 2, pp. 69-78, December 2025

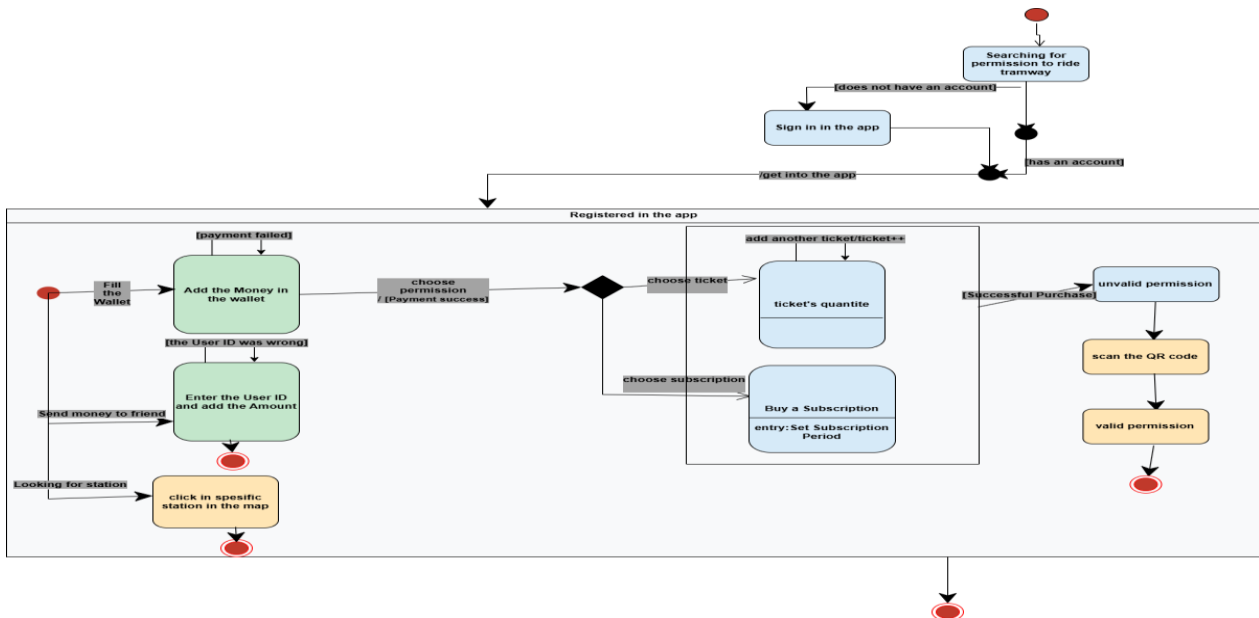


Figure 2. Activity diagrams

These findings collectively highlight the importance of customizing ticketing applications to local needs, infrastructure limitations, and user expectations—insights that have directly informed the design of "Setram Go" [4, 5, 8].

4. Proposed System

"Setram Go" is a hybrid mobile application designed to modernize the public transport experience in Ouargla by enabling users to digitally purchase tram tickets and manage their subscriptions. The app allows users to register, recharge a virtual wallet, and access different types of tickets and subscription categories—all from their mobile devices [4, 9].

Built using React Native for cross-platform compatibility and Express.js for backend operations, the system supports flexible payment options and includes location-aware features such as a real-time interactive map to locate nearby stations [9-11]. The system stores user data, transactions, and ticketing information in a MongoDB database, ensuring reliable and scalable data management [12].

4.1 Functional Requirements

The "Setram Go" mobile application provides several core functionalities that cover the entire process of digital ticketing and subscription management. The key functional requirements of the system are as follows:

- User Authentication:

- Allows users to register and log in using their email address.
- User data is stored securely in the backend database.
- When attempting to purchase a subscription, the user is required to upload identification documents to confirm their status (e.g., student, employee)
- Wallet Recharge and Payment Integration:
 - Users can recharge their in-app wallet using multiple payment methods:
 - Local card: Edahabia (Algerian national card).
 - International cards: Mastercard, PayPal.
 - The balance is used to purchase tickets or activate subscriptions.
- Ticket and Subscription Management:
 - Users can browse and purchase various types of tickets:
 - One-way, round-trip, daily, etc.
 - Multiple subscription categories are supported:
 - Student, school pupil, employee, etc.
 - All active tickets and subscriptions are stored and accessible from the application.
- QR Code Verification (Validation Process):

- The application includes a built-in QR code scanner.
- Users scan a predefined QR code displayed at tram stations or checkpoints.
 - Upon scanning, the app:
 - Verifies the location context.
 - Retrieves the user’s valid tickets and subscriptions.
- Once selected, the validation is confirmed and stored in the system.
- This method enables location-based verification without generating user- side QR codes.
- Interactive Map and Station Locator:
 - The app includes a live map showing nearby tram stations.
 - Station coordinates are predefined and stored manually using Google Maps data.
 - The system displays:
 - The name of each station.
 - The distance between the user and each station.
 - GPS is used to track user location in real time.
- Multilingual Support:
 - The interface supports both Arabic and English, allowing users to switch between languages at any time.
 - All views and labels are localized to ensure accessibility for local and international users.

- Performance:
 - Real-time interaction with map and ticket validation.
 - Fast response from backend services.

5. System Architecture

The architecture of "Setram Go" is composed of:

- Frontend: Developed using React Native, providing a responsive UI and native-like performance across both Android and iOS platforms.
- Backend: Built with Express.js, handling authentication, wallet management, ticket processing, and data storage.
- Database: A MongoDB database is used for storing user data, transaction history, tickets, subscriptions, and station data.
- API Communication: RESTful APIs manage interactions between the mobile app and the server.

The structural relationships between system components are defined through object-oriented classes, which are visually represented in Figure 3.

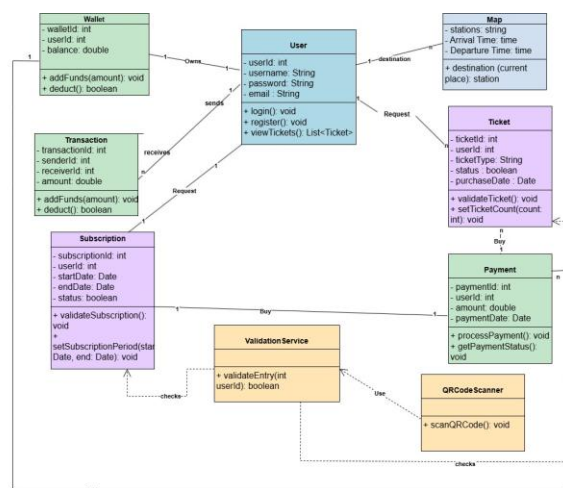


Figure 3. Class diagram

4.2 Non-Functional Requirements

- Cross-Platform Compatibility:
 - The application is developed using React Native, ensuring compatibility with both Android and iOS.
- Security:
 - Secure API communication through HTTPS.
 - Encrypted QR codes for ticket validation.
 - User data protection including document uploads and wallet balance.
- Scalability:
 - The system architecture supports future extensions, including integration with new payment systems and AI-based analytics.

5.1 Conception and Modeling Using UML

In the conception phase of the Setram Go application, we adopted a modeling approach based on UML (Unified Modeling Language). UML is a standardized modeling language used to visualize the structure and behavior of software systems. It provides a set of diagrams that help in designing the components of an application before implementation [13].

In our project, we used the following diagrams:

- **Use Case Diagram**

This diagram outlines the key features (use cases) available to the user:

- Main actor: User
- Available actions:
 - Log in or register
 - Fill the wallet
 - Buy permission (ticket or subscription)
 - Choose ticket count / set subscription period
 - Scan the QR code for validation
 - Send money to a friend
 - Look for a station on the map
- Other actors:
 - Pay Method: involved in the payment process
 - Friend: the recipient of money

- **Class Diagram**

Class diagrams are one of the most challenging diagrams in the Unified Modeling Language (UML) to draw. To create detailed and useful diagrams, you need to study the UML and Object- Oriented principles for a long period. Therefore, this page provides you with a very high-level overview of this process [4].

This is the system architecture that describes the structure of the application using classes:

- User:
 - Has ID, username, password, email.
 - Can log in, register, and view tickets.
- Wallet & Transaction:
 - Wallet holds user balance.
 - Transactions handle sending/receiving money.
- Ticket & Subscription:
 - Ticket: has type, status, purchase date, and count.
 - Subscription: has a start/end date, status, and validation method.
- Payment:
 - Handles payment processing and status checks.
- Map:
 - Used for selecting departure and arrival stations.

- Validation Service & QR Code Scanner:
 - Validate the user's ticket or subscription using scanned QR codes.

- **Activity Diagram**

A sequence diagram is a UML (Unified Modeling Language) diagram that represents the sequence of messages between objects during an interaction. A sequence diagram includes a group of objects, represented by lifelines, and the messages exchanged between these objects during the interaction.

Sequence diagrams represent the sequence of messages transmitted between objects. They can also represent control structures between objects. For example, the lifelines in a sequence diagram for a banking scenario might represent a customer, a teller, or a branch manager. The immunizations between the customer, teller, and manager are represented by the messages between them. The sequence diagram represents the objects and the messages between these objects [4].

This diagram shows the step-by-step process a user follows in the app:

- Starts with searching for tramway permission.
- If the user doesn't have an account, they must sign in.
- Once logged in, the user can:
 - Fill their wallet with money.
 - If payment fails, they're notified.
 - If successful, they can proceed to buy permission.
 - Send money to a friend by entering their ID and amount.
 - Choose between buying a ticket or a subscription:
 - If a ticket, the user selects the quantity.

If a subscription, the user sets the period.

- After a successful purchase:
 - The user scans a QR code.
 - If the code is valid, permission is granted.
 - If invalid, access is denied.
- The user can also click on the map to search for a specific station.

5.2 Development Tools and Technologies

The development of "Setram Go" relied on modern cross-platform and backend technologies to ensure flexibility, performance, and maintainability:

- Frontend: React Native — for building a hybrid mobile interface compatible with both Android and Ios [9].
- Backend: Express.js — used to develop RESTful APIs and handle server-side logic [11].
- Other Tools:
 - Geolocation APIs for map integration [10].
 - QR code scanner libraries [14].
 - Custom CSS for UI design and styling.

These technologies allowed the team to implement a scalable and user-friendly solution tailored for urban transportation needs in Algeria [9-12].

5.3 User Interface Design

The user interface (UI) was implemented using React Native combined with custom CSS styling. This allowed for a responsive and cross-platform mobile experience, available on both Android and iOS.

The application prioritizes clean layouts and intuitive navigation, enabling users to perform key actions like login, ticket purchase, and validation with minimal effort.

5.4 Key Application Interfaces

- Login and Registration Screen: This is the entry point of the application where users can either sign in or create a new account using their email address. The design is simple and guides users through the authentication process securely (See Figure 4).
- Wallet Recharge Interface: The wallet screen allows users to add balance to their account using different payment methods such as Edahabia (local card), Mastercard, or PayPal. This balance can later be used to buy tickets and subscriptions (see Figure 5).
- Ticket Purchase Interface: Users can browse available ticket options such as one-way, round trip, or day pass. The purchase process is straightforward and requires selecting a type and confirming the transaction from the wallet balance (see Figure 6).

- Subscriptions Management: In this screen, users can view and manage their active subscriptions. Each subscription type (student, employee, etc.) is visually distinct, and activating one may require document verification (see Figure 7).

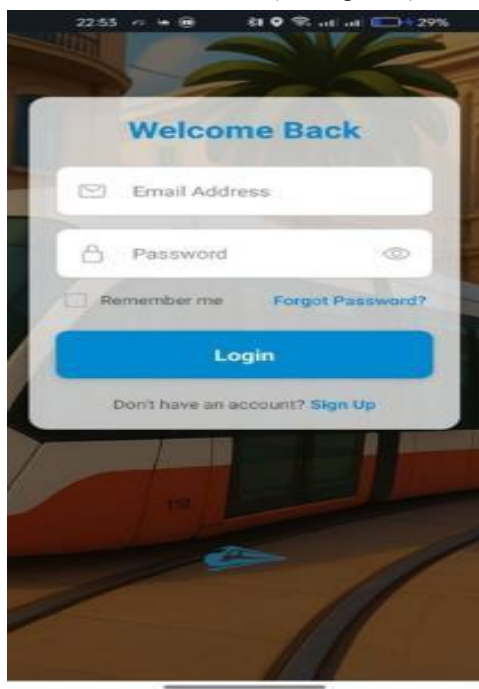


Figure 4. Login and registration

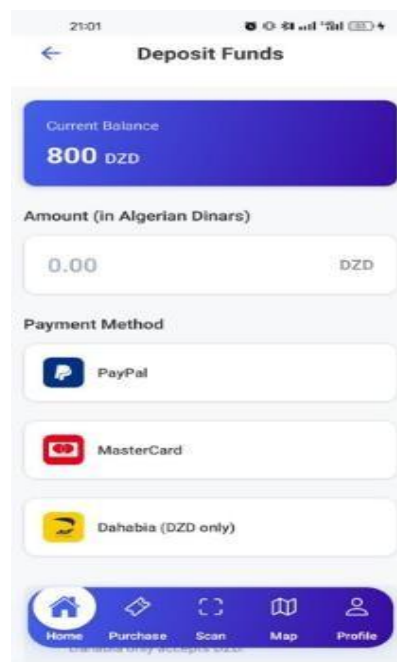


Figure 5. Wallet recharge interface

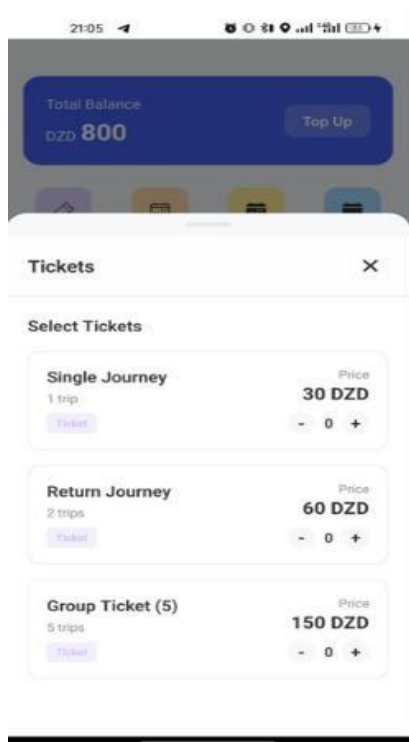


Figure 6. Ticket purchase interface



Figure 8. QR code scanner screen

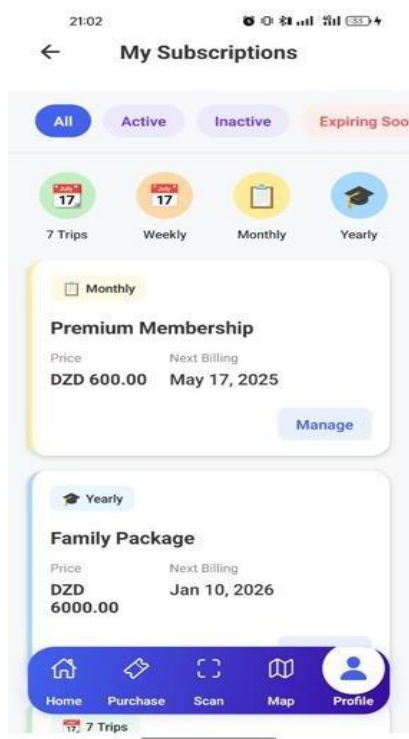


Figure 7. Subscriptions interface

- QR Code Scanner: The QR code scanning feature is an essential part of Setram Go’s ticket validation process. The application uses the mobile camera to scan a predefined QR code available at tram stations (see Figure 8).

Once scanned, the application:

- Verifies the station’s identity using the QR content.
- Matches the user’s location if needed. Displays a list of valid tickets and subscriptions.
- Allows the user to choose which ticket or subscription to validate.
- This method provides a secure, location-based validation process without requiring internet access to fetch new QR codes (see Figure 9).

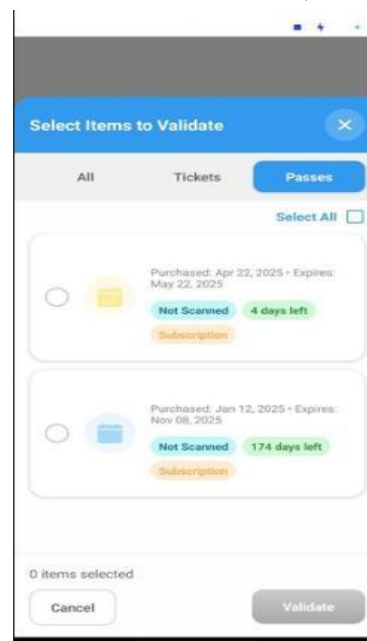


Figure 9. validation tickets

- Interactive Station Map: The map interface shows nearby tram stations using GPS data. Each station's location is manually set using Google Maps coordinates, and the app displays the distance between the user and the station in real time (see Figure 10).

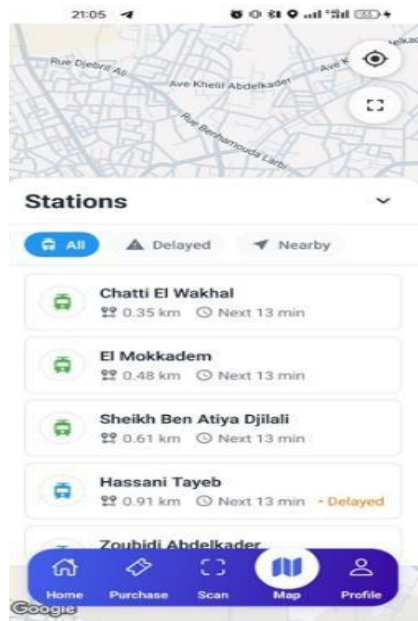


Figure 10. Map and station locator

6. Testing Environment

The testing of the "Setram Go" application was conducted in a simulated development environment. The frontend components were tested using emulators for both Android and iOS via React Native tools [9], while backend services built with Express.js were tested locally using REST clients such as Postman [11]. The database layer, implemented using MongoDB, was hosted on a local instance to simulate full application behavior [12]. No real payment gateway was integrated; instead, payment functionalities were simulated for testing purposes.

6.1 Functional Test Scenarios

Functional testing was carried out to validate the main features of the application according to predefined use-case flows. These scenarios were manually tested to ensure the correctness of the application logic and interface behavior as illustrated in Table 1.

6.2 Usability Observations

Although not tested with real end users, internal testing highlighted the following strengths:

- The user interface is intuitive and easy to navigate.

- Transitions between components are fluid.
- Multilingual support is functional and clear [8].
- Real-time map integration enhances user orientation.

Table 1. Summary of functional test scenarios and results

Feature Tested	Result	Notes
User Registration/Login	Success	Email-based registration and login tested.
Wallet Recharge	Success	Simulated top-up using mock payment data.
Ticket Purchase	Success	Various ticket types purchased successfully.
Subscription Activation	Success	Document upload and category verification tested.
QR Code Scanning	Success	Scanner detected and handled codes correctly.
Map and Geolocation	Success	Stations displayed with accurate distances.
Language Switching (EN/AR)	Success	Interface adapted correctly to both languages.

6.3 Identified Limitations

Despite positive test outcomes, several limitations were observed:

- Absence of Real Payment Integration: All payments were simulated. Integration with actual payment gateways such as Edahabia or PayPal remains pending [11, 12].
- Manual Document Verification: Identity documents are processed manually, which is not scalable and may lead to inconsistencies.
- Internet Dependency: The application requires an active internet connection for nearly all operations, including QR validation and wallet access [14].
- Lack of Offline Ticket Access: Users cannot access their tickets without internet connectivity, reducing accessibility in low-coverage areas.
- Security Concerns: No advanced security features such as encrypted QR tokens or time-based validation are currently implemented [15].
- Lack of Analytics: The system does not yet collect user activity data or feedback for continuous improvement [6].
- Limited Accessibility Features: The application does not currently support visually impaired users or users with other accessibility needs.

6.4 Future Improvements

To enhance the capabilities and readiness of "Setram Go" for deployment, the following improvements are proposed:

- Integration with Real Payment APIs: Establish connections with financial platforms for secure online payments using national and international cards.
- Automated Document Processing: Employ OCR or identity verification services for automatic document validation upon subscription requests [13].
- Offline Functionality: Implement secure caching of tickets to enable validation even when offline [15].
- Enhanced QR Security: Use encrypted payloads, expiration mechanisms, and session tokens for QR validation [15].
- AI-driven Recommendations: Analyze user behavior to propose subscription plans or ticket types using machine learning [6].
- Cloud-Based Backend Deployment: Migrate server components to scalable cloud infrastructure (e.g., AWS, Azure) to support broader access and monitoring [13].
- Accessibility Compliance: Introduce screen reader compatibility, adjustable text sizes, and high-contrast themes.
- Loyalty and Reward Programs: Encourage regular usage by offering bonuses or discounts for frequent users.
- Multi-Modal Integration: Expand the application to support additional transport services, such as intercity buses, under a unified platform.

7. Conclusion

In conclusion, this project presented the design and development of "Setram Go", a hybrid mobile application aimed at digitizing the ticketing and subscription process for the Setram public transport system in Ouargla. The application addresses key challenges such as manual ticketing delays, lack of electronic payment options, and limited accessibility.

Through an iterative development process using React Native for the frontend and Express.js with MongoDB for the backend, the application provides functionalities including user registration, wallet management, ticket purchase, QR code scanning for ticket validation, and

<https://csj.nabea.pub>

station location mapping. Testing in a simulated environment confirmed the application's functional viability and usability.

Looking forward, several opportunities exist to enhance and expand "Setram Go":

- Integrating real payment gateways to enable secure, seamless transactions.
- Automating document verification to streamline subscription management.
- Extending offline capabilities to improve service reliability in low-connectivity areas.
- Enhancing security features around QR code validation.
- Incorporating data analytics and AI to personalize user experiences.
- Expanding the application's scope to cover additional transportation modes and regions.

These developments will contribute toward realizing a fully digital, efficient, and user-friendly public transport ecosystem in Ouargla and potentially throughout Algeria.

Conflict of Interest: The authors declare no conflicts of interest.

Funding: This research received no external funding.

Author Contributions: All authors contributed equally to this work. All authors read and approved the final version of the manuscript.

References

- [1] C. Arribi and S. Boutarfa, "Digital Transformation: Opportunities and Challenges of Digitization in Algeria," *Economic Researcher Review*, vol. 12, no. 1, pp. 37-55, 2024.
- [2] U. C. Portion, I. Chidimma, and C. E. Nwokike, "Digital transformation of public services and its influence on the business landscape in African states," *International Journal of Research Publication and Reviews*, vol. 4, no. 9, pp. 467-472, 2023.
- [3] N. Lakhdari, "The impact of digital transformation on economic growth in Algeria: an econometric study," *Al Bashaer Economic Journal*, vol. 10, no. 2, pp. 585-600, 2024.
- [4] C.-C. Chen, C.-H. Chang, and K.-L. Hsiao, "Exploring the factors of using mobile ticketing applications: Perspectives from innovation resistance theory," *Journal of Retailing and*

- Consumer Services*, vol. 67, p. 102974, 2022, doi: <https://doi.org/10.1016/j.jretconser.2022.102974>.
- [5] A. P. Aristio, M. A. F. Iskandar, A. P. Ramadhansyah, S. Supardi, G. P. Utomo, and A. N. Parahita, "The intention of using mobile ticketing in online travel agent," *Procedia Computer Science*, vol. 197, pp. 273-281, 2022, doi: <https://doi.org/10.1016/j.procs.2021.12.141>.
- [6] J. Bian, W. Li, and C. Lee, "Current practices and emerging trends of transit apps for fixed-route bus services in the US," *Journal of Public Transportation*, vol. 25, p. 100052, 2023, doi: <https://doi.org/10.1016/j.jpubtr.2023.100052>.
- [7] S. C. Kim, D. Yoon, and E. K. Han, "Antecedents of mobile app usage among smartphone users," *Journal of Marketing Communications*, vol. 22, no. 6, pp. 653-670, 2016, doi: <https://doi.org/10.1080/13527266.2014.951065>.
- [8] L. Gracz, "The use of mobile applications for purchasing tickets for public transportation in Poland," *European Research Studies Journal*, vol. 26, no. 4, pp. 86-95, 2023.
- [9] Meta Platforms, "React Native Documentation," 2025. [Online]. Available: <https://reactnative.dev/docs/getting-started>
- [10] Developers, "Google Maps Platform Documentation," 2025. [Online]. Available: <https://developers.google.com/maps/documentation>
- [11] Express 5.2.1, "Fast, unopinionated, minimalist web framework for Node.js," 2025. [Online]. Available: <https://expressjs.com/>
- [12] MongoDB, "MongoDB Documentation," 2025. [Online]. Available: <https://www.mongodb.com/docs/>
- [13] Microsoft Learn, "Best practices for RESTful web API design," 2025. [Online]. Available: <https://learn.microsoft.com/en-us/azure/architecture/best-practices/api-design>
- [14] Expo Docs, "Expo Camera," 2025. [Online]. Available: <https://docs.expo.dev/versions/latest/sdk/camera/>
- [15] auth0 Docs, "JSON Web Tokens," 2025. [Online]. Available: <https://auth0.com/docs/secure/tokens/json-web-tokens>

How to cite this article

A. Nadjet, B. Zakaria, T. M. Lazhar, O. Youcef, and K. Souhil, "Mobile App for Purchasing Tickets: Setram Tickets Ouargla, Algeria," *CyberSystem J.*, vol. 2, no. 2, pp. 69-78, 2025. doi: 10.57238/csj.2025.1014



Access this article online