

Unique Identification based Railway Ticket Booking and Authentication System

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Abstract: Railways is the most convenient, affordable means of transport in India. So keeping this in view, the reservation of railway tickets is the most important task and it must be faster and efficient as the number of travelers is very high. In order to meet this demand, manual reservation is completely ruled out as it is time-consuming. Railways require an efficient program to implement the online reservation system. The proposed system is based on Unique Identification (UID) Technology which is applicable for booking rail tickets and managing travel database for convenience and transparency. The system uses AADHAR database for user verification. The verified user can add money to the system's inbuilt wallet which will automate the ticket booking process. The user then provides thumb impression at the source and at the destination station after checking out. This activity is recorded in the system and fare calculating algorithm in the system then calculates the fare based on source and destination recorded and the amount is then deducted from the inbuilt wallet. Thus, a transparent and user convenient environment is created that provides security in terms of user and payment details and a hassle-free travel This will improve the productivity of the Railways and will boost the "Digital India" campaign

Keywords: Aadhar; Unique Identification; security; thumb impression; e-wallet.

I. INTRODUCTION

The ticket reservation system of Indian Railways has moved from offline to online, making it convenient for people with smartphones and a stable internet connection to book tickets online, but it is limited for commute to long distances and as only a handful of people in India have access to Smartphones and India being ranked 134th in mobile data connectivity the online ticket booking system boom has slowed. The day to day travelers that board local trains to work have to book tickets manually via counters which is time-consuming and not efficient. The AADHAR system initiated by the UIDAI and Government of India has provided every Indian citizen a unique 12-digit key based on the biometrics and general details collected to make the verification system easier. This system is now being used to buy SIM cards, open bank accounts, financial transactions and to avail, every government service efficiently thus eliminating the need for excess paperwork and making the system more transparent and reliable. Indian Railways being the largest organization in the country can benefit from this system by making the ticket booking process offline but automated. In this paper, the system implemented will be installed at every railway station by replacing the existing ticket vending machines. As a signup process user needs to enter the 12-digit AADHAR key or the mobile number linked to AADHAR as it will automatically generate the person's profile based on the information collected during the application process of AADHAR card, the next part includes adding money to an e-wallet (only for net banking users) or else a monthly bill will be sent based on the journeys conducted in a month, thus making the system cashless.

In this paper, the Fingerprint based ticketing application which is modeled on the AADHAR. AADHAR is a Unique Identification technology (UID) developed by the Unique Identification Authority of India(UIDAI). The Government of India has recorded biometrics of each and every legal citizen of India and a Unique 12-digit number is assigned to each citizen which is used for verification and Authentication of the individual within the country. Fingerprint identification is one of the most well-known and publicized biometrics. Because of their uniqueness and consistency over time, fingerprints have been used for identification for over a century. Fingerprint identification is popular because of the inherent ease in the acquisition, the numerous sources ten fingers available for collection, and their established use and collections by law enforcement and immigration. For the working of application, it is essential to implement fingerprint enhancement process before extracting minutiae for the robustness of fingerprint identification algorithm with respect to the quality of fingerprint images.

This data of fingerprint is taken as input for source and destination of passengers at respective stations. Each fingerprint scanner is assigned a Unique id which is based on their location. Every time the user checks in or out of the station it updates the source and the destination location in the system. The Fare Calculating Algorithm then calculates the fare as per distance traveled and cost of the commute as mentioned in the database. The amount is then deducted from the in-built wallet in the system where the user has added money from debit/credit making the traveling process easy and cashless.

II. LITERATURE REVIEW

1. Train Ticketing System using Smart Card: For replacing the existing manual system, the project proposes to make the whole process of ticketing easier by using Smart cards. Smart cards consist of small microprocessing chips which interact with the reader and processes the desired output. Smart cards are used in order to travel via. Trains, It is used instead of tickets to avoid the long queues. Smart cards need to be recharged before using it. The goal of the project is to improve travel information and electronic ticketing using a smart card. Smart cards are easily portable and lightweight addition to it they are secured and user- friendly, can be used for Public Transport Networks (PTNs). They are used in order to keep whole transaction records by accessing the system's database. By using this card technology, the existing fare booking system can be improved. The Indian Railways have implemented this project, It is working successfully. Thus it helps The Indian Railways to save their money and generate revenues for their other requirements. The smart cards are widely used today at vending machines for booking tickets. The card is recharged with a certain amount of money and the amount is deducted for each fare from the card. It is similar to an ATM card. However, these smart cards need to be recharged manually at ticket counters which makes it time-consuming.

2. Ticketing System of Indian Railways through SMS and Swapping Machine: Indian Railways had begun the process of automation back in 1985 where tickets were printed through computers managed by a railway employee at the counter and the payment was done manually, but it creates a number of problems related to this newly implemented system, this paper is regarding the solutions of the problems related to automation, efficiency, and reliability[6].

3. E-KYC Ticketing System: The e-KYC ticketing system is the new way to book the tickets like a bus ticket, train ticket, flight ticket, and other ticket bookings. The main purpose of the e-KYC ticketing system is to ensure the safe and secure journey of oneself and other fellow passengers. The e-KYC ticketing System is a new way to verify the passengers having the journey on bus, train, flight etc. The e-KYC system permits ticket booking to the verified passengers only. This system will ask a Unique Number like Aadhar card in India which will be Universal Identity Number. Without the Aadhar card, people will not be able to travel by any mode of transport. The e-KYC ticketing system uses two-way verifications. The first verification happened before booking the ticket. The user needs to give his Aadhar card number to register them on the website. If they are not having Aadhar card, then they cannot book the ticket. The second verification takes place when the TT comes to check the ticket. Here TT will be having a device which will ask the ticket number and the thumb impression of the passenger. This thumbprint will be matched with the existing database. If it matches, then he can travel in the train else an e-mail will be sent to railway department and the journey of the particular passengers will be denied.

4. Multimodal Biometric Authentication Combining Finger Vein and Finger Print: Bio-Metric is a process of identifying a person using physiological and behavioral features. Physiological features are Iris recognition, DNA matching, hand vein identification, fingerprint identification and behavioral features are voice recognition, signature, password, keystroke etc. Since Unimodal systems are having drawbacks, in this paper we are focusing on Multimodal biometric systems. Multimodal biometric systems have been widely used to achieve high recognition accuracy. Among various multimodality options, fingerprint and finger vein has gained much attention to combining accuracy, universality and cost efficiency of the solution. In this paper, a new approach is employed to improve the authentication.

III. PROPOSED SYSTEM

To overcome the difficulties and drawbacks of previous systems, this system was proposed. The application in this system avoids paper wastage and time consumption thus leading an end to long queues. The verification process ensures transparency whereas the e-wallet system makes faster and reliable payments, thus saving the precious time of travelers and resolving the complexities of ticket booking.

A. System Architecture

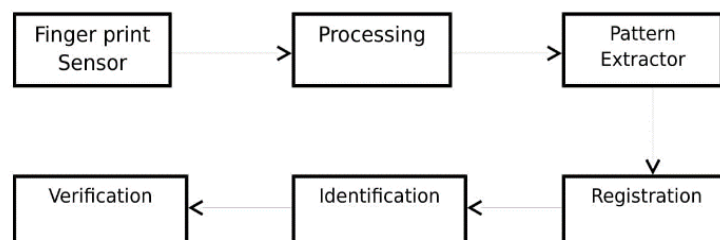


Figure 1: System Architecture

For the working of application, it is essential to implement fingerprint enhancement process before extracting minutiae for the robustness of fingerprint identification algorithm with respect to the quality of fingerprint images. This data of fingerprint is taken as input for source and destination of passengers at respective stations. Each fingerprint scanner is assigned a Unique ID which is based on their location. Every time the user checks in or out of the station it updates the source and the destination location in the system. The Fare Calculating Algorithm then calculates the fare as per distance traveled and cost of the commute as mentioned in the database. The amount is then deducted from the inbuilt wallet in the system where the user has added money from debit/credit making the traveling process easy and cashless.

B. Implementation

While arriving at the railway station, the user will have to pass through an Automatic Fare Collection Gates which are used in Metros. The entrance gate will collect users Source location, from where the user has started the journey and Fingerprint while entering the station additionally, it will record the time and date. This process is to authenticate the user and grant access to user if the account balance is sufficient. It will record the fingerprint. After that, it will verify the fingerprint's pattern with the one that's stored in the database. If a match is found, the gates open and the user can board the train. The same approach is followed for the exit gates.

1. Hardware Requirements

The proposed system uses Digital Persona U.are.U Fingerprint Reader 4500 shown in Fig.2, which is used to collect fingerprint data for registration and verification of users. This hardware has a high capacity of scanning fingerprints of 700dpi which helps in pattern matching and provides accurate data. It is used to form a digital image of a fingerprint which is further processed to distinguish features and to form a digital template of a fingerprint



Figure 2: Digital Persona 4500

2. Software Requirements

A web application is developed in order to manage this whole process using Code Igniter, a PHP framework. It is used to register a user, to book tickets, to check travel history and add balance in e-wallet. In order to integrate the input from fingerprint sensor with the application FlexCode Software Development Kit is used, which helps to interact with the application.

Flex Code SDK: FlexCode SDK is simple and easy to use in accordance with the demands of application needs. The functions concept are instant, you simply call the functions required for registering and verify fingerprints then FlexCode SDK will do registration process and verification process without getting the user to involved in it. The registration process will produce a fingerprint template in a text format that is easy to be stored and distributed. When identifying a finger, the templates are used to compare the fingerprints scanned. FlexCode SDK greatly save your time to integrate fingerprint technology into any application required.

XAMPP: In order to host the web application locally we need XAMPP, It is free and open source cross-platform web server. XAMPP stands for Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). The SQL and Apache needs to start while executing the application. Along with PHP, the main application was developed by using javascript, HTML and CSS was used for styling and designing. To generate an attractive User Interface, Bootstrap themes were implemented. PHP is used to store user data in the database.

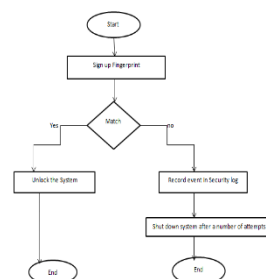


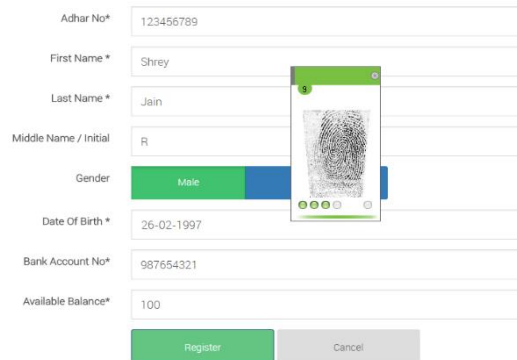
Figure 3: The verification process

Figure 3 shows Verification & Fare Checking: After traveling when a passenger will ready to exit from the station premises, this step will require. The objective of this step is to capture the image of the outgoing passenger and check that with the already existing image of a fingerprint. If it matches then check the travel fare with inserted fare and let the passenger go out. [2]

C. Modules

1. Registration

In Registration Module the user is registered by entering valid Aadhar data and taking multiple samples of fingerprints. This module is used to create a database containing user information about Aadhar details, Balance, Fingerprints, as shown in Figure 4.



The registration form includes the following fields:

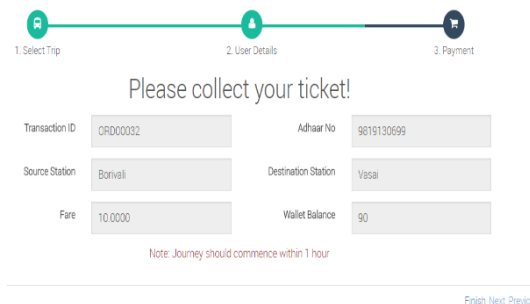
- Adhar No*: 123456789
- First Name*: Shrey
- Last Name*: Jain
- Middle Name / Initial: R
- Gender: Male
- Date Of Birth*: 26-02-1997
- Bank Account No*: 987654321
- Available Balance*: 100

Buttons: Register, Cancel

Figure 4: User Registration Module

2. Booking

In this module, the user books the ticket while entering the railway station by providing Fingerprint as key to enter the station. The user selects the Source and Destination stations. In the background, process application verifies the user and checks for whether the user has sufficient balance or not. In case of invalid data, fingerprint or low balance an error is displayed. In Figure 5, we can see that user has successfully booked the ticket and ticket details are displayed.



Progress: 1. Select Trip, 2. User Details, 3. Payment

Please collect your ticket!

Transaction ID: CPD00032 Adhaar No: 9819130699

Source Station: Borwell Destination Station: Vazal

Fare: 10,0000 Wallet Balance: 90

Note: Journey should commence within 1 hour

Buttons: Finish, Next, Previous

Figure 5: Booking Module

3. History and TopUp

In History module, users travel history is displayed as shown in Figure 6., It displays user’s data, source and destination stations, fare and date and time.



Search: Enter your Adhar No [] Search []

Show: 10 entries

User	Source Station	Destination	Trip Fare	Date/Time
ShreyJain	Mumbai-S1	Mumbai-D-1	20,0000	2018-01-14 16:22:25
ShreyJain	Kandivali	Mumbai-D-1	20,0000	2018-01-19 10:13:56
ShreyJain	Kandivali	Mumbai-D-1	20,0000	2018-01-19 10:20:56
ShreyJain	Kandivali	Mumbai-D-1	20,0000	2018-02-02 07:08:07
ShreyJain	Kandivali	Mumbai-D-3	40,0000	2018-02-02 07:10:07
ShreyJain	Mumbai-S1	Mumbai-D-1	20,0000	2018-02-02 11:54:04
ShreyJain	Mumbai-S1	Mumbai-D-3	40,0000	2018-03-08 23:10:04
ShreyJain	Mumbai-S1	Mumbai-D-1	20,0000	2018-03-08 23:28:17

Showing 1 to 8 of 8 entries Previous Next

Figure 6: History Module

In TopUp Module the user needs to enter valid aadhar number and amount to be refilled and the database is updated after successful TopUp operation.

**IV. CONCLUSION**

The result of the proposed system is a secured way of traveling in trains reducing the huge amount of time consumption by avoiding the rush for ticketing and making the process cashless. Thus, achieving a simple and efficient ticketing system. The proposed system can be used in other public transport services and can be used in various other applications like shopping and various other things which can be made cashless by using fingerprint for paying the bills. It can be used in quotidian tasks by replacing the money with the fingerprint for payment.

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