Android App for Local Railway Ticketing Using GPS and QR Code

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Abstract — Today Android mobiles are being used by almost everyone and there are applications designed for almost everything we need in a daily life. But when we see that there are long queues for getting regular local tickets we get frustrated and huge amount of time gets invested. The ATVM machines are many times out of order. Many people don't know how to use the machine and machines require large amount of maintenance cost. Mobile Application for booking local ticket online is a venture to avoid the current biggest problems that is the queue and machine (ATVM) maintenance cost and even unavailability of the machines. To overcome this problem application will provide users to login and create account in the app so that user can book tickets. User can transfer balance from his respective bank account in his apps. Admins of the application can change the cost of tickets as per the distance or cost per kilometre. Ticket Checker can check the ticket by scanning the ticket and can also check recent 2 tickets.

Keywords — **ASR ticketing, GPS Validation, Cloud Database, QR - Code format of ticket, Android OS, MySQL**

I.   INTRODUCTION

In the past decades, there has been much advancement in the field of technology. Considering railway department, e-ticket facility was introduced, wherein users could browse through an official website and book their long journey tickets which can be printed out after confirmation to show it to the checker when needed. A few months later a new technology called M-ticketing (mobile-ticketing) was introduced where customers messaged to a web-portal using their mobile phones after which a complete web page was downloaded to their phones where user could do the same booking process as in the e-ticketing facility. Also the use of smart cards has become mandatory in foreign countries during travel. But if user forgot to carry the travel cards along with and stand in the queue for local suburban tickets, the user could suffer. Android Suburban Railway (ASR) ticketing is primarily to buy suburban tickets which just a smart phone application, where you can carry your ASR ticket in your smart phone as QR-code (Quick-Response). It uses the smartphone's "GPS"

Facility to validate and delete your ticket automatically after specific interval of time once the user reaches the destination. Ticket information is stored in a cloud database for security purpose which is missing in the present suburban system. On the other side, the ticket checker has a checker application to search and validate the user's ticket information which is been stored in the cloud database.

QR CODE

A QR code is any code that users find on most of any items that they buy from the store. QR codes have come a long way and now that they are integrated into the online world it's a true phenomenon. It makes searching for online products, shopping and buying much easier. Now, users are going to use it for buying tickets. Creates an image in real world and acts like a web link for the smart phones. It actually grabs the code scans the item and goes online searches for the item which then give users so many details about the product. The user gets specific details as per user choice and reviews about the product you have just scanned from the scanner. When user scans a QR code a magazine, a newspaper or wherever

the iPhone or Android will to go to a website where the user will find much of promos, coupons, maps and many more information. QR codes now are used in a much broader context, including both business tracking applications and convenience-oriented applications aimed at mobile phone users, to open a Uniform Resource Identifier (URI), or to compose an e-mail or text message. Users can generate and print their own QR codes for others to scan and use by visiting one of several paid and free QR code generating websites or applications. It has then become one of the most-used types of two-dimensional barcode.
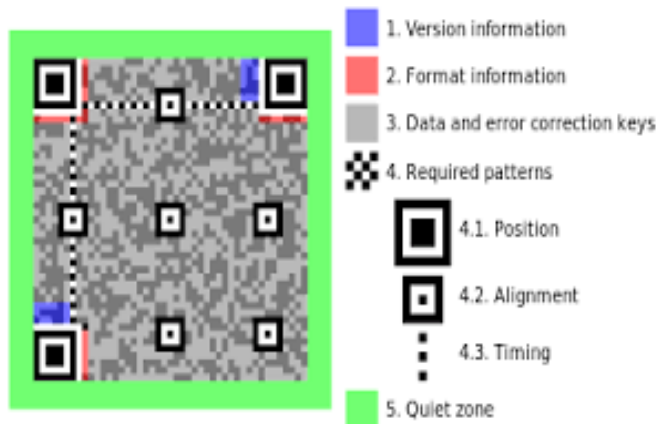

Fig1: Structure example of QR code

A. Encryption

Encrypted QR codes, which are not very common, have a few implementations. An Android application, for example, manages encryption and decryption of QR codes.

B. Encoding

The format information records two things: the error correction level and the mask pattern used for the symbol. The mask patterns are displayed as a grid that is repeated as necessary to cover the whole symbols. Modules corresponding to the dark portion of the mask are inverted.

Global Positioning System (GPS):

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information to the user or required system from anywhere on the Earth or displays a place near to that location. It can also track locations near to the surface of Earth. The location is determined through the combination of minimum three or more GPS satellites. Today almost all the Android based

smartphone have GPS enabled in them. The GPS service is used in many fields ranging from military application to cyber-crimes. A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include:

- The time the message was transmitted
- Satellite position at time of message transmission.

II.   PROPOSED SYSTEM

As a solution to these issues an android mobile application can be made which will comprise of all the functionalities where one can buy the tickets and carry their railway tickets in the smart phone as a Quick response code. Mobile devices like smart phones are emerging in the field of transportation services where technology is being used for data collection, location based transportation services and decision making when it comes to travelling. Comparatively study with QR code which gives the idea about how QR code is more efficient than RFID and barcode systems. Which will be compared in parameter such usability cost, executions, requirement, appearance etc. The structure of system divided into two components:

• The customer application which resides personal information gathering, buying ticket, pin code validation, generating QR code, GPS ticket validation and stored into the database.

• The checker application is to validate the ticket by entering the ticket number of the user and searching in the database to check whether the user has bought the ticket.

III.   RELATED WORK

The existing system which is employed by the Center for Railway Information Systems (CRIS) [5], provides a one-time password (OTP) upon booking the ticket from their online app. The user has to feed in the OTP and the phone number into the ATVM machine located at the station. The ATVM machine generates the ticket. The drawback of this system is that the user has to go to the machine to fetch the ticket and it is not completely online. Users need to stand in a long queue for getting tickets. Similarly a app was designed

where a ticket is booked but needs to be printed from machines. So it does not eliminate the paper and maintenance cost of the machines. According to the sources in news the similar app like our proposed system is under development with more features by the Indian Railways. Smart Card is a technology used which eliminates paper, money but fails to eliminate long queue and paper tickets.

IV. SYSTEM ARCHITECTURE

The system architecture in fig. 2 clearly shows how the system will work and how it is going to be executed [3]. The user has to sign up for using the android application. After signing up the user can select the appropriate details for booking the ticket through the book ticket page selected from the menu.

Once the book ticket button on the page is clicked, the ticket information is sent to the railway server as an http request via the internet. The train database is made on SQLite database which is the application database. The ticket information and the user detail is then stored in the MySQL [8]. The http response from the railway server is sent back to the application. The ticket is displayed in the application itself.
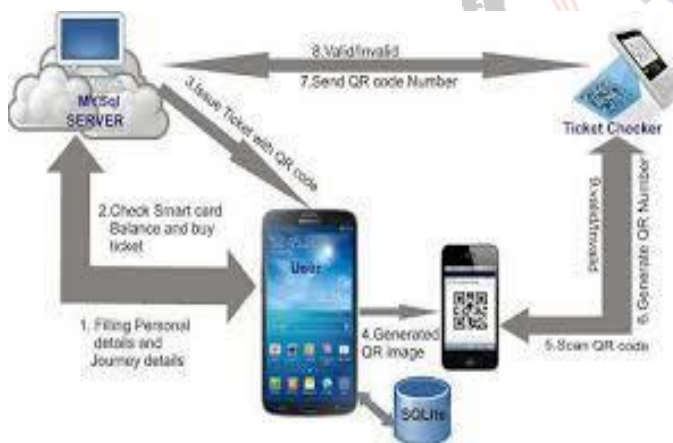

Fig. 2 System Architecture.

V. WORKING

1) PERSONAL INFORMATION GATHERING: The work here starts during the first time installation of our application. It gathers the basic customer information like first name, last name, date of birth, city, state etc., and it will be stored into user mobile's, SQLite database. So every time

when the user buys the ticket this customer information is also sent to the database for security purpose and used also in the QR.

2) TICKET BUYING: The user selects source, destination, class, no. of Adult and child tickets, ticket type like return or single etc. then the user browse through the menu option to choose either credit buy option or token buy which simplifies the buy process by remembering the credit card details. Once the user chooses any of these options the application moves on to the pin code validation module.

3) PIN CODE VALIDATION: Once the customer hits the buy button a PHP code in the railway server validates the pin number and passwords, if it is successful it saves both the journey details and customer info in the server's MySQL database. After which ticket number and time of buying is generated by the PHP code and the balance credit value is displayed.

4) GENERATING QR CODE: Once the PHP code generates the ticket number and time of buy the details saved in the MySQL database are sent to Google Chart API engine in order to generate the QR code. here all the personal and ticket information are converted into QR codes and sent back to the user mobile as HTTP response and saved in the application.

5) GPS TICKET VALIDATION: In this module (fig 1.0) the GPS plays the role of the checker, where when the user buys the ticket, the source geo points, destination geo points, ticket type, expiry time & date are stored in a mobile SQLite database. This service checks the user's current location in accordance with the destination geo points, after which the ticket type is checked and accordingly the ticket is deleted if two is single or updated if type is return.

6) CHECKING QR CODE WITH QR READER: In this module the checker will have QR Code reader and scan the QR code with the application in order to validate QR code and verify the journey details, especially the time and date of the ticket.

7) CHECKING WITH DATABASE: If suppose the user's display is being damaged and not able to scan the QR code due to other reasons like battery failure, we have Another

failsafe option to check the ticket by searching the ticket database with the user's ticket number for validation purposes.

❖ *High Level Requirements*

SR No.	Requirement Name	Requirement details
1	Mobile application	Sign in, sign up, view information, buy, download, cancel
2	Checker application	Scan and verify
3	Web Services	Responsible for authentication, location retrieval, payment processing, ticket confirmation and validation, QR code generation and validation, deletion of data, update data.

VI. FLOW GRAPH

The above concept can be best understood by the figure 3. The Application starts with a flash activity and then the user needs to login or sign up with his valid credentials. After logging in the system user will enter the details of source and destination and book his required ticket and then generate QR for the same. Both the ticket details as well as QR code is displayed to the TC.TC needs to login in the system to scan the QR of ticket to check whether the ticket is valid or not.
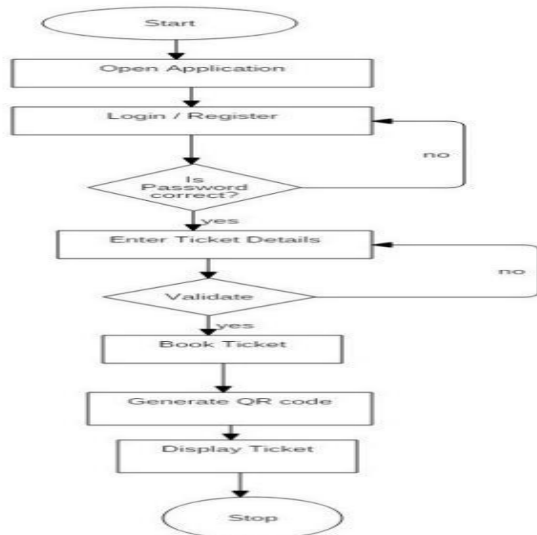

Fig. 3 Flowchart

VII. COMPARATIVE STUDY

The existing system is having many disadvantages. People need to stand in queues for a long period of time and it results

in missing of train in time of emergency and in this conditions even disasters like accidents happen. In case of ATVM machines it experiences many technical issues and require large amount of maintenance cost and repairing again and again which takes long time. Even recharging of Smart Cards require large queues. Loss of ticket is not accepted in current system. People tend to fool Ticket Collectors by showing old tickets. Paper wastage is large for printing of tickets.

The proposed system is very intact. It eliminates the paper system. The loss of Ticket is not possible since the ticket is stored in our mobile. In case of low battery or switched off mobiles the tickets can be referred on other devices by using login credentials since the ticket is stored in online database. In this system fooling is not possible since the old tickets get deleted from the database on command of database admin. If we compare the systems the proposed system proves to be of great advantage but can be of disadvantage if the user does not have a advanced mobile and a strong internet connection .

VIII. CONCLUSION

In this project we will present a mobile ticket application developed for android 1.5 using Java, SQLite, SQL and PHP on server side which can alter the approach people procure their tickets in future. This kind of ticketing application can be useful to any kind of transport system. This android app is one of its kind and finds massive application to buy local railway tickets through android mobile and also this app save huge effort for the ticket checkers by GPS justification of tickets and also moving from manual ticket examination process to digital examination process by just scanning with their own android mobile to authenticate the ticket. Hence a huge problem of issuing local train tickets has been solved with this new application. Knowing at what time the trains will be available will also relieve the user to allot his time accordingly to arrive at the station, so in this project GPS will be used here to find the location of the user and close by train stations to display the train arrival timings. Still further improvement modification can be a dynamic display of train locations by fitting GPS devices in trains to show its location

in the Google-map display which is obtainable in this application. Also as a station level safety we can have hardware devices to authenticate the QR codes prior to the user enters or leaves the station, where the user can have right to use towards platform after being validated by the hardware device. So from these we will surely contribute our own work in "DIGITAL INDIA" program of Government of India.

IX. FUTURE SCOPE

There is always scope for innovation when it comes to technology. Even our project is no exception. Some possible improvements that can be made in the project in the near future are understanding and making the use of GPS to track down the location of the passenger and enable selection of the nearest station [9]. Also understanding the use of SMS facility for ticket display [10].

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