WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Automated Railway Reservation System

Sudhanshu Pandey[1] , Satyanshu Bhardwaj[2] , Vaishali Rastogi[3] , Dr. Seema Malik[4]

[1] 24iosu108@rkgit.edu.in Department of CSE(IOT)RKGIT, Ghaziabad
[2] 24iosa093@rkgit.edu.in Department of CSE(IOT) RKGIT, Ghaziabad
[3] vaishfcs@rkgit.edu.in Department of CSE(IOT) RKGIT, Ghaziabad
[4] seemafio@rkgit.edu.in Department of CSE(IOT) RKGIT, Ghaziabad

ABSTRACT :

The "Automated Railway Reservation System" is a ground-breaking technology created to meet the modern technological problems that the railroads face. This totally automated system uses cutting- edge technologies to expedite the reservation and seat allocation process with the goals of increasing efficiency, providing greater convenience for passengers, and addressing problems like corruption and manual errors.

Usually, travellers reserve their tickets in advance, and those who were unable to do so at first are placed on a waiting list. But there are a lot of issues with this system, especially when it comes to people not showing up for trains on schedule and unscrupulous people using dishonest methods to take seats.

The Automated Railway Reservation System puts in place a thorough method to get over these obstacles. A radio frequency identification (RFID) reader is installed in every seat of the train to provide safe access. Passengers with specific quotas are assigned special seats that are fitted with biometric and RFID readers for stringent verification.

A cloud-based database is used to store and track data, a controller is used to manage system components, and a GSM module facilitates communication via calls and SMS.

Passengers link their RFID cards to their tickets at the time of reservation, and seats are assigned accordingly. When boarding goes well (Case I), travellers use their RFID cards to unlock their assigned seats, which instantly changes the database. In the event of a reservation cancellation (Case II), the system will instantly transfer the seat to the next highest-priority passenger on the waiting list and begin processing a partial refund for the passenger who made the original reservation.

When a passenger doesn't board on time (Case III), the system contacts the passenger ahead of time via SMS to find out if they may board at later stops.

Within the next three stations, if passengers are able to board, the system updates the database. If they don't, though, the seats become available for other passengers to use until the system notifies those on the waiting list. This procedure is carried out for every empty seat to guarantee maximum seat occupancy and low waste.

Many advantages are gained by putting the Automated Railway Reservation System into

practice. The elimination of manual ticket checking by ticket collectors relieves staff workload and saves significant time.

The system reduces corruption and unlawful occupation by guaranteeing that seats are only given to worthy travellers. Furthermore, when compared to conventional systems, improved security features like RFID and biometric identification offer a higher level of passenger protection.

To sum up, the Automated Railway Reservation System offers a creative technique to raise the security, precision, and effectiveness of the railway reservation procedure. Through the use of automation and cutting-edge technologies, it reduces frequent problems, streamlines processes, and eventually improves the travel experience for the over 23 million people who use trains every day.

INTRODUCTION:

The "Automated Railway Reservation System" is a fully automated system that may be used by Railways to carry out the following tasks in the current technological era -

- It can automatically assign passengers toavailable seats.
- It can update the state of seats automatically, whether they are empty oroccupied by passengers.
- According to the priority list, it automaticallydistributes the open seats to the waiting listpassengers.

- It makes sure that the designated passengers are the only ones who canaccess the seats.

Automated Railway Reservation System can directlybenefit 23 million passengers travelling per day through Railways.

In the traditional method of travelling from one place to another by using Railways, a person makes a reservation for a seat in the prior steps. After successful reservation, a particular seat is allotted to the passenger from Railway Station "A" to Railway Station "B". After allocations of each and every seat of the train to the respective passengers, a "Waiting List" is prepared simultaneously. The waiting List includes the list of all passengers who did not get anyseat on the train. There are several possible cases which generally happen in the railways.

CASE I - The Passenger successfully boards thetrain at Railway Station "A".

In this case, the passenger reaches the destination
i.e. Railway Station "B" by using the allotted seat inthe train.

CASE II - The Passenger cancels the reservationbefore boarding it from Railway Station "A".

In this case, that seat gets allotted to the new top- priority passenger on the waiting list and some fraction of the money gets refunded to the old passenger.

CASE III - The Passenger fails to board the trainon time from Railway Station "A".

In this case, the allotted seat remains vacant for the next three stations from the Railway Station "A". Thepassenger can board the train from any of the next three stations from the Railway Station "A". But, if thepassenger fails to do so, then the seat remains vacant until it comes to the knowledge of the Ticket Collector.

It takes an average of 5-6 hours for the Ticket Collector to check the status of each and every seat on the train. In most cases, vacant seats get allottedto undeserving passengers by the Ticket Collector in exchange for money that goes directly into the pocket of the Ticket Collector which promotes corruption.

If we analyse the above three possible scenarios thatgenerally occur in the Railways, we get to know that "CASE III" is one of the major problems being faced by the Railways. As of now, there is no established remedy for this problem.

We've developed an "Automated Railway Reservation System" in order to end this major problem being faced by the Railways.

In the Automated Railway Reservation System, every seat of the train has an RFID Reader and the seats are locked for security purposes. Some special seatshave also been developed for special quota passengers. Special seats have an RFID Reader together with a Biometric Reader to ensure that special seats should only be occupied by special quota passengers. Every seat on the train is locked and can only be unlocked by the RFID Card of the respective passenger. Automated Railway Reservation System also includes a GSM Module which communicates with the passengers through Calls or SMS, a controller which controls the workingof each and every component of the system and a database which keeps track of all the data in the cloud server.

Now, let us have a look at the same scenario of travelling from one place to another i.e. RailwayStation "A" to Railway Station "B" after the application of "Automated Railway Reservation System".

A person makes a reservation for a seat on the trainin the prior steps. While making the reservation,passengers link their RFID Card to their reservation ticket. After making a successful reservation, a
particular seat is allotted to the passenger. The allotted seats can only be accessed by the RFID Card of the respective passengers. Each and every seat of the train gets allotted to the respective passengers and a Waiting List is prepared simultaneously. Considering the same possible cases that generally occur in the Railways.

CASE I - The passenger successfully boards thetrain at Railway Station "A".

In this case, the passenger occupies the allotted seatby unlocking it through their RFID Card. Once the seat is occupied by the passenger, the system automatically updates this information in the database just at that moment.

CASE II - The passenger cancels the train beforeboarding it from Railway Station "A".

In this case, that seat gets allotted automatically to the new top-priority passenger on the waiting list andsome fraction of the money gets refunded to the old passenger.

CASE III - The passenger fails to board the trainon time from Railway Station "A".

In this case, the system communicates with all passengers through SMS to check whether they can board the train or not from any of the next three stations from Railway Station "A". If the passengers board the train from any of the next three stations, it automatically gets updated in the database that the seats have been occupied by the passengers. But, if any of the passengers failed to do so then that particular seat becomes vacant for another Railway Station "C" to Railway Station "B". The system automatically communicates with new top-priority passengers on the waiting list and tells the availability of seats from Railway Station "C" to Railway Station "B". If any of the passengers from the waiting list wish to grab the seats then those

particular seats get allotted to them. The system keeps following the same steps for each vacant seat on the train. The system continuously checks the status of each and every seat in the train and keeps track of the seats inthe database.

Due to the application of the "Automated Railway Reservation System", every operation is performed automatically by the system and everything is being updated to the database. There is no need for any Ticket Collector to manually check the tickets of each and every passenger which is a very hard and time- taking procedure. This reduces manpower and saves a lot of time. It ensures that the seats are allotted only to deserving passengers. It reduces corruption. It provides better security than the traditional Railway System.

LITERATURE REVIEW

Traditional Railway Reservation System:

For many years, the foundation of passenger transit has been provided by conventional railway reservation systems. The manual seat distribution mechanism used in these systems is prone to mistakes and inefficiency. Usually, seats are assigned at the time of reservation, and it is difficult to make changes to seat assignments once they are made. This approach frequently results in empty seats for a variety of reasons, which raises operational difficulties and financial loss.[5]

Challenges Faced by Traditional Systems:

Traditional railway reservation systems face a number of difficulties that limit their ability to adapt to the changing needs of passenger transport. The creation of waiting lists, which is done by hand and frequently leaves seats empty when passengers miss the train, is one of the major problems. Since manualaction is needed to fill these vacancies, the delayeddiscovery of vacant seats results in inefficiencies.[6]

Radio-Frequency Identification (RFID)Technology:

Railway reservation systems could be made more efficient with the use of RFID technology. The technology is able to determine each seat's occupancy status automatically and in real time by combining RFID tags with each seat. By doing away with the necessity for manual inspection and offering a smooth method of updating seat availability, RFID technology enhances the overall precision and responsiveness of the system.[3]

Biometric Authentication in TransportationSystem:

When it comes to transportation systems in particular, biometric authentication has shown to be useful in boosting security and guaranteeing that only authorised passengers can access specified seats. By adding an additional layer of security and loweringthe possibility of unauthorised access to allocated seats, RFID and biometrics work together to enhance security. This integration expedites the onboarding procedure while simultaneously addressing security concerns.[4]

Cloud-based Databases and CommunicationModule:

A secure and scalable way to store and retrieve data is made possible by the use of cloud-based databases. The Automated Railway Reservation System depends on these databases because they allow for the real-time tracking of seat occupancy, automate SMS and call contact with passengers, and offer a centralised platform for system management and monitoring.[1]

Existing Technologies in TransportationSystem:

In the transportation industry, the use of RFID, biometrics, and cloud-based databases is not new. Similar technologies have been effectively incorporated by other transportation modes, such asbuses and aeroplanes, to increase productivity, decrease manual involvement, and boost overall customer happiness. The development and implementation of the Automated Railway Reservation System can benefit greatly from the knowledge gained from these projects.[9]

Corruption and Manual Ticketing:

Corruption is a serious problem with traditional systems that are frequently brought on by labour- intensive manual ticket verification procedures. The chance for corruption is created by the delayed identification of empty seats, as customers who don't deserve a ticket can buy their way in. By doing away with the necessity for manual involvement and guaranteeing that seats are distributed transparently in accordance with predetermined guidelines, the useof an automated system lessens the likelihood of such dishonest activities.[10]

Need for Automation in Railway Systems:

The enormous number of passengers that ride on trains every day makes the necessity for automation in these systems clear. Solutions for the dynamic nature of passenger transport must be both efficient and flexible in the contemporary technological era. In the end, automation improves security, guaranteestimely updates, and assigns seats accurately, all ofwhich improve the traveller experience.[6]

METHODOLOGY

System Architecture:

In order to achieve seamless automation, the Automated Railway Reservation System is being developed using a comprehensive system design that incorporates many technologies. RFID readers, biometric readers, a central controller, a GSM module, and a cloud-based database are the system's essential parts.[2]

RFID Technology:

Every seat on the train has an RFID tag attached to it. RFID readers are positioned so they can read across the whole train. Real-time seat occupancy tracking and identification are made possible by RFID technology. An RFID card is used to authenticate a passenger when they board the train, after which their assigned seat is unlocked. This removes the chance of unauthorised occupancy and guarantees secure access.[4]

Biometric Authentication:

RFID and biometric readers are installed in special quota seats that are reserved for particular passengers. To guarantee that only the intended guests can use these reserved seats, biometric authentication provides an extra degree of protection. Combining RFID and biometrics improves seat assignment accuracy and lowers the possibility of unauthorised entry.[4]

GSM Module:

The GSM module acts as the system's and passengers' communication interface. Passengerscan opt to receive automated calls or SMS messages on seat assignments, cancellations, or other pertinent information. Passengers are made more aware and instantly informed of any changes to their reservationstatus thanks to this real-time communication.[3]

Central Controller:

The GSM module, RFID readers, and biometric readers are all coordinated by the central controller, which serves as the system's brain. It oversees the authentication procedure, facilitates communication with the cloud-based database, and guarantees the system's general dependability and integrity. The controller is designed to adhere to preset guidelines for managing waiting lists, seat assignments, and cancellations.[3]

Cloud Based Database:

All pertinent data, such as passenger identification, seat occupancy status, and waiting lists, are managed and stored in a cloud-based database. Data redundancy, scalability, and accessibility are guaranteed with cloud storage. The database serves as a central repository for all system activity and is updated continually in real time. Easy monitoring, analysis, and reporting are made possible by this.[1]

System Operation Workflow:

Reservation Process:

- **Passenger Reservation:** The reservation ticket andthe passenger's RFID card are connected when a passenger makes a reservation. A specific seat is assigned by the system according to availability andpriority.
- **RFID Authentication:** When a passenger boards a plane, they use their RFID card to authenticate and unlock their assigned seat.

Cancellation Process:

- **Cancellation Request:** The system immediately updates the database and releases the seat in the event that a passenger cancels their reservation.
- **Seat Reallocation:** The next highest-priority travelleron the waiting list is given an empty seat.

Missed Boarding Process:

- **Passenger communication:** When a passenger misses their scheduled departure, the system notifiesthem by SMS and inquires as to whether they can board at the next three stations.
- **Automatic Seat Vacancy:** The system designates aseat as unoccupied for the upcoming stations if the customer remains silent.
- **Update on the Waiting List:** The system notifies thehighest-priority individuals on the waiting list when a seat becomes available, giving the seat to the first person to reply.

Implementation Steps:

Seat Hardware Installation:

Placing RFID scanners throughout the train and attaching an RFID tag to every seat.
Placing biometric readers in seats designated forspecial quota.

System Configuration:

Setting up the GSM connectivity, biometricauthentication, and RFID authentication on the central controller.

Database Setup:

Creating a cloud-based database to hold waiting lists, seat occupancy data, and passenger information.

Testing and Calibration:

Carrying out comprehensive testing to guarantee thesmooth integration and functioning of the communication, biometric, and RFID modules.
System calibration to maximise accuracy and performance.

User Training:

Teaching passengers and railway workers how to use RFID cards, comprehend biometric authentication, and reply to SMS notifications.

Data Security and Privacy Measures:

Encryption:

Securing communication between RFID readers, biometric readers, and the central controller by putting strong encryption methods into place.

Access Control:

Putting in place stringent access controls to stop illegal users from accessing the cloud-based database and central controller.

Privacy Policies:

Establishing explicit privacy policies to guarantee thesafety of passenger data and compliance with applicable data protection laws.

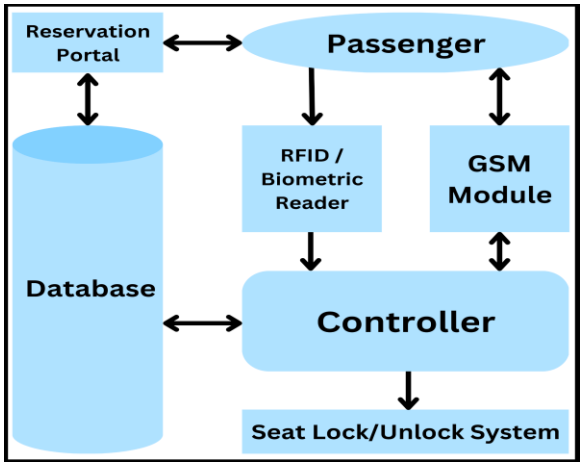
Continuous Monitoring and Maintenance:

Real-time Monitoring:

Putting in place a real-time monitoring system to keep tabs on system performance, spot irregularities, and guarantee quick problem-solving.

Regular Maintenance:

Arranging for routine maintenance inspections to fix any hardware or software problems, upgrade system parts, and improve overall system dependability.[3]



CONCLUSION

In order to overcome the issues with traditional railway reservation systems, a major advancement has been made with the creation and deployment of the Automated Railway Reservation System. The
railway industry may enhance efficiency, transparency, and passenger security by utilising this system, which integrates advanced technology including biometrics, RFID, and cloud-based databases.[7]

Key Achievements:

Enhanced efficiency:

The delays incurred by human seat inspection have been avoided by RFID technology's real-time tracking capabilities. The train is easy for passengers to board, and the system instantly updates the state of seat occupancy. As a result, the lengthy procedures associated with seat assignment and ticket verification have been greatly shortened.[8]

Transparent Seat Allocation:

The availability and accessibility of seat allocation data are guaranteed by the usage of a cloud-based database. With automated SMS notifications, travellers may simply monitor the status of their waiting lists, reservations, and cancellations. A smoother travel experience is facilitated by the system's transparency, which also fosters passenger confidence.

Improved Security Measures:

To improve security and guarantee that only authorised passengers can use these reserved seats, biometric scanners have been integrated for special quota seats. When combined with biometric authentication, RFID technology offers a strong barrier against unwanted access, which lowers the possibility of fraudulent activities.

Impact on Railway Operations:

Reduction in Corruption:

The seat assignment process is automated by the system, reducing the possibility of corruption that frequently occurs with manual ticket checking. The predetermined guidelines and real-time updates guarantee that seats are distributed on the basis of merit, excluding the potential influence of dishonest behaviour.

Time and Cost Saving:

The amount of work that railway employees must perform is greatly decreased by doing away with manual seat checks and waiting list management. The automated procedures of the system result in significant time savings as well as lower operating expenses. Resources can now be redirected into raising the general quality of services thanks to this increased efficiency.[11]

Enhanced Passenger Experience:

Simplified reservation procedures, prompt SMS notifications, and transparent and safe seat assignments are all advantages for passengers. The implementation of the Automated Railway Reservation System enhances the entire passenger experience by promoting increased levels of satisfaction and trust in the railway network.

Future implications and recommendations:

Scalability:

The Automated Railway Reservation System is easily scalable to meet increasing passenger volumes and technical developments as they occur. System performance can be seamlessly compromised throughout expansion thanks to the cloud-based architecture.

Continuous Improvement:

Finding areas for improvement will require constant observation and gathering of input. Frequent system updates can improve the system's ability to meet the changing demands of the railway sector and address new difficulties.
In summary, the Automated Railway Reservation System is proof of the revolutionary potential of technology to completely reimagine conventional railway operations. This technology sets a new standard for the industry by embracing automation, transparency, and better security, thereby paving the

way for a more efficient and passenger-centric railway experience. The technology has the potential to completely change how railway reservation systems are implemented around the world in the future as it is adopted and improved.[10]

REFERENCES :

1. "Building the Internet of Things: Implement New Business Models, Disrupt Competitors, TransformYour Industry" by Maciej Kranz.
2. "Internet of Things: Principles and Paradigms" byRajkumar Buyya, Amir Vahid Dastjerdi, and Samee Ullah Khan.
3. "Arduino Workshop: A Hands-On Introduction with65 Projects" by John Boxall
4. "Getting Started with Arduino: The Open Source Electronics Prototyping Platform" by Massimo Banzi and Michael Shilloh
5. "Indian Railways: The Weaving of a NationalTapestry" by Bibek Debroy and Sanjay Chadha
6. "The Great Indian Railways: A Tryst with theNation's Destiny" by Arup K. Chatterjee
7. "Indian Railways: Glorious 160 Years" by Indian Railways
8. Trains at a Glance by Indian Railways (official publication with comprehensive information on train schedules and routes)
9. M. S. Looijenga, " The Detection of Messages using Machine Learning", M.S. Thesis, University of Twente, Enschede, Netherlands, 2018.
10. D. Cer, M. Diab, E. Agirre, I. Lopez-Gazpio, and
11. L. Special, " Semantic Textual Similarity Multilingual and Cross-lingual Focused Evaluation," in Proceedings of the 10th International Workshop.
12. C. Potts, "The Switchboard Dialog Act Corpus", the University of Colorado at Boulder (2011).[Online]. Available:
13. http://compprag.christopherpotts.net/swda.html[Accessed: 6-April 2020].