



Navigating the Future of Metro Travel with Online Transaction Smart Cards



Presentation on Capstone project

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Introduction

What it is?

- Online transaction system/ application enabled Metro rail smart card system.
- Allows faster payments from any location.
- Reduced station entry traffic.
- Secure passenger data protection and fraud prevention.
- Account administration with balance monitoring and fare payment management.



Motivation

Why it is needed?

- Integration with online transactions for faster, convenient, and secure fare payments.
- Centralized management through a secure server, reducing traffic at station.
- Enhanced security measures to protect passenger data and prevent fraud.
- Account administration features monitor balances and manage fare payments.
- Customizable information sharing options, giving users control over their data.



Objectives

What are the aims of the project?

- Develop an Online Transaction system/ application.
- Implement smooth and precise online Recharge Functionality.
- Develop Card Balance and Transaction monitoring module.
- To ensure Security and Privacy of users' and passengers'.
- Integrate with Existing Metro Rail Infrastructure.



Literature Reviews

Backed by several literature reviews!

[1] A.Shaik et al. proposed a new MRTS architecture, featuring modern mobile app for internet transactions in transportation. RFID technology for e-ticketing and offers insights into existing systems. The app offers better security and a comprehensive solution for a metro rail ticketing system, enhancing passenger experience and leveraging mobile technology.

[2] Marie-Pier Pelletier et al. Proposed a technique to collect revenues in public transit producing large quantities of detailed data communicating with a central server without physical contact. The smart card system is of a great service in this sector by adjusting systematic schedule adjustment, distinguishing planned and implemented systems, and survival models applied to ridership.



Literature Reviews

Backed by several literature reviews!

[3] Lacmanović et al. Utilized embedded ac-RFID technology rather than contactless transactions, which do not call for physical contact. The main goal was to enhance customer satisfaction for retail transactions while retaining computing speed and RF sensitivity. The firm can tailor the forms of payment media thanks to the streamlined user experience with the payment system.

[4] Chau, Patrick Y. K. et al. "Octopus," an automated fare collection system, is composed of three crucial components. By focusing on a narrow market with high transaction volumes, it offers users of various public transit modes convenience and cost-effectiveness. Transactions are accelerated and made simpler using contactless smart cards, whose independence from rival platforms ensures widespread acceptance and rapid uptake.



Literature Reviews

Backed by several literature reviews!

[5] Olivier Caelen et al. introduced a fraud detection strategy for online credit card transactions using transaction qualities, customer spending patterns, and network features. The "six-seconds rule" enables accurate online and offline fraud detection.

[6] AL-Maliki et al. proposed a payment protocol with five methods: magnetic stripes, chip & PIN, chip & signature, contactless cards, and mobile payments. The focus was on security attacks to uncover vulnerabilities in the EMV payment protocol.



Problem Analysis

Problem arose from analyzed reviews!

- The existing systems need physical contact during balance recharges.
- Integrating online transactions may cause data breaches.
- The user experience is not so convenient account monitoring.
- potential disparity in speed and efficiency.
- Legacy infrastructure might cause compatibility issues with the new online system.



Hardware



RFID Card & Reader



NodeMCU



Intel Core i3 or AMD Ryzen 3



Minimum of 4 GB of RAM



OS: Windows or Linux



Software



VS Code & Bash Terminal



NodeJS



postgreSQL



Git

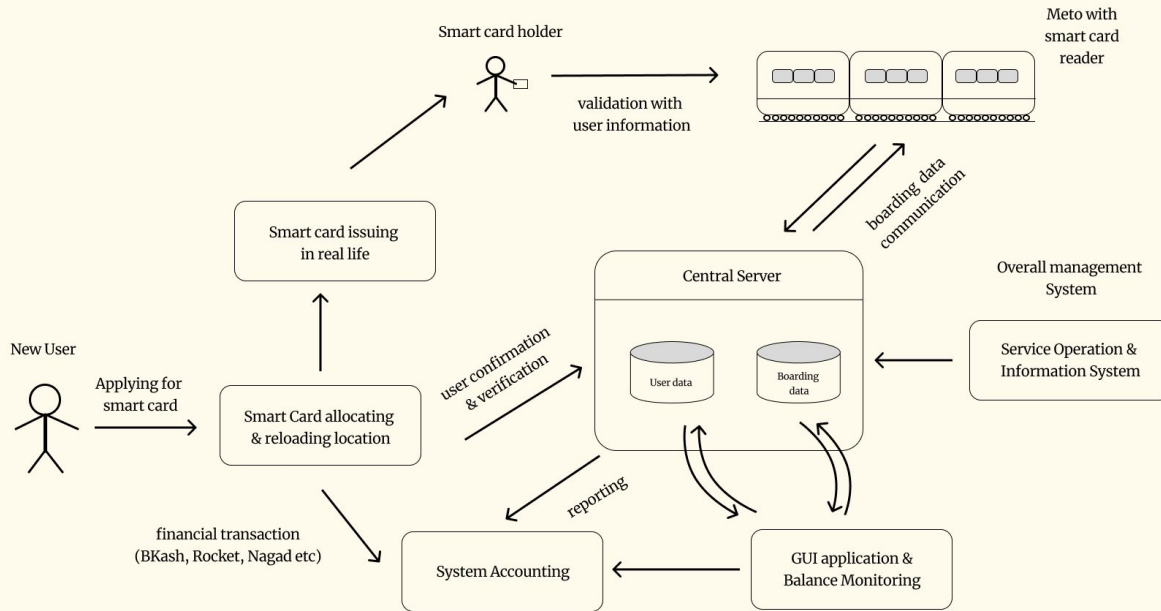


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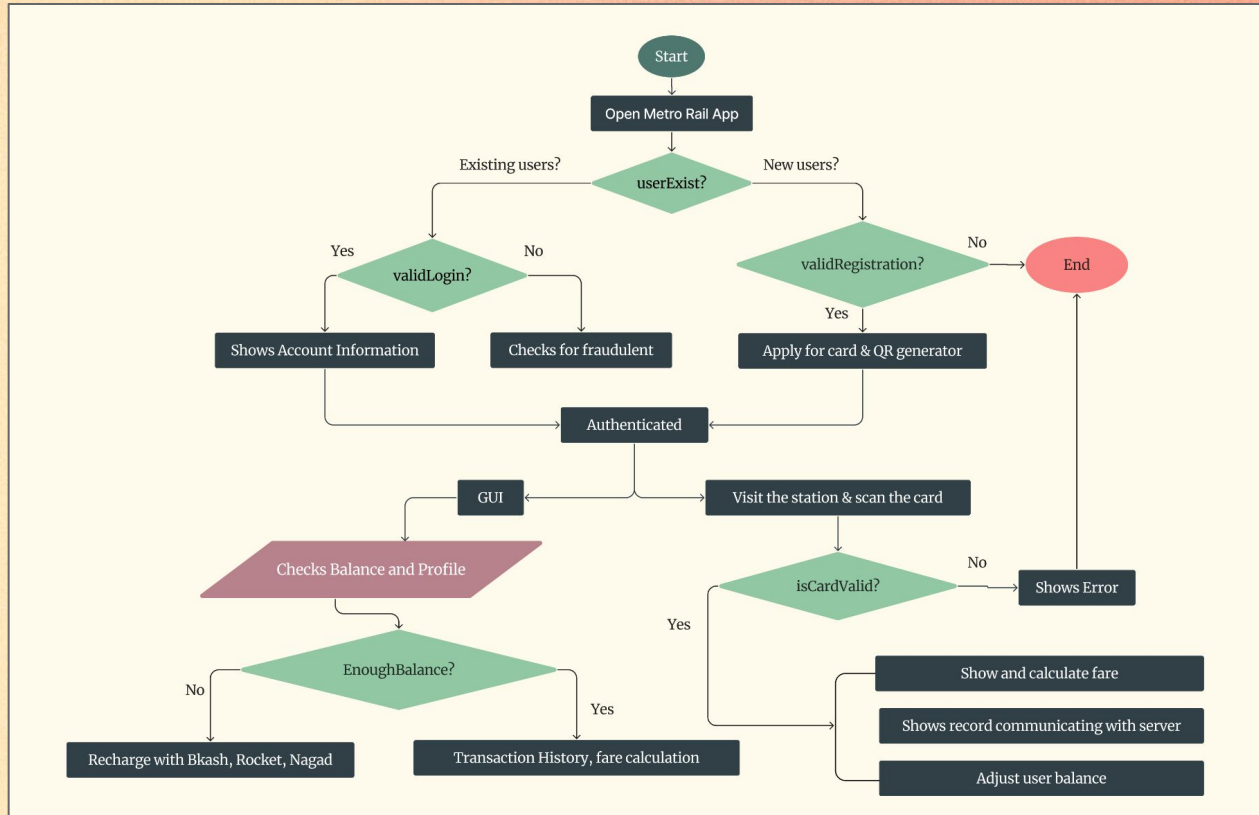




Proposed Methodology



Flow Chart



Conclusion

- Literature reviews explore metro implementation, benefits and user satisfaction.
- Case studies analyze contactless cards, security measures and user feedback.
- Integration potential transport and non-transport payment systems is studied.
- The review notes setup costs, compatibility issues, and future trends like technology advancements and mobile usage expansion.



References

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- [4] Patrick Y. K. Chau and Simpson Poon. Octopus: An e-cash payment system success story. *Commun. ACM*, 46(9):129–133, sep 2003
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Thank You!

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