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# RFID BASED SMART MASTER CARD FOR BUS TRAIN METRO TICKETING

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## PROBLEM SCOPE

The challenges faced by urban commuters in current transportation systems form the core of the problem scope addressed by the Smart Traveling Card initiative. Within the scope of contemporary urban environments, where diverse modes of transportation such as buses, trains, and metros coexist, the existing travel card systems fall short in providing a holistic and dynamically managed payment solution. The identified problem lies in the absence of real-time fund management capabilities, a crucial aspect for users navigating through dynamic travel scenarios

## ABSTRACT

Buses, trains, metros, and private automobiles are among the many modes of transportation available in today's cities. Each mode of transportation now has its own way of collecting fares, making it a time-consuming procedure for consumers to keep track of fares for each mode of transportation. As a result, we suggest a smart master card system that connects all of these systems and enables for a single

master card and centralized system for all modes of transportation. We employ three RFID scanners to showcase this notion as bus, train, and metro train smart card scanners, respectively. We now utilize a single smart card that is compatible with all of the platforms. We now provide a fourth card, the master smart card, which can be used on all three scanners, allowing the user to utilize any mode of transportation they want with the same card. The system also allows for the selection of a source and destination, and deducts a specific amount from the user's master card as a result. In this work, an RFID-based ticketing system is proposed with the goal of offering a comfortable, stress-free, and simple mode of transportation while simultaneously reducing manpower. The standard ticket system via smart card, which stores all of the user's details, including bank account information, was installed in this automated system. This is comparable to an ATM card. If customers indicate that they want to take a specific bus, they can acquire tickets using RFID technology by flashing the

ticket in front of the bus, which opens automatically and closes after a specified amount of time. We can see how many passengers are on board the bus and how many empty seats there are by utilizing an LCD monitor. Keywords: RFID, Transportation, Card

## INTRODUCTION

The introduction of the Smart Traveling Card represents a paradigm shift in the realm of travel convenience, seamlessly integrating RFID technology, NODEMCU, and an OLED display to redefine the travel experience. This innovative card aims to streamline the payment process for commuters across various modes of transportation, including buses, trains, and metros. Unlike conventional travel cards, the unique feature of this smart card lies in its ability to allow users to charge the associated account in real-time, providing an unparalleled level of flexibility and control. The convergence of RFID technology, NODEMCU (a versatile open-source IoT platform), and the OLED display enables users to experience a sophisticated and user-friendly travel payment system. The RFID reader embedded in the card facilitates swift and contactless transactions, allowing travelers to effortlessly swipe the card at designated points on buses, trains, and metro stations.

This seamless integration not only enhances the efficiency of the travel process but also contributes to reducing congestion and transit delays.



Figure 1.1 Over view of the Smart Travel Card

The NODEMCU, functioning as the brains of the operation, establishes a robust connection between the smart card and the user's account, enabling real-time financial transactions. Users can conveniently manage and monitor their account balance, adding funds as needed through a secure and user-friendly interface. The advanced functionalities of the NODEMCU empower the card with the capability to process transactions rapidly, ensuring a smooth and hassle-free experience for travelers. The OLED display serves as the interactive interface, providing users with essential information such as account balance, transaction history, and travel details. This visual feedback enhances transparency and user engagement, allowing individuals to

stay informed about their travel expenditures in real-time. The display also contributes to a more intuitive and user-centric interaction, fostering a positive user experience. The Smart Traveling Card not only revolutionizes the way commuters navigate through different modes of transportation but also introduces a novel approach to managing travel expenses. This integration of cutting-edge technologies not only elevates the efficiency of travel transactions but also places the power of financial control directly into the hands of the users. As we delve deeper into the functionalities and design principles of this smart card, it becomes evident that it represents a transformative leap towards a more connected, convenient, and user-centric future of travel.

## LITERATURE SURVEY

The extensive literature survey undertaken for the Smart Travelling Card initiative is a nuanced exploration across various domains, providing a comprehensive understanding of existing research, technologies, and methodologies. Delving into the intricate landscape of urban mobility and payment systems, the survey uncovers the multifaceted challenges faced by commuters in contemporary transportation networks. Studies on

congestion dynamics, user experiences, and financial management in urban transportation set the stage, offering valuable insights into the complex milieu that the Smart Travelling Card seeks to address. Moving into the realm of technology, the survey scrutinises the application of RFID technology within transportation systems. The focus is on how RFID facilitates contactless transactions and augments the overall efficiency of fare payment. The examination extends beyond theoretical frameworks to encompass real-world implementations, drawing from success stories and challenges faced in integrating RFID-based payment solutions. Concurrently, the survey probes the capabilities of NODEMCU, an open-source IoT platform, assessing its potential in optimising transaction processing. Insights garnered from this exploration are pivotal in understanding how the integration of such technologies contributes to the efficiency and seamlessness of the proposed Smart Travelling Card. The integration of OLED displays in user interfaces emerges as a pivotal aspect of the survey, elucidating the impact of visual feedback on user engagement, transparency, and overall user experience. By drawing from relevant studies, the Smart Travelling Card initiative aims to

implement a user-centric design that prioritises empowerment and positive interactions. Furthermore, the survey navigates through existing payment solutions adept at transitioning across various transportation modes. This investigation is instrumental in uncovering the key factors that contribute to the versatility and adaptability required for success in the diverse and dynamic landscapes of urban environments. The literature survey extends its reach to studies focusing on real-time fund management in travel cards. Understanding user experiences, challenges, and the implications of such systems on financial transparency provides crucial insights. Success stories and case studies related to smart card initiatives in urban transportation contribute valuable lessons, offering a practical understanding of the triumphs and challenges encountered in real-world implementations. The literature survey for the Smart Travelling Card initiative delves into a multifaceted exploration of existing research, technologies, and methodologies across several key domains. Firstly, an in-depth examination of urban mobility and payment systems provides valuable insights into the challenges inherent in current transportation paradigms. Studies on

congestion, user experience, and financial management in urban transportation form the foundation for understanding the contextual background of the Smart Travelling Card initiative. The survey then scrutinises the application of RFID technology in transportation systems, investigating its role in facilitating contactless transactions and enhancing efficiency in fare payment. Exploration of success stories and challenges in implementing RFID-based payment solutions informs the potential benefits and pitfalls of incorporating this technology. Additionally, the survey delves into the use of NODEMCU, an open-source IoT platform, assessing its capabilities in optimising transaction processing and overall efficiency in IoT-based solutions. The integration of OLED displays in user interfaces takes centre stage in the literature survey, where studies on visual feedback contribute to user engagement, transparency, and a positive overall experience. Insights from these studies inform the user-centric design principles for the Smart Travelling Card, emphasising empowerment and positive interactions. Furthermore, an exploration of existing payment solutions that transition seamlessly across various transportation modes, including buses, trains, and metros,

sheds light on the versatility and adaptability required for success in diverse urban environments. The survey extends to literature on real-time fund management in travel cards, aiming to understand user experiences, challenges, and the impact of such systems on financial transparency. Additionally, it explores success stories and case studies related to the implementation of smart card initiatives in urban transportation, offering valuable lessons from both triumphs and challenges. In a broader context, the literature survey encompasses technological innovations in urban mobility, focusing on advancements in payment systems, smart cards, and IoT applications. This exploration is crucial for aligning the Smart Travelling Card initiative with the evolving landscape of transportation technology. Lastly, insights from smart city initiatives emphasise the importance of adaptability and scalability in transportation solutions, ensuring that technological advancements meet the changing dynamics of urban centres. The comprehensive literature survey aims to equip the Smart Travelling Card initiative with a nuanced understanding of existing knowledge, enabling it to leverage insights, bridge identified gaps, and contribute to the evolution of innovative solutions in urban mobility and payment systems.

Zooming out, the survey widens its lens to capture technological innovations in urban mobility, exploring advancements in payment systems, smart cards, and IoT applications. This exploration is vital for ensuring that the Smart Travelling Card initiative aligns seamlessly with the evolving technological landscape of transportation. The survey culminates by gleaning insights from smart city initiatives, emphasising the paramount importance of adaptability and scalability in transportation solutions. This broader perspective ensures that technological advancements are not only innovative but also capable of meeting the dynamic needs of burgeoning urban centres. The extensive literature survey is a crucial foundation for the Smart Travelling Card initiative, providing a rich tapestry of insights, best practices, and potential pitfalls. It equips the initiative with the knowledge needed to navigate the complex intersection of technology, user experience, and urban dynamics, ensuring a holistic and informed approach to the development of this innovative solution.

**EXISTING SYSTEM** The current method has less transparency and security, which does not suit the expectations of passengers. It guarantees that every passenger has a printed ticket for the duration of the voyage.

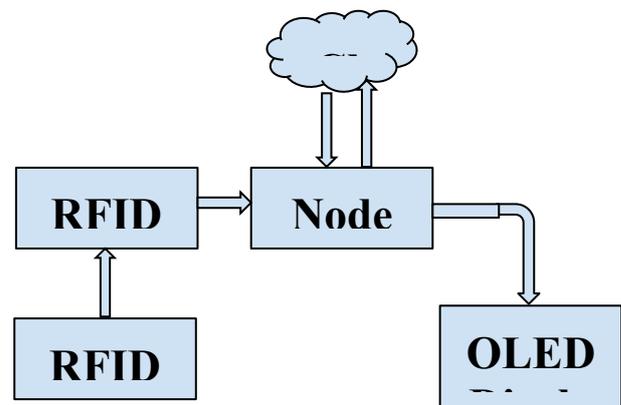
This will take more time and squander human and energy resources. Even portable ticketing machines are sluggish and require a qualified operator to use. The primary impediment to taking public transportation in our everyday lives is the unpredictability of waiting at stops or in lengthy lines; there are also ticketing issues and faults that generate commotion at stops and stations. So our designed smart master card would address our difficulties and save the time we spend waiting in huge lines at stations.

### PROPOSED SYSTEM

The primary reason for using RFID Card technology is reusability, which is far more efficient than the old paper-based ticketing system. It will not only reduce the need for human retrieval, but it will also contribute to a seamless travel experience. This initiative introduces the notion of e-currency and lowers human work. RFID technology is utilized to identify the smart master card and the distance travelled by the passenger, as well as to maintain track of the user's source and destination. In our everyday lives, we use public transportation and encounter issues such as long ticket lines and commotion at train stations. So this smart master card will solve our difficulties and save us time waiting in huge lines at stations. In addition, we hope that our suggested approach, which assures

maximum safety and security, will help to decrease fraud. The system that calculates fares and provides tickets via messaging, informing the user and guardian of the transaction's status via messages sent to the registered cellphone number

### IMPLEMENTATION



The methodology for the Smart Travelling Card initiative is intricately structured to translate the wealth of insights derived from the extensive literature survey into a tangible and innovative solution. This multifaceted approach involves a combination of technology integration, user-centric design principles, and a robust testing and implementation strategy. The first facet of the methodology focuses on the integration of key technologies. The implementation of RFID technology takes centre stage, necessitating the development of both hardware and software components for enabling seamless contactless transactions. Simultaneously, the integration of NODEMCU, an open-source

IoT platform, is strategically planned to optimise transaction processing. This involves the development of software functionalities to harness the capabilities of NODEMCU for swift and efficient transaction processing in real-time. Additionally, the inclusion of an OLED display in the card's design is a crucial aspect. The methodology emphasises the development of a user-friendly interface that showcases real-time information on account balances, transaction history, and travel details. The second aspect of the methodology revolves around the implementation of user-centric design principles. Prototypes and mockups will be created, incorporating iterative feedback from users to refine the design continually. The real-time fund management capabilities of the Smart Travelling Card will be a pivotal focus, allowing users to dynamically adjust their account balances during travel. The design will prioritise transparency, ensuring users have a clear understanding of their financial transactions. Testing forms an integral part of the methodology. The versatility of the Smart Travelling Card across multiple transportation modes will undergo comprehensive testing through simulation scenarios and real-world scenarios. Efficiency and transaction processing will

be rigorously tested to assess transaction speed, system responsiveness, and overall reliability. Pilot testing with a select group of users will provide valuable real-world feedback on usability, reliability, and overall satisfaction. The scalability and adaptability of the technology to different urban environments and varying scales of transportation systems will be assessed as part of the methodology. This involves evaluating how well the Smart Travelling Card aligns with the dynamic needs of urban centres, ensuring its continued effectiveness as cities evolve. The methodology adopts an iterative development approach, where insights from testing phases and user feedback inform continuous refinement. Optimization processes will be implemented to enhance system efficiency, user interface, and overall performance. Throughout the entire process, comprehensive documentation will be maintained, encompassing design principles, technological integrations, testing methodologies, and user feedback. Knowledge transfer sessions will ensure the seamless dissemination of information for future maintenance and enhancements. The proposed methodology reflects a systematic and adaptive approach, ensuring the Smart Travelling Card initiative not only meets its outlined objectives but also remains

flexible and responsive to the dynamic landscape of urban mobility and technological advancements.

**CONCLUSION** The system should be totally automated, dependable, transparent, and user-friendly. The cards are far more handy than the paper-based ticketing system since they are reusable. The card may also be used as a universal travel pass, allowing access to any mode of transportation on any route. Unwanted incidents may be prevented since everyone who travels with RFID tickets is tracked at all times. In the future, we will be able to use a similar card by altering it at shopping malls, toll booths, parking lots, and other locations. With few or no modifications, the entire system may be employed in highway vehicles, toll payment systems, and railway ticketing systems. The cards are far more handy than the paper-based ticketing system since they are reusable. The cards are far more handy than the paper-based ticketing system since they are reusable. The card may also be used as a universal travel pass, allowing access to any mode of transportation on any route. Unwanted incidents may be prevented since everyone who travels with RFID tickets is tracked at all times. Also, the prospects for minimizing traffic bottlenecks and

confusion in bus stops, which we frequently encounter in cities, are enormous.

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