© JUN 2026 | IRE Journals | Volume 9 Issue 12 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I12-1719326

Train Ticket Reservation System in Railways based on RFID Technology

N MANIKANDAN[1], S AJITHKUMAR[2]
[1]*Assistant Professor, Computer Science and Engineering, AVS College of Technology, Attur Main Rd, Chinnagoundapuram, Salem.*
[2]*Student (M.E Computer Science and Engineering), AVS College of Technology, Attur Main Rd, Chinnagoundapuram, Salem.*

Abstract- Indian Railway is currently dealing with a lot of problems such as availability of confirming seat to waiting list passengers after its departure. Moreover, there is no such system or regulation in Indian railway that instantly gives accommodation to waiting list passengers during their journey. This paper proposes the Dynamic Seat Allocation (DSA) in train ticket reservation system by considering the advantage of RFID tag processing which seem use of wireless communication. RFID tags are embedded within train tickets, for allowing real-time monitoring of seat occupancy status. RFID readers are installed in the trains to track seat availability continuously. Based upon reservation, passengers RFID tag enabled tickets are scanned and the system dynamically allocates available seats to Waiting list passenger by means of factors such as passenger preferences and real-time seat availability.

I. INTRODUCTION

Indian Railway is India's third largest human transport system over which 2 crore passengers travel daily all over India. Even if there are seat available random people who don't buy tickets enter the compartment and buy tickets from the tc.

Due to this, peak seasons take place and more than half of the passengers having tickets of waiting suffer. These waiting list passengers accomplish their journey from their source station to destination in standing mode.

RFID technology utilizes radio frequency signals to identify and track objects equipped with RFID tags. In the context of train ticket reservation, this technology can be harnessed to create a Dynamic Seat Allocation (DSA) system, offering passengers a seamless and personalized journey.

Unlike static seat assignments, a dynamic system allows for flexible adjustments based on real-time factors, such as passenger preferences and cancellations.

1.1 RFID Technology

RFID (Radio Frequency Identification) is a technology that incorporates the use of electromagnetic or electrostatic coupling in the Radio Frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal, or person. RFID tag is an alternative system for barcode and QR code. The advantage of RFID is that it does not require direct contact or line-of-sight scanning.

RFID system consists of two essential components: a tag and a reader. The tag is analogous to the barcode label and it comes in different shapes and sizes. It contains an antenna connected to a small microchip. The reader functions similar to a barcode scanner. However, barcode scanner uses laser beams whereas the RFID reader uses electromagnetic waves. To transmit these waves the scanner uses an antenna that transmits a signal, communicating with the tag antenna.

1.2Objective

The main objective of this proposed system is to provide a dynamic seat allocation for Waiting List Passenger Seat Allocation (WLPSAS).

- To provide a dynamic seat allocation which is helps to Indian Railways.
- To optimize the seats for waiting list passengers.
- To propose the RFID system for real time seat allocation system.

© JUN 2026 | IRE Journals | Volume 9 Issue 12 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I12-1719326

- RFID tag with PNR number contains information about the ticket.

II. LITERATURE SURVEY

Indian Railways have provided both online and offline reservation for its passengers. Railways have also introduced both tatkaal and normal reservation schemes which reduces the tension of last minute booking cancellations. This saves a lot of effort and money which become a boon for the waiting list passengers. The android application has made the technology and internet access much faster than unusual which books the tickets in an efficient way.
The arrival sequential problems of different OD passengers in different time periods, in order to ensure that the train's long-distance capacities will not be prematurely cracked, the maximum passenger-kilometer principle is used to decide the seat allocation for each time period. According to the differences in the travelling distance of passenger demands, long-haul demands or short-haul demands, the seat allocation can be divided into the full-trip ticket allocation and the short-trip ticket allocation.

RFID technology is one of the important components of economic efficiency. This technology will also reduce damage from unscheduled delays and downtime in the section by stopping trains at stations and junctions. RFID readers or an RFID frame reader make it possible to transmit the recorded data at a train speed of 40 km/h to a receiving point and then to a big data center. Thus, this technology reduces downtime and damage from scheduled and unscheduled delays.

III. SYSTEM ANALYSIS

3.1 Existing System

The railway system deals with problems like allocation of seats for waiting list passengers and immediate cancellation/getting down at the destination by the confirmed list of passengers. Passengers who don't buy tickets from TTE's (Train Ticket Examiner) buy tickets from touts which leads to the unavailability of seats for waiting list passengers resulting in the violation of rules.

The number of waiting list passengers in Indian railways has been increasing drastically in every year at the rate of 25 to 50%. Such increase leads to inefficient allocation of seats for waiting list passengers. In the current system there is more space for touts to book tickets illegally and they sell them at an exaggerated price. The TTE's still use pen and reservation charts to check & verify the passenger details. Also TTE's can't keep track of passengers who have reached their destination.

3.2 Proposed Methodology

The proposed methodology saves human effort and time thus increasing the revenue for the Indian railways. The waiting list passengers can't be able to confirm their seats due to rush. The Indian Railways on trying to solve this problem increases the number of coaches for waiting list passengers to make their tickets to be confirmed.

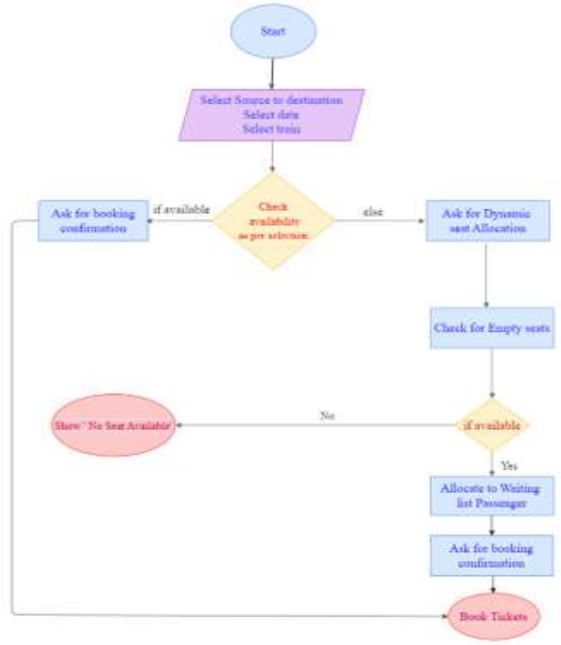

Fig 3.1 System Architecture

IV. SYSTEM SPECIFICATION

4.1 Hardware Requirements

- Processor : Intel Core 2.0 DUO
- Hard Disk : 160 GB
- Ram : 2GB
- Monitor : 14" SVGA Color Monitor
- Mouse : Ball / Optical

© JUN 2026 | IRE Journals | Volume 9 Issue 12 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I12-1719326

- Keyboard : 102 Keys
- RFID Reader
- RFID Printer

4.2 SOFTWARE REQUIREMENTS

- Operating System : Windows 7 or latest / Linux (Ubuntu 8.04 or later)
- Programming Tool : HTML, XML, JAVA, and PHP.
- Mobile Application Development: Eclipse

V. PROJECT DESCRIPTION

5.1 Module Description

Module description is the important stage of project. The following modules are:

- Modification in current Passenger Reservation System.
- Booking, Check-in, Check-out and Cancellation procedure.
- Automatic up gradation procedure.
- Allocation Procedure.

5.2 Modification In Current Passenger Reservation System

Our proposed Model suggests the use of RFID tag in the ticket generated, which contains the PNR number. When the passengers start their journey they should obtain the reservation ticket either confirm or waiting with the RFID tag print over the ticket.

5.3 Booking, Check-In, Check-Out and Cancellation Procedure

In the android apps which we developed the first page contains four interfaces: booking, check-in, check-out and cancellation. If a passenger want to book the ticket then he/she wants to go for booking interface. When the journey begins the check-in and check-out procedure takes place.

1. Booking

Once the passenger wish to book the ticket he/she wants to click the booking interface. After this clicking it navigates to the registration page. The registration page contains the necessary details that the passenger wants to filled. Once the passenger fills the registration form the given details will be stored and PNR number get automatically.. Based on the given details the PNR number will be randomly generated for the passengers. Then the RFID tag gets generated based on the allotted PNR number.

The RFID tag that is generated will differ from each passenger. Once the registration procedure gets finished the ticket will get automatically generated in their mobile phones itself. The generated tickets will contain the following details like passenger name, source, destination, PNR number, seat number, train name and train number. After the payment for the ticket is made the ticket gets generated. Then the passenger can start the journey with the help of the generated tickets.

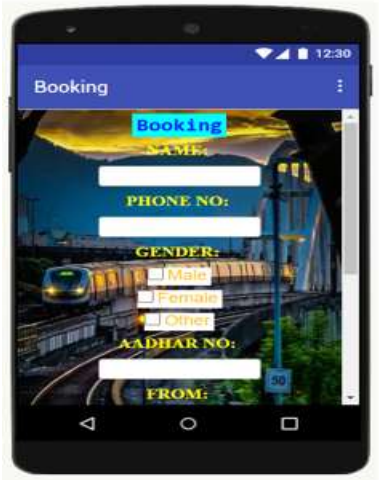

Fig 5.1 Booking Page

2. Check-in

When the passenger boards into the train the passenger, they wants to do the check-in process by RFID reader. The RFID reader interface will include an LED display or a small screen to show feedback messages such as "Scan your ticket" or "Ticket validated". LED lights to indicate the status of the RFID scan (e.g., green light for successful validation, red light for error). The RFID reader should support touch less operation, allowing passengers to simply wave their RFID-enabled tickets near the reader for validation. Once the passengers completes the checks-in process the information will automatically gets updated in the database server.

© JUN 2026 | IRE Journals | Volume 9 Issue 12 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I12-1719326

Fig 5.2 Check-In Page

3. Check-out

The RFID reader should have a display screen showing messages such as "Please tap your ticket to check out" or "Thank you for traveling with us". LED lights in system indicating the status of the check-out process (e.g., green light for successful check-out, red light for error). Optionally, a beep or sound to confirm successful check-out. Display a confirmation message on the interface after successful check-out, thanking the passenger for their journey. In the case if the passenger does not discontinue the journey the check-out interface will be automatically given at the destination.

Fig 5.3 Check-Out Page

4. Cancellation

After the user log-In through the app, the user also has the option to cancel the ticket. If the ticket has been cancelled before the boarding time of the train, then the passenger will get the incumbent amount. The cancelled seat will be reflected as vacant in the server which will be dynamically allocated to waitlisted passenger according to the predefined logic.

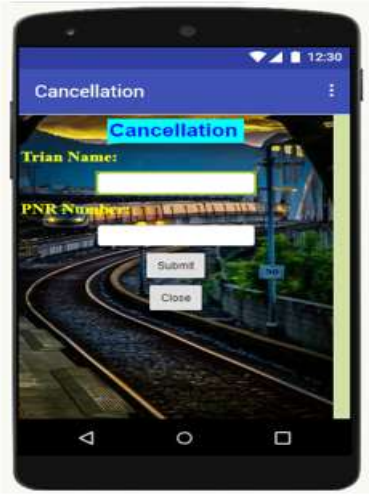

Fig 5.4Cancellation Page

5.4 Automatic Upgradation Procedure

The up-gradation policy is based on the First In First Come (FIFO) algorithm. The seats for the waiting list passengers will be allocated by using the FIFO algorithm. These seats will be allocated to the passengers in such a way that who is in the first position in the waiting list.

5.5 Allocation Procedure

Once the DSA Server updates its database, it will give the vacant seat information to the PRS server which will update every time. Next, if the waiting list passenger are on the train and the seat are vacant then DSA SERVER will automatically allocate the seat to waiting list passenger otherwise it will be booked from counter or through online. In this way it is possible to allocate seat dynamically during the journey of waiting list passenger.

VI. SYSTEM IMPLEMENTATION

System implementation is the important phase in the project where the theoretical design is turned into practical application. The implementation of the developed system will give the user the overall view whether the system is functioning effectively with no drawbacks.

The reliability of the developed system will be tested by using various testing strategy like unit testing and acceptance testing.

Proper implementation is essential to provide a reliable system to meet necessary requirements. During the implementation stage a live demonstration was undertaken and made in front of end-users. The various features are being provided in the system discussed during the implementation.

This project is implemented by using the RFID tag which is scanned by RFID reader using the PNR number. Here android application is used to check the availability of seats for waiting list passengers. This application provides a sophisticated journey for waiting list passengers.

VII. CONCLUSION

The proposed methodology provides a radical change in train operation and passenger experience. RFID tag is printed on the tickets which are scanned by the RFID reader fixed on the train compartment. The smart card contains a RFID tag within which a passenger specific PNR is stored, where RFID device encode the PNR number but check-in process redirects to PRS server and fetch the stored data to verify the passenger details. DSA server allot the seats of absent passengers to waitlisted passengers and if still some seats remains vacant then reflected them as available across railway network from where any passenger willing to board on it can book the ticket. Thus the system provides the capability to book the tickets for the passengers on board thus making the system to behave dynamic. A practical and necessary up-gradation to the Indian Railways has been proposed which solves a number of problems in the current system. These technology inclusions in the railway reservation system introduce transparency and reduce the activities of touts at peak seasons which prove the increase in revenue for Indian Railways.

REFERENCES

[1] Maitreya Deepak Korekar, “Railway Ticketing System Using Dynamic Seating Allocation within One Train and Across Multiple Trains”, International Journal of Advances in Engineering and Management (IJAEM) Volume 5, Issue 11 Nov 2023.

[2] HyndhaviNagolu, Dr.A.V.Ramana, “Dynamic Seat Allocation in Trains”, International Journal of Research Publication and Reviews, Vol 4, no 3, pp 1793-1796, March 2023.

[3] Mehul Yadav, SumedhKurundkar, “A QR Code Based Processing for Dynamic and Transparent Seat Allocation“, International Journal of Scientific and Research Publications, Volume 3, Issue 10, October 2021.

[4] Irina Popova, Vladimir Evsyukov, “Application of digital technologies in railway transport”, International conference of Arctic transport accessibility: networks and systems,published by ELSEVIER 2021.

[5] JinQin, “Collaborative Optimization of Dynamic Pricing and Seat Allocation for High-speed Railways: An Empirical Study from China”IEEE paper on 2019.

[6] Mr. Pranav Shriram,“The Digital Railway System and Dynamic Seat Allocation” , Second International conference on 2018.