International Journal of Engineering & Technology, 7 (2.33) (2018) 1288-1291

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Train Ticket Inspection and Validation Using Biometrics

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Abstract:

The current suburban railway system comprises of some challenges, that is the tickets has to be checked manually and the population travelling through train have also increased immensely. This resulted in various issues such as never ending queues, wastage of paper, lots of resources and staff utilization and this is the Existing system. In the Proposed system**,** if the user intends to travel from a source to destination with no intention to return on the very same day, then only half ticket costing will be taken into consideration. Modification Part of the Project is our Implementation, Android User books the Outstation Ticket by specifying Source & destination with number of Tickets using Aadhaar Card. QR Code is generated comprising all of the above. Once User gets into train, user has to give Finger Print & Scan QR Code to take up their seat. The seat of passengers who hasn't arrived is dynamically allocated to Waiting list. All the information are transferred to TTR.

Keywords: *Fingerprint, Quick Response Code, Mobile Ticketing, Server, Cloud.*

1. Introduction

The field of technology is becoming more advance and growing at a great extent. Take an example of railway department, e-ticketing facility was introduced where users can browse through the governmental website and book their long journey train tickets which is later printed to show to the ticket checker when needed. After that a new technique was introduce called M-ticketing where the user will message to the web portal through mobile phone after which a complete web page was downloaded on the mobile phone and after that user can perform all the booking process as like in e-ticketing facility. With our system train ticket can be booked with just a phone application and this ticket information is stored in the form of QR code. The information of every user is stored in a Cloud database for the purpose of security which is unavailable within the current suburban railway system database for checking purpose. Also ticket checker are going to be given QR code scanner, with that the checker will get the complete details of the passenger. For the generation of QR code we can make use of the transition ID. When this transition ID is being scanned by the checker from the user phone a request is sent to the server to retrieve the data to the checker phone. In this way the ticket of the passenger will be checked by the checker and this app saves huge work done by ticket checkers. If passenger has not arrived even after the train started, our system will send SMS Notification to the passenger, if passenger is not coming then seat is dynamically allocated to the Waiting list people & all the information are transferred to TTR.

2. Review of Literature

In this paper [1]. Roy, Aditi, NasirMemon, and Arun Ross the security of the authentication systems based on partial fingerprint is examined, especially when the multiple fingerprints of a user are enrolled. Many electronic devices have started to use fingerprint sensors for authentication process and they are in limited size, so these devices needs to acquire a single finger's multiple impressions and they are stored as templates for that singer user. A user is said to be successfully authenticated only if the partial fingerprint obtained during the authentication matches any one of the stored templates. The persons involved in this paper have tried to generate a synthetic or a real fingerprint that would match with any of the stored templates. In this paper they have exposed a potential vulnerability of partial fingerprint-based authentication systems by generating a "MASTERPRINT", especially when multiple impressions are enrolled per finger. The status of existing [2]. Purnomo, Dudheria, Rishabh secured QR code scanner apps for Android from a security point of view is being explored in this paper. QR codes are becoming ubiquitous and so there are various threats that can take place when sharing the
rogue URLs through this code. Several QR code scanner apps have also been available in the past few years to battle threats like phishing and various malware, but those apps merely presented the QR code encoded with URL to the user rather than validating it against the threat databases. They have also tested two of such apps and the results of their experiments suggest that protection provided by such QR code scanner apps against the rogue URLs is restricted

to a limit. They also proposed recommendations to enhance such kind of app's security. This paper[3]. Han, Byron B., Craig A. Marciniak, and Wayne C. Westerman proposes a concept where the unified image of biometric data is being constructed using the one or more than one portions of at least one image of the biometric data. A sequence of biometric data images is received, such as, for example, a sequence of fingerprint images, and a set of biometric data images is selected from the sequence of images. One or more than one portions of at least one image of the biometric data in set of images can be selected to be included in the unified or combined image of biometric data. If the unified image of the biometric data is not complete, then that user can be prompted for one or more additional images of their biometric data.

The review of biometrics literature[4] Marasco, Emanuela, and Arun Ross and presentation of the state of art in fingerprint antispoofing and several issues related to the vulnerability of fingerprint recognition systems to attacks have been highlighted in this biometrics literature. Some of commercial fingerprint recognition systems can be deceived when these artificial fingers are being placed on the sensor; that is, the system successfully processes the ensuing fingerprint images and thereby it allows an adversary to spoof the fingerprints of another person. The spoof detection importance have also been highlighted as it plays a significant role in increasing the biometric system's robustness. They have also proposed several countermeasures that distinguish between live fingerprints and spoof artifacts.

3. Existing System

In the existing system, people are booking their train ticket through mobile application but do not give their fingerprint. There are various issues such as never ending queues, wastage of paper due to manual ticketing process, lots of resources are being utilized and more number of staffs are also needed to be utilized in this existing system. The TTR has to go and check every passenger manually to verify their seats and there is no automated application for this verification process. The people in the waiting list cannot be notified immediately if there is any vacancy in the seats when the journey starts. There is no any QR code for each seat in train. While travelling in night hours, the passenger's rest may be disturbed by the TTR in the name of ticket checking. The TTR has more process to do already and also the TTR needs to allocate seats to the waiting list if any seat is available in the reservation compartment. If the user wants to get down in a railway station in the half distance, there is no option to reduce the train ticket cost.

4. Proposed System

In this paper, user has to register their details like their name mobile number and finger prints. User will reserve their ticket and they will get their ticket ID. Train seat contain QR code. Passenger has to scan the QR code on seat and punch their finger print also. Admin will compare those QR code and finger print with existing data. Through this admin will know about passenger's presence on the seat. By this we can provide easier way of seat verification. If passenger has not arrived even after the train started, our system will send SMS Notification to the passenger, if passenger is not coming then seat is dynamically allocated to the Waiting list people & all the information are transferred to TTR. So the huge amount of work done by ticket checkers is also reduced by this digital ticket checking process. If the user intends to cancel the journey during travel and get down from train in half distance, then only half ticket costing will be taken into consideration.

(i). User Android Application

An Android app is a software application running on the Android platform. Here a user android application and ticket checker application is being developed. Mobile Client is an Android application which created and installed in the User's Android Mobile Phone. The Application First Page Consist of the User registration Process. While creating the Android Application,

We have to design the page by dragging the tools like Button, Text field, and Radio Button. Once we designed the page we have to write the codes for each action. Testing is done to check whether the functions of code work properly.

Fig 1: User Android Application

Once we create the full mobile application, it will generated as Android Platform Kit (APK) file.

This APK file will be installed in the User's Mobile Phone. User have to register their details in this application along with their aadhar number and have to register their finger print in biometric for security purpose. This application is used to book and cancel tickets and also does verification.

(ii). Server

A server is a computer program or a device that will provide functionality for other programs or devices, called "clients". Client–server systems called as request–response model in which the client sends a request to the server, which will perform some action and sends a response back to the client, usually with a result or acknowledgement. In our project, the Server will monitor the entire User's information in their database and verify them if required. The Server will store the entire User's information in their database. Also the Server has to establish the connection to communicate with the Users. The Server will update the each User's activities in its database. The Server will authenticate each user before they access the Application. So that the Server will prevent the Unauthorized User from accessing the Application.

(iii). Ticket Booking and Mobile Wallet

User have to book ticket to travel on train while booking ticket, system will show how many seats is available in train. By this passenger will book their ticket and the amount for ticket will be debited from mobile wallet on your mobile phone. A mobile wallet is a way to carry your credit card or debit card information in a digital form on your mobile device

Instead of using your physical plastic card to make purchases, you can pay with your smart phone, tablet, or smart watch. If the user intends to travel from a source to destination with no intention to return on the very same day, then only half ticket costing will be taken into consideration and the remaining amount is credited to the user's wallet.

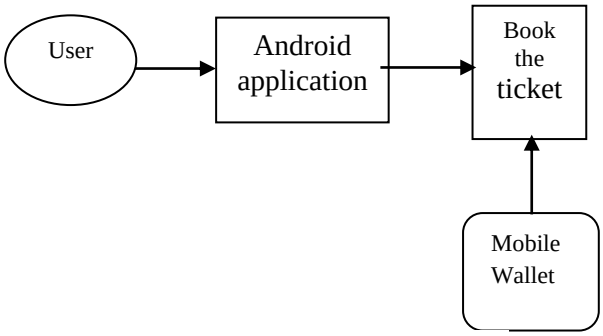

Fig 2: Ticket Booking and Mobile Wallet

(iv). QR Code (or) Fingerprint Kit

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode). A barcode is a machine-readable optical label that contains information about the item to which it is attached.

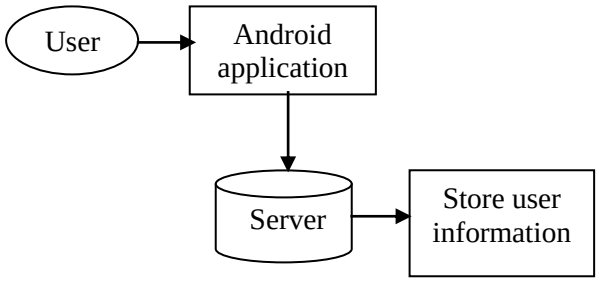

Fig 3: Server

Fig 4: QR code

Fig 5: Fingerprint Kit

A QR code can be scanned using a QR scanner or a smart phone with built-in camera to view the information that is efficiently stored in it. Here we are using QR code to store seat number, coach number and train number. This is a permanent QR code which is attached in every seat. While people book ticket to travel, corresponding seat ticket ID will be sent to passenger. Fingerprint Kit is also attached in every coach. This can be used if the user does not have android phone to verify the seat. The user has to enter seat number and punch fingerprint here.

(v). Fingerprint Scan

Users have to scan the QR code and give finger print before they sit. Passenger can give their fingerprint either through mobile's fingerprint scanner or using fingerprint scanner attached in corresponding compartment.

When the user scans QR code using android phone, System will check correct authentication by comparing this QR code and fingerprint with previous data.

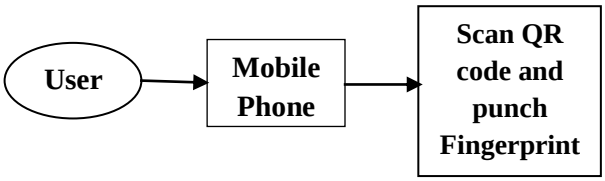

Fig 6: QR code scan using phone

If the user doesn't have android phone, they can enter their seat number, coach number in Fingerprint Kit and punch their fingerprint, the system will compare both values. If the fingerprint of the passenger matches with the previous data of that user, then the authentication is completed. If it is not authenticated the user has to give fingerprint again for re-verification and if the fingerprint doesn't match again with previous data, then the *seat* is not confirmed for that passenger.

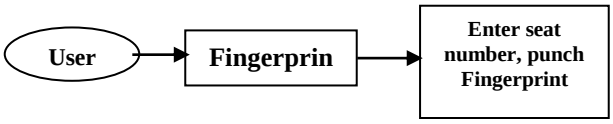

Fig 7: Verifying using Fingerprint Kit

(vi). Check Availability of Seats (Ticket checker application)

TTR have an application to check the availability of seats. In application there are two options are there, one is availability and another one is engaged. The TTR application is responsible for checking whether the reserved passenger has arrived or not and also does the refund process for the passenger who cancels their ticket. If passenger has not arrived even after the train started, our system will send SMS Notification to the passenger; if passenger is not coming then seat can be dynamically allocated to the Waiting list people.

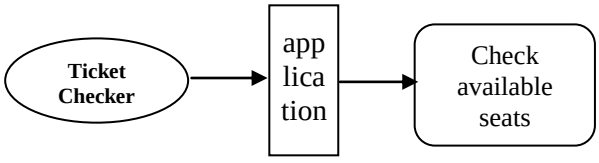

Fig 8: Check availability of seats

While checking availability of seats if there is any seat available then admin can provide it to another passenger in the waiting list. Admin

in the server also uses application in which adding a new location, adding new route or any changes in route can be made.

5. System Design

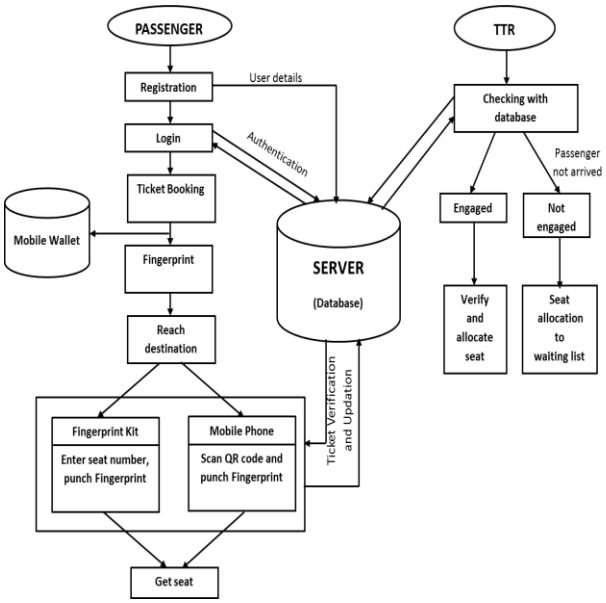

Fig 9: Architecture Diagram

6. Future Enhancement

In this paper, modification can be done and make more advanced by fitting GPS(Global Positioning System) in the train to get the current location of the train and this feature would be very useful to the user. And another feature that can be included is that when a user(passenger) gets down in the middle of the journey then the GPS in train should track user's location and if it confirms the user(passenger) has got down of train and walked away, then the user's remaining amount should be refunded to the user account.

7. Conclusion

In this paper we have surveyed many papers related to biometrics and mobile ticket application, so that we could develop an android application to provide a secured travel system by allocating seat for passenger and providing easier way of seat verification for TTR. By this, the people in the waiting list are also benefited as the unallocated seats are being immediately intimidated and digitally allocated to them and also the passengers are not disturbed after they have correctly verified their seats once. The passengers are also benefited with a facility that if they need to get down from train in half distance during travel, then the ticket is validated only for the distance they have travelled and the remaining amount is credited to their wallet. We conclude that we have tried to develop a project where both passenger and the TTR is benefited as their manual work is reduced.

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