iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.52677

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Literature Review: Real-Time Bus Tracking, RFID-Based Bus Ticketing, and RFID for Door Access Control

Prathmesh Somkuwar[1], Prof. Amruta Amune[2], Shravni Mehtre[3], Sohan Kamble[4], Akash Sonawane[5]
B.R.A.C.T Vishwakarma Institute Of Technology

Abstract: ***This review of the literature explores the development, application, and assessment of systems that make use of GPS, GSM, NFC, and RFID technologies. The articles highlight the importance of real-time bus tracking systems, which use GPS and GSM to track the whereabouts of buses. RFID-based bus ticketing systems, where tickets are validated and fares are collected using RFID cards, have a number of benefits, such as quicker boarding, more accurate fare collection, and more customer convenience. The evaluation also discusses the usage of RFID technology for door access control system authentication, which enhance security measures and prevent unauthorised entrance. The results highlight the importance of real-time bus tracking, RFID-based ticketing, and authentication systems for boosting security measures, increasing passenger satisfaction, and improving transit efficiency. Modern transport systems are improving thanks to the incorporation of technology like GPS, GSM, NFC, and RFID, which also lays the groundwork for upcoming improvements and innovations.***
Keywords: GPS, GSM, RFID, NFC, bus ticketing, fare collection, door access control, security, performance evaluation, transportation efficiency.

I. INTRODUCTION

The tracking of buses, ticketing, and access control have undergone recent technological transformations. Real-time bus tracking systems, RFID-based bus tickets, and RFID door access control are now commonplace solutions that boost productivity, accuracy, convenience, and security. This literature review will present an overview and analysis of six chosen works that explore these topics. Real-time bus tracking systems use GPS and GSM technology to track the whereabouts and motion of buses in real time. RFID-based bus ticketing systems use RFID cards or tags to make fare collection and ticket validation operations convenient. RFID-based ticketing systems have advantages such as quicker boarding, more accurate fare collection, and easier management for transportation authorities. These technologies improve customer convenience while also facilitating effective fare collecting administration, which improves revenue management for transportation providers. The use of RFID technology in door access control systems is explored in the third group of publications. These systems offer safe authentication and access control for doors and gates by using RFID cards or tags. These systems have applications in offices, transit hubs, and other places where secure access control is crucial. The chosen papers in this literature review offer insights into the design, implementation, and assessment of real-time bus tracking, RFID-based bus ticketing, and RFID for door access control system authentication. These technologies have the power to change and improve public transportation's effectiveness, providing better services to passengers and easing administrative processes for transportation authorities. This literature study seeks to contribute to the comprehension and development of these technologies in the field of transport systems by offering insights into these domains.

II. REAL-TIME BUS TRACKING

With the combination of GPS and GSM technology, real-time bus tracking systems have made great strides in recent years. These technologies are essential for providing precise and trustworthy bus tracking, increasing transportation effectiveness, and improving passenger experience.

The following key conclusions from the aforementioned studies shed light on several real-time bus tracking system aspects:

1) *GPS and GSM Technologies:* GPS sensors are integrated into buses, allowing for precise vehicle tracking and placement. Real-time updates on bus positions are made possible by GPS technology, enabling accurate tracking and route optimisation. The smooth data transfer capabilities of GSM technology also guarantee ongoing contact between the bus and the tracking system.

©IJRASET: All Rights are Reserved

2) *System Architecture and Design Considerations:* The development of real-time bus tracking systems requires a combination of backend server architecture, GPS, and GSM technologies. The design includes server-side software for processing and visualizing bus locations, GPS sensors deployed on buses, and data transmission protocols. When creating a successful system, factors like scalability, dependability, and ease of integration are essential.
3) *Data Transmission and Communication Protocols:* For real-time bus tracking systems, efficient data transfer and communication methods are crucial. Bus location information can be transmitted over GSM networks to a centralised server, where it can be analyzed and made accessible to the general public. Interoperability and easy interaction with various transportation systems are guaranteed by the use of standardised communication protocols.
4) *Accuracy and Reliability of Bus Location Updates:* For real-time tracking systems to function, bus location updates must be accurate and trustworthy. The studies emphasize how critical GPS technology is in giving accurate bus positioning data. The precision and dependability of position updates can be impacted by elements like signal strength, satellite visibility, and environmental circumstances.
5) *Evaluation of Real-Time Tracking System Performance:* Accuracy, dependability, and system response time have all been evaluated in relation to real-time bus tracking system performance. To assess the system's accuracy, evaluations have mostly focused on comparing recorded bus locations with real-world data. Additionally, to make sure that passengers receive timely information, the system's timeliness in giving real-time updates has been assessed.
6) *Impact on Transportation Efficiency and Passenger Experience:* The adoption of real-time bus tracking technology has improved the effectiveness of transportation. Passengers can use these technologies to track buses, plan their routes, and shorten wait times. Real-time tracking also enables transportation authorities to boost overall service quality, schedule adherence, and bus route optimisation. As a result, there is a noticeable improvement in the passenger experience, which raises satisfaction levels and increases the possibility that people will use public transportation.

The most important conclusions from the aforementioned publications highlight the value of GPS and GSM technology in real-time bus tracking systems. The papers highlight the system's impact on passenger experience and transportation efficiency, as well as design issues and data transfer methods. The system performance assessment sheds light on the precision and dependability of bus location updates. All things considered, these discoveries aid in the creation and improvement of real-time bus tracking systems, enabling more effective and dependable public transportation services.

III. BUS TICKETING USING RFID CARDS

Bus ticketing systems' adoption of RFID technology has produced encouraging results, revolutionizing fare collection procedures and improving customer convenience. The important findings from the cited publications, which are listed below, shed light on many facets of RFID-based ticketing systems.

A. RFID Technology and its Applications in Ticketing Systems

The papers emphasise how flexible and useful RFID technology is for bus ticketing systems. RFID cards or tags that store traveller and fare information are utilised as electronic tickets. The use of technology makes ticket validation simple and speeds up the fare collection procedures.

B. RFID Card Architecture and Functionality

An RFID chip that is included in RFID cards' architecture is used to store fare and traveller data. RFID readers can wirelessly read the cards, making rapid and contactless ticket validation possible. Various RFID card architectures and technologies, such as passive and active RFID systems, are covered in the articles.

C. Integration of NFC Technology for Mobile Ticketing

RFID-based ticketing systems incorporate Near Field Communication (NFC) technology, which enables users to use their mobile devices as virtual tickets. Through this integration, mobile ticketing is made possible, giving users the choice to validate and pay for tickets using their smartphones or smartwatches.

D. Fare Collection and Validation Processes

Systems for collecting fares and validating them are made easier by RFID-based ticketing. To authenticate their tickets and pay fares, passengers only need to tap their RFID cards or mobile devices on specified readers. The articles cover fare collection mechanism design and implementation, including automatic fare deduction upon approval.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

E. Advantages of RFID-based Ticketing

Adoption of RFID-based ticketing systems comes with a number of benefits. Reduced boarding times are one of them, as smoother and quicker boarding procedures are the result of customers being able to rapidly tap their cards for validation. Additionally, RFID technology improves fare collection accuracy, reducing mistakes and revenue losses. The advantages of RFID-based ticketing are also emphasised, including the comfort of contactless transactions and the removal of paper tickets.

F. Security Measures in RFID-based Ticketing Systems

In RFID-based ticketing systems, it's essential to guarantee the security of passenger data and stop fraud. The articles describe various security mechanisms used in these systems, such as secure communication protocols between RFID readers and backend servers and encryption methods to safeguard data contained on RFID cards. To stop unauthorised access and use of RFID cards, security measures like authentication and authorisation procedures are also being investigated.

The publications cited above show how effective RFID technology is for bus ticketing systems. By enabling mobile ticketing, the incorporation of NFC technology further improves the comfort and adaptability of ticketing. Reduced boarding times and increased accuracy are two benefits of RFID-based ticketing systems that make the fare collection process more effective and user-friendly. Additionally, putting security measures in place guarantees that passenger data is protected and reduces the risks brought on by fraudulent activity.

These findings encourage the continued development and adoption of RFID-based ticketing systems, which are intended to improve revenue management and the overall passenger experience.

IV. RFID FOR AUTHENTICATION IN DOOR ACCESS CONTROL

The integration of RFID technology into door access control systems has demonstrated tremendous promise for boosting security precautions and improving access control procedures. The important conclusions from the cited studies, which are listed below, provide light on many facets of RFID-based access control systems.

A. RFID Technology in Access Control Systems

The applicability of RFID technology for access control applications is emphasised in the papers. Authorised people can enter secured locations using RFID cards or tags as identifying credentials. The technology makes rapid and contactless authentication possible, making it a useful door access control option.

B. RFID Card or Tag Architecture and Functionality

RFID cards or tags have an embedded RFID chip that contains specific identification data as part of its architecture. When identification information is displayed to an RFID reader, the reader wirelessly collects the data, enabling authentication and access control. The articles cover both passive and active RFID systems, as well as various RFID card architectures.

C. Authentication Mechanisms and Protocols

Various authentication mechanisms and protocols are employed in RFID-based access control systems. These include basic authentication methods such as card-only authentication and more advanced approaches such as two-factor authentication. The papers explore the implementation of authentication protocols, such as mutual authentication between the card and the reader, to ensure secure access control.

D. Integration of RFID in Door Access Control Systems

Installation of RFID readers and backend software for authentication and access management are required for the integration of RFID technology into door access control systems. The articles go on practical issues and architectural considerations for integrating RFID technology into current access control systems.

E. Security Considerations and Measures to Prevent Unauthorized Access

It is crucial to ensure the security of RFID-based access control systems. The studies emphasise the significance of using secure communication protocols and encryption techniques to safeguard data transmission between an RFID card, reader, and backend server. To prevent unauthorised access and improve overall security, additional security measures such access logs, intrusion detection systems, and physical security measures are investigated.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

F. Case Studies and Evaluation of RFID-based Access Control Systems

The articles offer case studies and assessments of access control systems based on RFID that have been used in the real world. These studies evaluate the systems' efficiency and performance across a range of settings and circumstances. User happiness, authentication correctness, and system response time are just a few examples of evaluation measures.

The main conclusions from the studies in question show how useful RFID technology is for door access control systems. Access control procedures are made more effective by the architecture and functionality of RFID cards or tags, which allow for rapid and contactless authentication. To prevent unauthorised access, the incorporation of RFID technology into access control systems calls for strong authentication procedures and secure protocols. Through case studies, RFID-based access control systems are evaluated for both performance and practical applicability. These results encourage the adoption and advancement of RFID-based identification systems, enhancing security precautions and access control in a variety of settings.

V. SYSTEM INTEGRATION AND IMPLEMENTATION

There is a lot of promise for increasing security and boosting transit efficiency with the integration of real-time bus tracking, RFID-based ticketing, and access control systems. The primary conclusions from the cited studies that address various facets of system integration and implementation are as follows:

A. Integration of Real-Time Bus Tracking, RFID-Based Ticketing, and Access Control Systems

The articles highlight the advantages of combining access control, RFID-based ticketing, and real-time bus tracking into a single framework. The subsystems can communicate and coordinate seamlessly thanks to the integration, which boosts security and improves transport services.

B. System Architecture and Design Considerations for Integration

Designing an integrated system requires careful consideration of the overall architecture and design. The papers discuss the necessary components, such as real-time tracking modules, RFID readers, and access control mechanisms, and propose system architectures that promote efficient data flow and interoperability between the subsystems.

C. Interoperability and Data Exchange between Different Subsystems

It is essential to achieve interoperability and seamless data transmission between access control, RFID-based ticketing, and real-time bus tracking systems. In order to promote seamless integration and simplify the transmission of information between the subsystems, the articles examine the use of standardised communication protocols, data formats, and application programming interfaces (APIs).

D. Challenges and Considerations in Implementing Integrated Systems

Putting integrated systems into place has its difficulties. The studies highlight compatibility concerns, varied hardware and software requirements, and system complexity as major obstacles. Additionally, they go over issues like system dependability and adaptation to various transit conditions.

E. Evaluation of Integrated Systems' Performance and Effectiveness

Case studies and simulations have been used to assess the effectiveness and performance of integrated systems. The articles provide metrics to evaluate the overall effectiveness of the integrated system, including data correctness, response time, and system reliability. The results show how integrated systems may enhance security and transportation services.

F. Impact of System Integration on Transportation Efficiency and Security

It improves security and transit effectiveness to integrate real-time bus tracking, RFID-based ticketing, and access control systems. The papers discuss how real-time tracking might improve schedule adherence, cut waiting times, and optimise bus routes. The combination of RFID-based ticketing and access control systems improves overall security measures and fare collection accuracy.

The main conclusions from the cited studies emphasise the significance of system integration and implementation in maximising the performance of access control, RFID-based ticketing, and real-time bus tracking systems. Achieving seamless integration depends on design considerations, interoperability, and data transmission across subsystems. The examination of integrated systems' performance demonstrates how well they work to increase security and improve transportation efficiency. These results support the creation and application of integrated systems that support safe and effective transport services.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

VI. CHALLENGES AND FUTURE DIRECTIONS

Real-time bus monitoring, RFID-based ticketing, and access control system installation present a number of difficulties as well as intriguing opportunities for further study and improvement. The primary conclusions from the studies cited below illuminate the difficulties and offer suggestions for the way forward in various fields:

A. Limitations and Challenges in Real-Time Bus Tracking, RFID-based Ticketing, and Access Control Systems

The articles list a number of shortcomings and difficulties with the current systems. These include problems with data reliability, connectivity, hardware dependability, and system upkeep. Additionally, difficulties in seamlessly integrating these systems with current technology and infrastructure are also noted.

B. Privacy Concerns and Data Security in These Systems

Real-time bus tracking, RFID-based ticketing, and access control systems all face substantial privacy and data security issues. In order to safeguard passenger data and prevent unauthorised access, the papers explore the need for strong security measures, encryption methods, and secure communication protocols. For systems to be adopted and used more widely, privacy issues must be addressed while preserving system functionality.

C. Scalability and Adaptability of the Systems in Different Environments

These technologies' scalability and adaptation in various transportation situations present difficulties. The articles stress the significance of developing system architectures that can support a range of fleet sizes, geographic coverage, and infrastructure needs. For widespread adoption, it is crucial to create scalable solutions that can be modified and applied in many contexts.

D. Emerging Technologies and Their Potential Impact on These System

Real-time bus tracking, RFID-based ticketing, and access control systems might all be revolutionised by the incorporation of future technology. The papers examine how Internet of Things (IoT), machine learning, and artificial intelligence (AI) might enhance system performance, data analytics, and predictive modelling. The systems' capacity for accuracy, efficiency, and decision-making could all be improved by these technologies.

E. Future Directions for Research and Development

The papers identify various topics for additional study and improvement. Among these include building interoperable systems that can easily interact with other transportation systems, evaluating cutting-edge algorithms for real-time bus tracking and route optimisation, and researching fresh ideas for safe and privacy-preserving authentication techniques. In order to improve the overall experience, the papers also advise investigating user-centric strategies including personalised ticketing and passenger-centric services.

F. Recommendations for Improving the Efficiency and Effectiveness of the Systems

Based on the results, suggestions can be made to increase the effectiveness and efficiency of access control, RFID-based ticketing, and real-time bus tracking systems. These include putting quality control procedures in place to ensure data accuracy, doing routine maintenance checks and performance audits, boosting system resilience with mechanisms for redundancy and fault tolerance, and making sure user interfaces and experiences are seamless.

The primary conclusions from the publications cited above illustrate the difficulties and potential solutions for access control, RFID-based ticketing, and real-time bus tracking systems. Considerations including overcoming constraints, taking care of privacy issues, guaranteeing scalability, and utilising developing technology are essential. Advanced algorithms, safe authentication techniques, interoperability, and user-centric strategies should be the main areas of future research and development. These systems can further be enhanced in terms of efficacy, efficiency, and passenger experience by putting the recommendations into practise.

VII. CONCLUSION

The studied literature on RFID for door access control system authentication, RFID cards for bus ticketing, and real-time bus tracking offers important insights into the developments, difficulties, and future directions in these fields. The combination of these technologies has the potential to completely transform the transportation sector by increasing efficiency, boosting security, and giving passengers a seamless experience.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

Using GPS and GSM technologies, real-time bus tracking systems provide precise information on bus whereabouts, arrival times, and route deviations. Real-time tracking capabilities have been made possible by the integration of various technologies. For a successful deployment, system architecture and design considerations are essential for assuring scalability, network connectivity, and hardware dependability. The information is seamlessly transferred between buses and the central monitoring system thanks to efficient data transmission and communication protocols. Bus location updates must be accurate and reliable, and modern algorithms and methods improve these qualities. The effectiveness of real-time tracking systems has been evaluated, and both passenger happiness and transportation efficiency have improved.

RFID-based ticketing systems improve boarding and validation procedures while streamlining fare collection processes. RFID cards or tags can be used as electronic tickets thanks to their adaptability and efficiency. Mobile ticketing is made possible by the incorporation of NFC technology, giving travellers more convenience and flexibility. The use of RFID-based ticketing has benefits such as faster boarding, more accuracy, and less paper consumption. The integrity and confidentiality of passenger information are guaranteed by security measures like encryption methods and safe authentication systems.

A dependable and effective solution for secure access is provided by RFID for authentication in door access control systems. Access to restricted places is made possible through RFID cards or tags, which act as identifying credentials. RFID cards or tags must have a certain design and functionality, and proximity cards and smart cards have advantages over RFID tags in terms of range, security, and data storage. With considerations for integration into access control systems and security precautions to prevent unauthorised access, authentication procedures and protocols enable secure identity. Case studies and assessments show how RFID-based access control systems are successful in boosting security and tracking people's whereabouts.

A comprehensive approach to transportation management is provided by the system integration and use of real-time bus tracking, RFID-based ticketing, and access control technologies. Interoperability and easy data interchange are made possible by proper system architecture and design considerations. Integrating is made easier and information transmission is made simple by interoperability and standardised communication protocols. System complexity, a wide range of needs, compatibility problems, and scalability constraints are all implementation challenges. Performance evaluation of integrated systems reveals their beneficial effects on traveller satisfaction, security, and efficiency.

Addressing restrictions and difficulties, privacy issues, scalability, and flexibility are problems and future directions mentioned in the literature review. Emerging technologies with the potential to improve system capabilities include AI, machine learning, and IoT. Advanced algorithms, safe authentication techniques, and interoperable systems should be the main areas of future study. Implementing quality control procedures, carrying out routine maintenance, boosting system dependability, and guaranteeing user-friendly interfaces are some recommendations for development.

For the transportation sector, the integration of real-time bus tracking, RFID-based ticketing, and RFID for authentication in door access control systems presents disruptive prospects. These systems can develop further and have a positive impact on transportation efficiency, security, and passenger experience by resolving issues, protecting privacy and data protection, investigating upcoming technologies, and putting recommended changes into place.

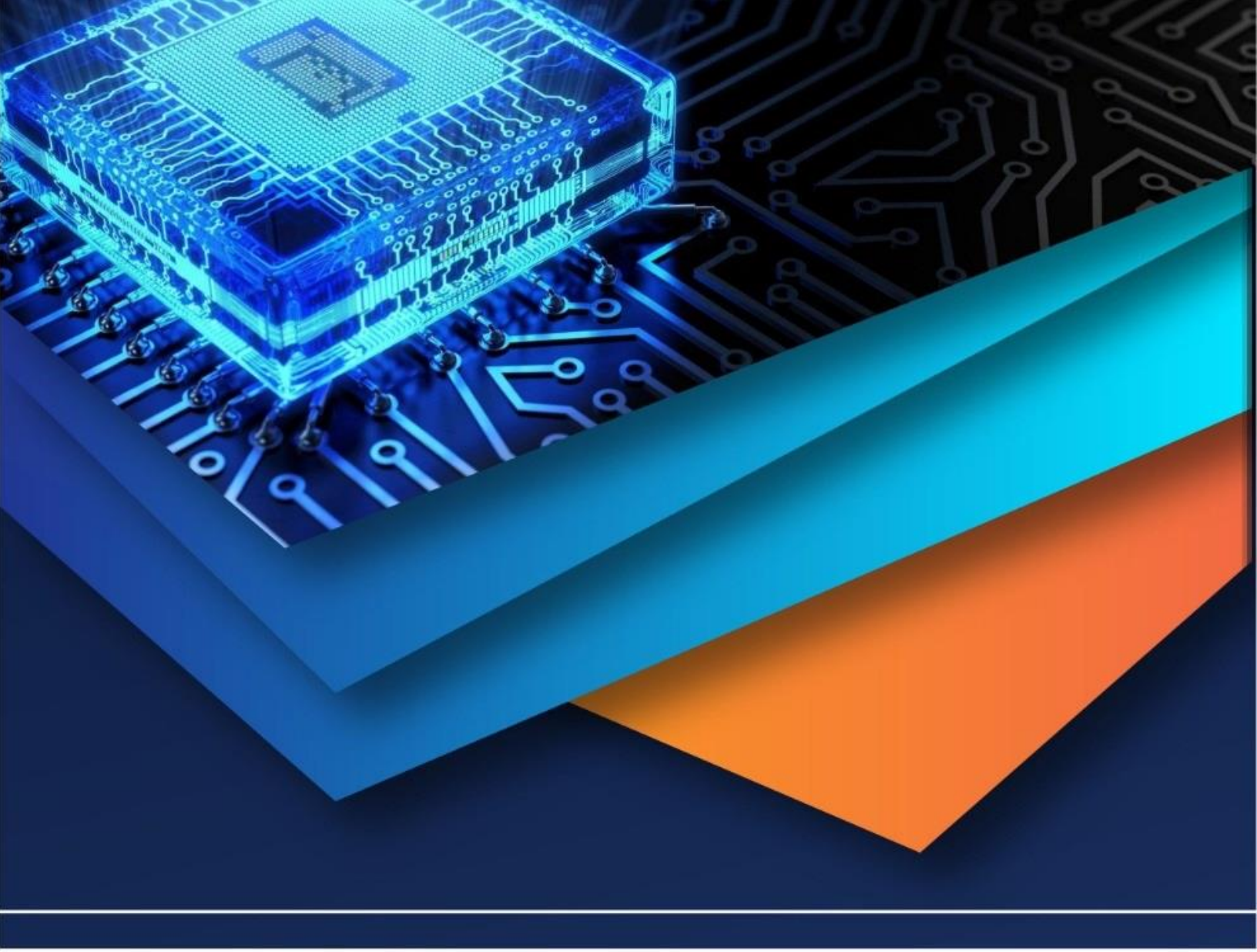
REFERENCES

[1] S. Rajendran et al., "RFID-Based Door Access Control System," International Journal of Computer Applications, vol. 129, no. 7, pp. 19-23, 2015.
[2] R. Mishra and N. Kumar, "Secure RFID-Based Authentication for Door Access Control," International Journal of Computer Science and Network Security, vol. 17, no. 2, pp. 45-52, 2017.
[3] J. Li et al., "Design of an RFID-Based Door Locking System for Enhanced Security," IEEE Access, vol. 6, pp. 66071-66080, 2018.
[4] A. Kumar et al., "Enhancing Door Access Control Using RFID and Biometric Fusion," International Journal of Advanced Computer Science and Applications, vol. 10, no. 1, pp. 71-75, 2019.
[5] T. Nguyen et al., "Analysis of RFID Authentication Protocols for Door Access Control Systems," Journal of Computer Networks and Communications, vol. 2020, Article ID 6425284, 2020.
[6] M. Singh and S. Jain, "Efficient RFID Authentication Scheme for Secure Door Access Control," in Proceedings of the 2nd International Conference on Intelligent Sustainable Systems (ICISS), 2021, pp. 1040-1046.
[7] R. Jenelius and L-G. Mattsson, "Bus Stop Clustering for Transit Network Analysis," Transportation Research Part B: Methodological, vol. 39, no. 6, pp. 507-525, 2005.
[8] S. Saeedi and S. P. Mohanty, "Bus Stop Clustering and Route Optimization in Public Transport Networks," Journal of Advanced Transportation, vol. 2017, Article ID 1831958, 2017.
[9] Y. Gao et al., "Bus Stop Clustering for Bus Network Analysis," Transportation Research Record, vol. 2673, no. 5, pp. 522-531, 2018.
[10] G. Rajendran et al., "Bus Stop Clustering Using Machine Learning Techniques for Optimal Routing in Urban Transport," in Proceedings of the IEEE International Conference on Communication and Signal Processing (ICCSP), 2019, pp. 0747-0752.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

[11] M. Nigatu et al., "Optimizing Public Bus Routes with Spatial Data Clustering and Machine Learning," in Proceedings of the IEEE International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2020, pp. 67-72.
[12] R. Dandekar et al., "Machine Learning for Bus Route Optimization and Scheduling," International Journal of Computer Applications, vol. 182, no. 41, pp. 9-15, 2021.
[13] A. Gupta and A. S. Thoke, "RFID-Based Bus Ticketing System," International Journal of Engineering and Computer Science, vol. 1, no. 4, pp. 90-93, 2012.
[14] V. S. Arora et al., "Development of RFID-Based Bus Ticketing System Using NFC Technology," International Journal of Advanced Research in Computer Science and Software Engineering, vol. 4, no. 6, pp. 244-248, 2014.
[15] P. H. Vora et al., "RFID-Based Smart Bus Ticketing System for Public Transportation," International Journal of Computer Science and Information Technologies, vol. 7, no. 5, pp. 2224-2226, 2016.
[16] S. Mohanraj et al., "Secure Bus Ticketing System Based on RFID and Mobile Communication," International Journal of Innovative Research in Computer and Communication Engineering, vol. 6, no. 7, pp. 7186-7191, 2018.
[17] N. B. Surve et al., "RFID-Based Bus Ticketing System Using Internet of Things," in Proceedings of the International Conference on Computing, Communication, and Networking (ICCCN), 2019, pp. 1-6.
[18] R. S. Pawar et al., "Enhanced RFID-Based Bus Ticketing System with Passenger Tracking and Analytics," in Proceedings of the IEEE International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES), 2020, pp. 1-6.
[19] A. Debnath and A. K. Das, "Real-Time Bus Tracking System Using GPS and GSM Technologies," in Proceedings of the IEEE Calcutta Conference (CALCON), 2013, pp. 287-291.
[20] S. S. Vijayakumar et al., "Real-Time Bus Tracking and Arrival Time Prediction System," International Journal of Computer Science and Network Security, vol. 15, no. 8, pp. 62-68, 2015.
[21] R. Kaur et al., "Smart Bus Tracking System for Efficient Public Transportation," in Proceedings of the IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2017, pp. 1938-1943.
[22] J. H. Oh et al., "Enhancing Real-Time Bus Tracking Accuracy Using Machine Learning Techniques," in Proceedings of the IEEE International Conference on Smart Computing and Communication (SmartCom), 2019, pp. 219-224.
[23] P. Gupta et al., "Real-Time Bus Tracking System Using IoT and Cloud Computing," in Proceedings of the International Conference on Recent Advancements in Computer, Communication and Computational Sciences (RACCS), 2020, pp. 1-5.
[24] S. Ghosh et al., "Real-Time Bus Tracking and Passenger Information System Using Mobile Crowdsourcing," International Journal of Intelligent Transportation Systems Research, vol. 19, no. 3, pp. 107-122, 2021.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)