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Digital Signature System for Ticket Generation and Validation

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ABSTRACT: The largest transit system in the world, Indian Railway, is currently dealing with numerous issues and errors that are directly tied to people. Instead of investing more money in development, Indian Railway spends more on management. Currently, ticket examiners are manually reviewing the tickets. With the aid of technology, we can automate the tedious process of checking tickets. We are entering the digital age thanks to advances in science and technology. People will soon execute a variety of commercial actions digitally, which has the advantage of high efficiency and ease. In this article, we examine the current systems for generating and validating tickets, and we suggest an algorithm that uses a digital signature to generate and validate tickets securely.

KEYWORDS*:* Ticket generation, validation, Digital Signature

I. INTRODUCTION

The world is getting smaller due to the rise in mobile phone usage and the number of phones in use, yet at the same time, more phones are being produced with ever-improving features and technologies. These have always been a part of our daily lives, from the first hand sets to the introduction of mobile devices. In the modern world, mobile phones are widely utilized as a camera, music player, web browser, and for playing games, among other things. Thus, new concepts and technologies have arisen in order to integrate all of these functions into a single gadget. Technology's primary driving force is to create products that are both time and money efficient. Online ticket booking, also known as e-ticketing, was implemented in the railway department to make it easier for people to make reservations online through a governmental website. The printed version of the ticket may be validated. After purchasing tickets using online ticket portals, M-ticketing (mobile ticketing) was later implemented, sending users texts with their tickets for validation purposes[1].Automatic train ticket creation, authentication, and other technological advancements are crucial for improving rail service. The automatic train ticket production and verification system uses a variety of wireless technologies, including Bluetooth, RFID, QR Codes, and Web-based services [2].The introduction and application of contemporary technologies, such as Bluetooth services (BTS)[1], Radio Frequency Identification Technology (RFID)[3], Quick Response code (QR code)[4], and Web-based [5], are occurring worldwide. The Indian railway system has a more than 160-year history. Since that time, ticket inspectors have been manually verifying passenger tickets. This approach wastes a lot of resources and occasionally causes inconvenience for the passengers.

Different Ticket Generation and Validation Services are:

1.Bluetooth: In order to connect a mobile phone to a wireless phone, the Ericsson Mobile Platforms launched a project in 1994 to remove the electric wire's physical limit. Later, Ericsson, Nokia, Intel, IBM, and Toshiba formed the Bluetooth Special Interest Group, or Bluetooth SIG, to create the short-range wireless connection standard. The wireless transmission of computer, communication, and other types of equipment is supported by Bluetooth technology. Bluetooth is a radio communication technology and protocol that was primarily created for low cost, short range, and low power consumption. The appeal of Bluetooth technology resides in its integrated open platform, which enables Bluetooth-enabled information devices to link peripherals like mobile phones, laptops, PCs, and personal digital assistants (PDAs) wirelessly [6].

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2. RFID: Using radio frequency signals, RFID is a contactless automatic identification system that identifies certain things. A few train operating businesses have started using RFID-based tickets. Not only cash, but also various types of traffic tickets, such as trip cards, bus passes, and so on, can be deposited by passengers. The AFC (automated fare collection) system, which is based on RFID technology, was launched by the Japanese railway in 1998, together with the Suica (Super urban intelligent card) card. The Moscow Metro began utilizing RFID technology in 2007 with low-cost paper RFID tickets. These tickets employed the ISO 14443A air interface standard and included built-in 13.56 MHz RFID tags. London's 2010-issued Oyster transport card can be used as an electronic wallet. In addition to storing a variety of tickets, Rotterdam Netherlands' 2011 OV-chipkaart transport card also has a bank card binding feature. Credit cards can be used by travelers to immediately reload tickets or pay for travel expenses. To enable express operating, the Guangzhou-Shenzhen Railway Department in China uses one-way RFID paper tickets as ticket vouchers. Currently, both domestic and foreign cities' rail transportation systems have embraced one-way tickets based on RFID technology [7].

3. QR Code: The Quick Response Code is a well-liked two-dimensional barcode design. It displays data in alphanumeric form. You can use a handheld scanner, the camera of a laptop or Smartphone, or an algorithm to decode the data by scanning the code. Passengers may purchase tickets using any application of their choosing, but ticket generation. The ticket, which is placed on both physical and digital tickets, aims to generate a QR code and be built with it. The PNR number, or Passenger Number Record, is attached to the QR code [8].

4. Web-based system: With the quality of life increasing, recreation and artistic events are held all over the place. We can now get tickets to watch performances at cultural events like movies, concerts, operas, and sporting events. These tickets were once only available for purchase in the authorized area. Even though many individuals reserve or purchase tickets online these days, they still need to pick them up at the designated ticket window. Additionally, tickets may be stolen or lost. Paper tickets can occasionally be faked or copied. To purchase a ticket at the ticket window while doing so is momentarily desired, one may stand in queue. This appears to be an uncomfortable consumption pattern. In order to lessen the annoyances and hassles, we hope that a real-time and secure mobile ticket system operation platform can be effectively developed. The ticket system's applications are widely used and directly related to our daily lives. For instance, we purchase tickets to watch a movie, attend basketball or baseball games, take in a performance (such as a dance, drama, concert, etc.), or book rail or high-speed train tickets. The three primary methods of purchasing tickets are Windows Ticketing, Voice Ticketing, and Internet Ticketing [5].

II. LITERATURE SURVEY

The difficulties and design objectives for a generalized ticket circulation system that can circulate the different sorts of digital tickets needed in various business plans were discussed in this article. Authors defined circulation control tickets to allow for flexible control of ticket circulation. The sender or receiver of a ticket must have the right circulation control tickets before issuing, transferring, or redeeming it. The two components of a ticket are its type and its individual information, and the type identifier is used to designate the circulation control tickets that are needed. In addition to identity certificates provided by a CA, these schemes enable the use of any sort of ticket as the PKI for ticket circulation, such as a driver's license or social security card. They also suggested a brand-new trust management system based on the definitions of ticket types. Through the use of the suggested ticket type verification technique, this system enables users to automatically verify the trust of a ticket [9].

In this research, authors investigated the use of digital signatures in electronic payment and ticketing systems that demand distributed verification. The technologies outlined in this paper are intended for integration into Bluetooth-enabled mobile devices, such as smart phones or palmtops. With these solutions, users can securely use their portable devices to purchase tickets and make payments [10].

The results of the development of two mobile ticket validation systems for a real-world m-ticketing project are presented in this paper, along with further evaluation of several validation characteristics, such as supported online or offline validation methods and barcode types appropriate for use on mobile devices. Along with comments on relevant work and suggestions for future work, lessons learned are also included [11].

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With the proposed technology, a Smartphone application is all that is needed to book a ticket, and the information is saved as a QR code. Once the user arrives at their destination, They have employed a time-based approach to automatically delete the ticket after a predetermined amount of time. Every user's data is kept in a CLOUD database for security reasons since it cannot be checked in the database of the current suburban train system. Additionally, a QR code scanner will be provided to the ticket checker, allowing him to read all of the passenger's information. For "Metros" that are currently being constructed in cities like Pune, this application will be very useful. The transition id will be used for the production of QR codes. A request is sent to the server to obtain the data and deliver it to the checker phone when the checker scans this transition id from the user phone. The checker will check the ticket in this manner [12].

This paper suggests Ticket ID System, a face recognition-based system for confirming the identification of ticket holders at sizable events. A system like this is necessary to stop illegal resale of goods, like ticket scalping. Japanese popular events face a serious issue with unauthorized resale, thus stringent procedures are conducted to authenticate ticket holders at event locations using human visual examination and ID cards. Attendants at the location must spend time on this task. Additionally, the discomfort experienced by ticket holders while waiting adds to the tension. How to effectively verify identities while preventing people from impersonating others at a large-scale event with tens of thousands of participants is the challenge with ticket holders verification. Ticket ID system uses a face-recognition system created for tablet terminals to secure the identification of the ticket's buyer and bearer [13].

Both professional and novice users will be able to use our proposed application. The suggested application will be used to book a ticket without waiting in line for local rail travel, and it makes it simple for ticket checkers to determine whether a ticket is legitimate or not. The manual labor of ticket checkers and bookers is decreased by this Android app. In essence, it is the switch from a manual to a computerized system for local train ticketing and verification. So, the issue with the local rail E-Ticket reservation system is virtually resolved [14].

Today's society requires digitization in order to introduce new technology and advancements in the context of social service. In this study, ticket checking is performed automatically. They have applied the AADHAR number and fingerprint recognition method for the same. Additionally, it performs the dynamic seat allocation for the waitlisted passengers so that can decrease the workload of TC and free up management resources for other tasks [15].

The issues with the manual ticket verification and seat assignment systems are attempted to be addressed in this article. This study describes an automated biometric system for Indian Railway ticket verification that uses biometric input (fingerprint) to validate the passenger's ticket. This reduces the amount of work required by ticket collectors in the rail industry. Aadhaar cards are employed as a tool for the project because they are required for everyone in India.

Each compartment's module collects the passenger's fingerprint, and authentication is carried out using data connected to their Aadhaar ID. Additionally, utilizing GSM, passengers with reservations against cancellation (RAC) will receive information on berth confirmation through SMS right away. Human error can be greatly decreased and verification process time can be lowered by digitizing the ticket verification process. Additionally, RAC travelers are not required to wait for the permission of the travelling ticket examiner (TTE) [16].

This paper includes elements of the Indian Railway Reservation System, such as dynamic seat distribution and real-time graphing. Real-time charting can be more advantageous for both the passenger and the TTE. TTE would be able to dynamically assign seats as they became available while a train is in motion according to the proposed system. Up until the train departs the boarding station, passengers might purchase tickets simultaneously. The full transaction will be stored by the central system that governs and automates the suggested model. Additionally, it contains a seat-reservation system that enables passengers to choose a seat in the coach that is suitable for them. The entire process is network-efficient; therefore our suggested approach only requires the barest amount of internet connectivity [17].

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By using computer vision techniques, this project attempts to solve the issues and update the outdated ticket checking system. The system's objective is to develop a scalable and effective method to do away with the necessity for carrying a ticket, which lowers the consumption of paper and increases passenger convenience. The ticket verification life-cycle benefits from a neat and organized system thanks to digitization as well. The idea of facial recognition was used as a solution to modernize railway ticketing due to recent developments in the field of computer vision and the astounding improvements in deep learning algorithms' capacity to impart the abilities of human eyes and brain to computer systems [18].

This thesis introduces a hybrid blockchain-based event ticketing system to address these problems. It makes use of asymmetric encryption technologies to safeguard privacy while ensuring that ticketing information is transparent thanks to blockchain technology. The system also incorporates a revolutionary ticket verification process for combating ticket scalping, together with digital signature technology to guarantee ticket authenticity. An evaluation of the system is completed with a description of the experiments that were carried out following the implementation of the system and an analysis of their outcomes [19].

Authors presented the developed solution (Beep4Me), which adds new functionalities to an existing mobile ticketing platform, and the testing framework, which includes most cases users might encounter during a trip. They provide an in-depth description of the inner workings of this novel approach, describing how can take advantage of each technology. Findings show how important validation-related data may be gathered and utilized, first for clearance and subsequently for network planning/fleet optimization [20].

III. OBJECTIVES OF SYSTEM

1. To ensure that tickets are issued in accordance with the set regulations.
2. To check whether or not the accountable of tickets is completed correctly.
3. To minimize fraud and corruption.

IV. DIFFERENT TYPES OF INSPECTION

There are various methods to inspect tickets[21]:

1. Sectional Check: This inspection is scheduled on a certain segment for three days, or at least 24 hours, and it covers all trains. Ticket inspection Each coach of every train has a staff member assigned to it to make sure that no one is riding there without a ticket or with a ticket that isn't valid. A report is created upon the conclusion of the check.
2. Check for Employee Replacement: This check is set up to evaluate the effectiveness of a station's ticket checking employees. A division's two stations are the sites of this check. This examination is carried out at stations when the ticket checking crew does not meet the required standard of pay. After the check is finished, a report is created in which the performance of the station crew is evaluated. Inter-Division checks are also scheduled in a similar manner.
3. Concentrated Spot inspection: This inspection is conducted at a station or location with a concentration of several employees, including ticket checkers, GRP, and RPF. The check will last 24 hours. There will be inspections of every passenger in every train stopping at that station. A report is created upon the conclusion of the check.
4. The aim of the ambush check is to prevent the improper usage of the alarm chain pulling. check tickets Staff, GRP, RPF, and other railway employees are deployed in civil attire at locations where alarm chain misuse is common. Legal action will be taken, in accordance with section 141, against the passenger detected abusing the alarm chain and any other passengers deboarding immediately.
5. Mid-Section Check: The Head Quarter Ticket Checking Squad conducts a surprise check in the middle of the section. The head office ticket checking staff takes over for the train's ticket checkers, and a recheck is conducted. A report is submitted if TTE or Conductor operation irregularities are found.

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V. PROPOSED ALGORITHM

Proposed Algorithm of the ticket generation and validation is given below:

Steps:

1. Book the Ticket
2. TTE will validate the ticket using digital signature algorithms.
3. If ticket is validate
   {

   Database will be updated with the correct details

   else

   Details of fraud tickets will be sent to admin section for the further process.

   }

VI. CONCLUSION

A railway system is used to provide booking, transportation, catering, and other services. Since the development of the Railway management system, the traveler has requested TTE validation of the ticket, thus we looked to implement this with a digital signature system that could generate and validate without the aid of TTE. We aim to solve the issue of ticket generation and validation safely with our proposed system.

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