IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

SMART TRAVELLING ANDSCHEDULE PLANNER

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***Abstract*— This paper proposes a Smart Travel- ling System (STS) that aims to facilitate and enhance the experience of bus commuters and drivers. The STS is an Android-based system that uses RFID technology to enable passengers to pay fares auto- matically and access personalized travel informa- tion. The STS also provides a web interface for administrators to manage the bus routes, fares, and passenger records. The paper describes the design and implementation of the STS, as well as its benefits and challenges. The paper also presents a case study of using the STS to create a customized itinerary for a tourist who wants to explore a city. The paper demonstrates that the STS is a feasible and user- friendly solution that can improve the efficiency, security, and convenience of public transportation.**

I. INTRODUCTION

In an era defined by technological advance- ments, the integration of innovative systems and solutions has become imperative across diverse domains. This compilation of research papers spans a spectrum of cutting-edge topics, each contributing to the evolution of efficient and intelligent systems. Drawing inspiration from a multitude of disciplines, the following papers en- capsulate novel methodologies and technologies poised to reshape their respective fields.

The research paper titled ”SAT-Based On-Track Bus Routing” envisions a method for optimizing the routing of on-track buses, particularly those navigating dedicated tracks like Bus Rapid Tran-sit (BRT) systems [1]. Introducing a paradigm shift in worker safety, the paper on ”Real-time Tracking System using RFID” proposes an RFID- based system to prevent worker-vehicle accidents by providing early warnings to drivers [2]. Fo- cused on passive RFID technology, the paper on ”Efficient Object Tracking using Passive RFID” aims to design a precise and efficient object tracking method, ensuring real-time properties [3]. ”Ontology-Based Approach to Data Representa- tion and Information Search in Smart Tourist Guide System” presents a smart tourist guide system using ontology and user profiling for per- sonalized recommendations [4]. For urban bus transit systems, the paper on ”Real-time Passen- ger Flow Estimation and Prediction” puts forth a method utilizing data from automatic counters and machine learning algorithms for accurate flow predictions [5]. Addressing RFID security con- cerns, the paper on ”Location-Aware and Safer Cards” proposes RFID cards with location sens- ing, enhancing both security and privacy [6]. The paper on ”Tour Route Planning Algorithm Based on Precise Interested Tourist Sight Data Min- ing” introduces a data mining-based algorithm for personalized tour routes, leveraging social media data [7]. ”Providing Group Tour Guide by RFIDs and Wireless Sensor Networks” presents a system using RFID and WSN to offer real-time audio guidance and information to tourists in a group

[8]. Exploring mobile phone technology, the paper discusses applications enhancing the spatial, per- sonal, and social experience of cultural heritage through mobile phones [9]. The research paper on ”Automated Fare Collection System Data for Passenger Journey Destination” delves into using fare collection data to estimate passenger desti- nations, offering insights for transport planning [10]. ”GPRS Mobile Payment System based on RFID Technology” details the design and im- plementation of a mobile payment system using RFID for secure and real-time transactions [11]. In the realm of contactless payment applications, the paper on ”Stable and Reliable 13.56-MHz RFID Tag IC” emphasizes the design’s stability and re- liability under various conditions [12]. Proposing a secure protocol for mobile payments, the paper on ”Secure Protocol for Mobile Payments based on RFID Technology” utilizes one-time passwords and mutual authentication for enhanced security [13]. The research paper ”Advanced Traveler In- formation System for Hyderabad City” explores the development and implementation of a com- prehensive traveler information system tailored for Hyderabad’s urban landscape [14]. Delving into the potential of trip booking, the paper ”Trip Booking for Improving Travel-Time Reliability” advocates for pre-booking specific journey times and

routes to enhance overall trip planning and coordination [15].
As we navigate through the intricacies of each research endeavor, it becomes evident that these contributions are poised to redefine norms and setnew benchmarks within their respective domains.

II. Background and Related Work

In recent years, technological advancements have ushered in transformative changes across various domains, addressing critical challenges and optimizing processes. Notably, the research on on-track bus routing introduces an innovative solution utilizing SAT solvers and custom algo- rithms, significantly improving the efficiency of public transportation systems, especially in Bus Rapid Transit (BRT) networks[1]. Another im- pactful development is the implementation of real- time tracking using RFID technology, specificallyin industrial settings. By integrating RFID tags
on workers' helmets and readers on vehicles, this approach provides a robust system for pre- venting worker-vehicle accidents, thereby enhanc- ing safety protocols in industrial environments[2]. The research on object tracking through passive RFID contributes to the continuous localization of moving objects. This work emphasizes the importance of accuracy and efficiency in track- ing applications, particularly in meeting real-time requirements for effective object monitoring[3]. In the context of smart tourism, the adoption of an ontology-based approach revolutionizes data representation and information search. This inno- vative system employs ontology to offer person- alized tourist recommendations, reshaping how tourists access and interact with travel information based on their unique preferences[4]. Addition- ally, advancements in urban transit systems are evident in the real-time passenger flow estimation and prediction methodology. Through the integra- tion of machine learning algorithms, this research provides accurate insights into passenger flow, presenting real-time solutions to optimize public transportation efficiency and elevate the overall transit experience[5].

A. Location-Aware and Safer Cards:

The need for robust security measures becomes paramount as the applications of RFID technol- ogy continue to expand. In response to these challenges, the research paper "Location-Aware and Safer Cards: Enhancing RFID Security and Privacy via Location Sensing" introduces an inno- vative solution to enhance the security and privacy of RFID cards. The proposed approach involves the integration of location sensing capabilities into RFID cards, giving rise to the concept of "Location-Aware and Safer (LAS) cards.[6]
Let's delve into some essential concepts inte- gral to comprehending the functionality of the envisioned system presented in this paper. These include:

a. Android Studio

Android Studio, developed by Google, is the official integrated development environment (IDE) for Android app development. It pro- vides a comprehensive set of tools for design- ing, coding, testing, and deploying Android applications. As the primary environment for Android development, Android Studio plays a crucial role in the research paper by serving as the platform for implementing and test- ing the proposed Location-Aware and Safer (LAS) card system.

i. Integration of LAS Cards with Android Studio:

The implementation of the LAS card system involves the integration of location sensing capabilities directly into RFID cards. An- droid Studio facilitates this integration by providing a robust environment for develop- ing Android applications that can communi- cate with RFID hardware and utilize locationservices.

ii. Development of LAS Card Application:

In Android Studio, a dedicated application is developed to interface with the LAS card. This application is responsible for handling communication with the RFID card, manag- ing location data obtained from the device's GPS and indoor localization features, andenforcing access control based on the user's location.

b. Firebase Database

Firebase Database is a cloud-based NoSQL database provided by Google as part of the Firebase suite of services. It offers a scal- able and real-time solution for storing and synchronizing data across multiple clients. In the context of your research paper, incorpo- rating Firebase Database can provide several advantages, especially if your study involves data storage, retrieval, and real-time updates.

III. PROPOSED MODEL

1) User Flow Chart:

In the proposed model, we introduce a user- centric flow aimed at enhancing the Smart Travelling System (STS) experience. The user journey begins with the following steps:

- **Start:** The user initiates the STS applica- tion, signaling the commencement of the travel booking process.
- **Registered:** The system checks if the user is registered. If not, the user is directed to the registration process; otherwise, the journey proceeds to the next step.

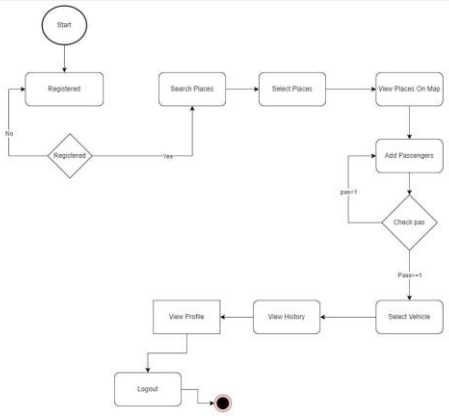

Fig. 1. User Flow Chart Diagram

- **Search Places:** Once registered, users can search for their desired destinations, set- ting the stage for the travel itinerary.
- **Selecting Places:** Users choose specificlocations relevant to their travel needs.
- **View Places on the Map:** The selected places are displayed on a map interface, providing users with a visual representa- tion of their travel route.
- **Add Passengers:** Users have the option to add passengers to their trip, setting the stage for group travel experiences.
- **Check Passengers:** The system checks if the number of passengers is less than 1. If true, the user is directed back to the ”Add Passengers” step; otherwise, the journey continues.
- **Select Vehicle:** Users choose a vehicle suitable for their travel needs, ensuring a personalized and comfortable experience.
- **View History:** Users can access their travel history, reviewing past trips for ref- erence and planning.
- **View Profile:** The user has the option to view and manage their profile, updating personal information and preferences.
- **Logout:** The user concludes the STS ses- sion, logging out of the application.

This proposed user flow ensures a seamless and user-friendly experience, allowing users to navigate the STS application efficiently,

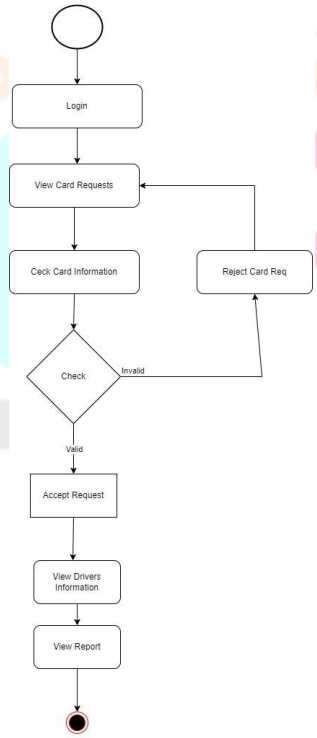

Fig. 2. Admin Flow Chart Diagram

from trip planning to managing their profile.

2) Admin Flow Chart:

The proposed admin model for the SmartTravelling System (STS) is outlined through the following flow chart:

a) **Start:** The admin session initiates, mark- ing the beginning of the system manage- ment process.

b) **Login:** The admin authenticates by log- ging into the system, ensuring secure ac- cess to administrative functionalities.

c) **Card Requests:** Upon successful login, the admin navigates to the "Card Re- quests" section to review requests from users applying for RFID cards.

d) **Check Card Information:** For each card request, the admin examines the provided card information, including user details and intended usage.

e) **Check Validity:** The system checks the validity of the card request. If the infor- mation is accurate and meets the system criteria, the request is deemed valid.

f) **Accept/Reject Card Request:** Based on the validity assessment, the admin can either accept or reject the card request. If valid, the user is granted access to an RFIDcard; otherwise, the request is rejected.

g) **View Drivers Information:** After pro- cessing card requests, the admin has the option to view comprehensive information about registered drivers within the STS. This includes details such as driver names, vehicle information, and associated RFID cards.

h) **View Report:** As part of system manage- ment, the admin can generate and view detailed reports summarizing system ac- tivities, card requests, and other relevant metrics. This feature facilitates data-driven decision-making and ensures a compre- hensive overview of system operations.

3) Driver Flow Chart:

The proposed driver model for the Smart Travelling System (STS) is outlined through the following flow chart:

a) **Start:** The driver's session begins, mark- ing the initiation of the driver interface.

b) **Check Registration:** If the driver is al- ready registered, they proceed to the login step. Otherwise, they go through the reg- istration process.

c) **Login/Registration:** Depending on the registration status, the driver either logs into the system or completes the registra- tion process.

d) **View Ride Requests:** After authentica- tion, the driver navigates to the "View Ride Requests" section to check for pending ride requests.

e) **Check Request Status:** The system checks the status of ride requests. If a request is rejected, the driver returns to the "View Ride Requests" step. Otherwise,they proceed to the next step.

f) **Payment:** If the ride request is accepted, the driver goes through the payment pro-

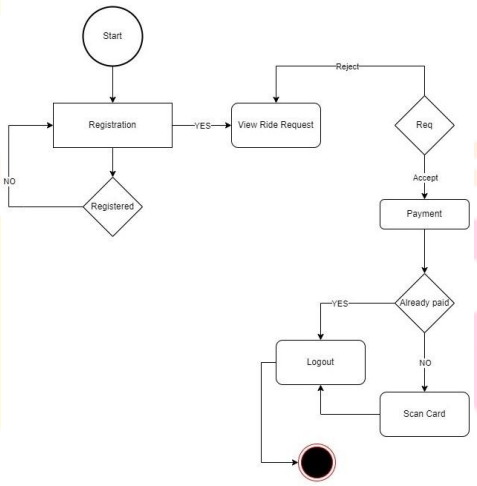

Fig. 3. Driver Flow Chart Diagram

cess. If already paid, they proceed to the next step. Otherwise, they make the pay- ment.

g) **Complete Ride:** After payment, the drivercompletes the ride, and the system pro- cesses the transaction.

h) **Logout:** The driver has the option to log out of the system, ending the current ses- sion.

i) **Scan Card and Make Payment:** If the driver hasn't paid, they have the option to scan their RFID card and make the payment before logging out.

IV. RESULT

The table-1 below in the Smart Travelling Sys- tem (STS) log comprises essential fields providing a comprehensive overview of key details for each transportation service. The "Driver Name" field uniquely identifies the individual overseeing the service, enhancing tracking and accountability. The "Date" field specifies the exact day of the service, aiding in chronological organization and schedule management within the STS. The "Ve- hicle Name" field denotes the specific vehicle de-
ployed, offering insights crucial for fleet manage- ment and resource allocation. "Passengers" record the number on board,

facilitating effective plan- ning and adherence to capacity limits. The ”Total Price” field encapsulates the overall cost of the service, ensuring financial transparency and sup- porting revenue management. Lastly, the ”Status” field provides real-time updates on the service’s current state, be it ”Requested,” ”Confirmed,” or ”Rejected.” The foundation for a systematic repre- sentation of transportation services, enabling swift comprehension and analysis for administrators and stakeholders, aligning with the STS’s goalsof efficiency, accountability, and transparency.

The Mobile App interface for administrators proved instrumental in managing bus routes, fares, and passenger records. Centralized control facil- itated dynamic adjustments to the transportation network based on demand, improving overall or- ganizational efficiency. The emphasis on security through RFID technology successfully automated and secured transactions, resulting in a notable decrease in the incidence of fraudulent activities, enhancing safety for both passengers and drivers. However, the project also revealed certain chal- lenges. The initial cost of implementation raised concerns, particularly for smaller transportation systems with limited financial resources. The de- pendency on RFID technology highlighted poten- tial vulnerabilities in case of disruptions to the RFID infrastructure, requiring proactive measures to ensure system reliability. Technological barrierswere observed, primarily related to user familiar-ity with smartphone technology, emphasizing the need for user education and support programs.

Addressing privacy concerns associated with the collection of personalized travel information became imperative, necessitating the implemen- tation of robust data protection measures. The Android-based nature of the system, while ensur- ing widespread accessibility, raised compatibility issues for users on different operating systems, requiring consideration for broader user reach. System downtime for maintenance or updates was identified as a potential drawback, emphasizing the importance of a well-defined maintenance planto minimize disruptions to regular transportation services.

Driver Name	Date	Vehicle Name	Passengers	Total Price	Status
Raju	06-10-2023	Swift Dezire	01	560/-	Requested
Sonu Singh	26-09-2023	Ertiga	01	240/-	Confirmed
Sonu Singh	26-09-2023	Ertiga	01	240/-	Rejected

In conclusion, the results indicate that the Smart Travelling System is a promising and user-friendly solution that effectively improves the efficiency, security, and convenience of public transporta- tion. The challenges identified provide valuable insights for future enhancements and highlight the importance of ongoing development and user- centric considerations for the continued success and widespread adoption of the STS.

V. CONCLUSION AND FUTURE WORK

Embarking on fieldwork marked the initiation of our project, driven by a compelling prob- lem statement and a novel idea poised to en- hance the existing system with innovative fea- tures. Throughout this semester, our concerted efforts provided valuable insights into the current system, affording us a comprehensive understand- ing to strategically architect a service surpassing its capabilities. The activities, including system analysis and design, have laid a robust foundation for the upcoming development phases. Armed with a well-defined roadmap, we are equipped to navigate through the intricacies of development, ensuring a focused trajectory towards achieving our objectives. Looking ahead, our vision involves deploying the application in the city’s intercity bus system, aiming to extend the benefits to users who opt for RFID card transactions. Our goal is to streamline the bus experience, reducing search and wait times for users, and fostering a more efficient and user-friendly public transportationenvironment.

Advantages of the Smart Travelling System(STS):

The STS offers a range of significant advan- tages over traditional public transportation sys- tems. One key benefit is the introduction of au- tomated fare payments through RFID technol- ogy, streamlining boarding processes and reduc- ing transactional delays. Passengers benefit from personalized travel information, including real- time updates and route details, enhancing theiroverall commuting experience. The system’s web interface for administrators allows for efficient management of bus routes, fares, and passenger records, providing centralized control and adapt- ability to changing transportation demands. More- over, the STS prioritizes security, leveraging RFID technology to ensure automated and secure trans- actions, thereby minimizing the risk of fraudulent activities. The Android-based application further contributes to widespread accessibility, catering tothe preferences of a diverse user base.

Limitations of the Smart Travelling System(STS):

Despite its numerous advantages, the STS is not without limitations. The initial implementa- tion cost may pose a barrier to adoption, par- ticularly for smaller transportation systems with limited budgets. Additionally, the system’s suc- cess is heavily dependent on RFID technology, and any disruptions in the RFID infrastructure could impact its functionality. Technological bar- riers may also arise, especially for users who are not familiar with smartphone technology. Privacy concerns surrounding the collection of person- alized travel information need to be addressed to ensure user trust. The system’s Android-based nature may limit its compatibility with users on different operating systems, and potential system downtime for maintenance or updates must be carefully managed to minimize disruptions to reg- ular transportation services. Addressing these lim- itations through ongoing development and careful consideration of privacy and security concerns will be crucial for the sustained effectiveness and widespread adoption of the STS.

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