

An Intelligent Ticket Checker Application for Train Using QR Code

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ABSTRACT

The biggest challenge in the current ticketing system is QUEUE. In this growing world we have to stand in the queue for purchasing tickets. Tickets can vary i.e., movie tickets, bus tickets, railway tickets, etc. The technology is growing quickly, therefore this should be modified. This paper “An Intelligent Ticket Checker Application for Train Using QR Code” is mainly use to buy suburban tickets which is most challenging when compared to book the long journey tickets with the existing system. With our system ticket can be booked with just a smart phone application and ticket information is stored in the form of QR code.

We will be using time-based technique for automatically deleting of the ticket after a specific interval of time once user reaches the destination. The information of every user is stored in a CLOUD database for security purpose which is unavailable within the current suburban railway system database for checking purpose. Also, ticket checker is going to be given QR code scanner, with that he will get the complete details of the passenger. This application will be very helpful for “Metros” which are now currently going to be established within the cities like Pune.

For the generation of QR code we will make use of the transition id. When this transition id will be scanned by the checker form the user phone a request is send to server to retrieve the data to the checker phone. In this way the ticket will be checked by the checker.

INTRODUCTION

The field of technology is becoming more advance. Take an example of railway department, e-ticketing facility was introduce where users browse through the governmental website and book their long journey tickets which is later printed to show to the checker when needed. After that a new technique was introduce called M-ticketing where user messaged to the web portal through mobile phone after which a complete web page was downloaded on the mobile phone after that user can perform all the booking process as like in e- ticketing facility. In foreign countries the use of Oyster and Octopus card has become mandatory during travel. But we suffer when the card is misplaced and we stand in the Queue for the tickets in this situation e- ticketing, m-ticketing cannot be used.

With our system ticket can be booked with just a phone application and ticket information is stored in the form of QR code. We will be using time-based technique for automatically deleting of the ticket after a specific interval of time once user reaches the destination. The information of every user is stored in a CLOUD database for security Purpose 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 he will get the complete details of the passenger. This application will be very helpful for “Metros” which are now currently going to be established within the cities like Pune. For the generation of QR code we will make use of the transition

id. When this transition id will be scanned by the checker form the user phone a request is send to server to retrieve the data to the checker phone. In this way the ticket will be checked by the checker

1. GROWING IMPORTANCE OF ANDROID PHONE

Android is software for the mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary for developing applications on the Android platform using the Java programming language. The Android is a Linux-based operating system for mobile devices such as Smartphones' and tablet computers. It is developed by the Open Handset alliance led by Google.

It is the largest community of developers writing applications that extend the functionality of the device. Developers write primarily in a customized version of Java. The Android applications can be downloaded from the third-party sites or through online store such as Google Play which is maintained by Google.

2. FEATURES

QR CODE

QR code means Quick Response Code. QR Code acts as a kind of link that bridges the gap between physical product. QR Codes are magical because they can be read from any orientation. The squares are position detection patterns, which allow for 360-degree, stable, high-speed reading. QR Codes can handle all kinds of data including numeric, binary, symbols, control codes, alphabetic characters and Japanese character. The size of QR Code depends upon the data content. The QR Code can be printed on business cards, shopping products, brochures as well as any other place where you want to put it. The information is easily accessible by using QR Code. The structure of QR code is shown in following figure



Fig 1: Quick Response Diagram

SQLite

SQLite is RDBMS. SQLite is an in-process library that implements a self-contained, server less, zero configurations, transactional. It is written in ANSI-C and provides simple and easy-to-use API. In contrast to many database management systems, SQLite is not a client- server database engine. The source code for SQLite is in public domain. SQLite is ACID- complaint (Atomic, Consistent, Isolated and Durable), allowing safe access from multiple processes or threads. It is not a standalone process like alternative databases; you can link it statically or dynamically as per your requirement with your application. It can access its storage files directly. A complete SQLite database is stored in a single cross- platform disk file. It is very small and light weight, less than 400KB fully configured. It is available on UNIX (Linux, OS-X, Android) and Windows (Win32, Win RT, WinCE).

MYSQL

MySQL is open-source relational database management system (RDBMS) which is freely available and

makes use of Structured Query Language. It was widely used open-source client server RDBMS. It is one of the best RDBMS being used for developing web-based software applications. MySQL is developed, marketed, and supported by MySQL AB, which is Swedish company. It makes use of a standard form of the well-known SQL data language. It has become popular because of its features. MySQL is released under an open-source license. So, you need not require paying. It is capable of handling a large subset of functionality of the most expensive as well as powerful database packages.

It is scalable and it has the ability to handle almost any amount of data. It is a secure database. It includes solid data security layers which protect sensitive data from intruders. It supports the several development interfaces like JDBD, ODBC and scripting (PHP and Perl). It can be executed under a number of operating system.

3. MATHEMATICAL MODEL

Identify the process

Admin Process Process= {P1, P2, P3,, Pn}

P1=Add location (longitude, latitude) P2=Manage routes (source, destination) P3=Manage fare of ticket (amount) P4=Send transaction detail on checker application (source, destination, user name, ticket type, ticket fare) where source = source, station name = destination, station name user name = name of the user, ticket type= type of the ticket i.e. returns type or single type, ticket fare= amount of the ticket.

User's process

Process= {P1, P2, P3,, Pn} P1= user login process (user_id, password) Where, user_id= user id of the user password= password of the user P2= Railway ticket booking (user_id, src_station, destination_station, num_seats, ticket_type, amount_account) Where, user_id= user id of the user src_station= source station name destination_station= destination station name num_seats= no of seats to be booked ticket_type= type of the ticket i.e return type or single type amount_account= amount to be added to the users prepaid account P3=Generation of QR code (t_id) Where, t_id= transaction id of each user P4=The deducted amount will be shown to the user

Checker process

Process= {P1, P2, P3,, Pn} P1= checker login process (checker_id, password) Where, checker_id= checker id of the user password= password of the user P2=scanning the generated QR code P3= ticket checking process (t_id).

4. PROPOSED MODEL

The advancements in the field of technology are being increasing day by day. Few months before a new technology called M-ticketing (Mobile Ticketing) was introduced where user download the ticketing application, users can do the same booking process as it was in the e- ticketing facility. For example, consider Mumbai's Suburban Railway Ticketing where user can book the ticket through his/her Smartphone and get hard copy of the ticket through ATVM (Automatic Ticket Vending Machine) but still here the problem of standing in a queue arises to get the ticket in a printed form through ATVM.

The main purpose of this project is developing Android Suburban Railway (ASR) ticketing application which is mainly to buy the suburban tickets. Our Android Suburban Railway ticket can be bought with a simple smart phone application, where you can get your railway ticket in your smart phone itself in the form of QR (Quick Response) code.

Once the user buys the ticket depending upon the ticket type it will get validated. For single ticket type

the ticket will be valid for the respective journey time and we will provide extra thirty minutes in case if the train is late. For return ticket type the ticket will be valid till midnight. User's ticket information is stored in admin database for security purpose which is missing in the present suburban system. Till now the application for the checker to check the ticket has not been developed, but in our project, we will develop a checker application to scan user's QR Code for getting the user ticket id and he will search the ticket id in admin database to get the ticket information.

5. SYSTEM DESIGN

The system is made up of three components:

1. Admin application
2. User android application
3. Ticket checker android application

1. Admin Application

This system provides desktop application for an admin. Using this application the admin can make changes in the system. These changes may include:

1. Add new location
2. Add new route
3. Manage route

2. User Application

Using the user application, the user (passenger) can do the following tasks.

2.1 Signup and Login

This is the first procedure to know the user's information. User need to register before using this application. During the registration user must fill his personal information like name, address, set a username, password, phone number and email-id for his account. The next time whenever user wishes to buy a ticket, user can simply login into his account using username and password which he has registered. All these information are stored and can be accessed from the cloud server.

2.2 Buy ticket

In order to buy the ticket the user should select the source and destination locations. These source and destination will be checked from the database. The user will check schedule of trains according to source and destination.

Once the user has selected source and destination, he/she can book the ticket. Before buying the ticket, the user has to ensure if there is enough balance in his/her account.

2.3 Password validation

After selecting source and destination by the user it will hit the buy button. The server validates the password of the user, if it is successful the journey details and information regarding user in the server's MySQL Database will be saved. Ticket Number and time of buying is generated and balance amount value is displayed.

2.4. Generating QR Code

Once the ticket number and time of buying the ticket is saved in server database, the transaction id is send to server database to generate QR code. Then generated QR code is send to the user mobile and saved within the device memory. This QR code contains the transaction ID, status of ticket, source and destination and amount.

2.5. Ticket Validation

A) **Time Base System**:- Once the user buys the ticket depending upon the journey time it will get validated. Once the journey time gets finished the ticket will get deleted automatically.

2.6. View History

The user can view all the previous transaction. User can also delete them if user wishes to.

This information will be deleted from his phone only and not from the server database. The user can also edit his personal information.

3. Ticket Checker Application

Using the ticket checker application, the checker can do the following tasks

3.1. Checking QR Code

The ticket checker will have QR code scanner which will scan the QR code with the checker application to obtain user transaction ID, status of ticket, source and destination and amount.

3.2. Checking with Database

This is a backup arrangement just in case if the ticket checker is not able to scan QR Code if the user's mobile display is being damage, battery failure etc. In this case the ticket checker will directly verify with admin database by making use of the username to get detail information about the ticket for validation purpose. Checker will enter the ticket id in server database to get information about the ticket, in order to verify the journey details especially time and date of the ticket.

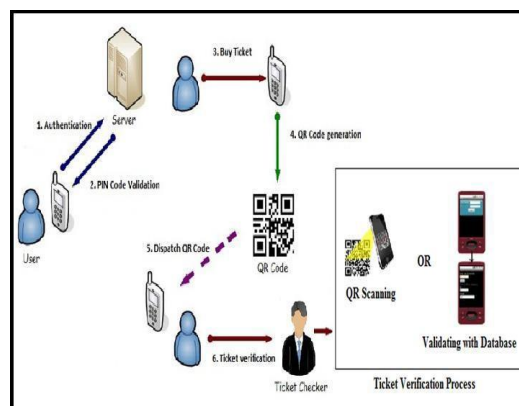


Fig 2: Architecture Diagram

6. ALGORITHM USED

Secure Hash Algorithm (Sha-1) Secure hash is cryptographic hash function designed by United State National security Agency. It used to generate a condensed representation of a message called as message digest. Hash function takes a string of any length and reduces it to a unique fixed length string. It produces 160 bit (20 byte) hash value in the hexadecimal form. It is used for ensure data, message integrity, password validity etc. This algorithm is called as a secure because it is computationally infeasible to find a message which corresponds to a given message. Important properties of this algorithm are each hash is unique but always repeatable and the function is “One Way”.

Steps

1. Initialize with some variable and pick up a string.
2. Break it into characters. (Note: Spaces count as a character.)
3. Convert the character into ASCII code.
4. Convert the numbers into binary format.

5. Add „1“ to the end.
6. Append 0's to the end.
7. Append original message length.
8. Chunk the message. Break the message up to in 512-bit chunks.
9. Break the „chunk“ into „words“. Break each chunk up to sixteen 32-bit words.
10. Extend into 80 words. Perform the XOR operation by selecting the four of the current words.
11. Perform the left rotation by factor of one.
12. Initialize with variables.
13. The main loop will be run once for each word in succession.
14. End.

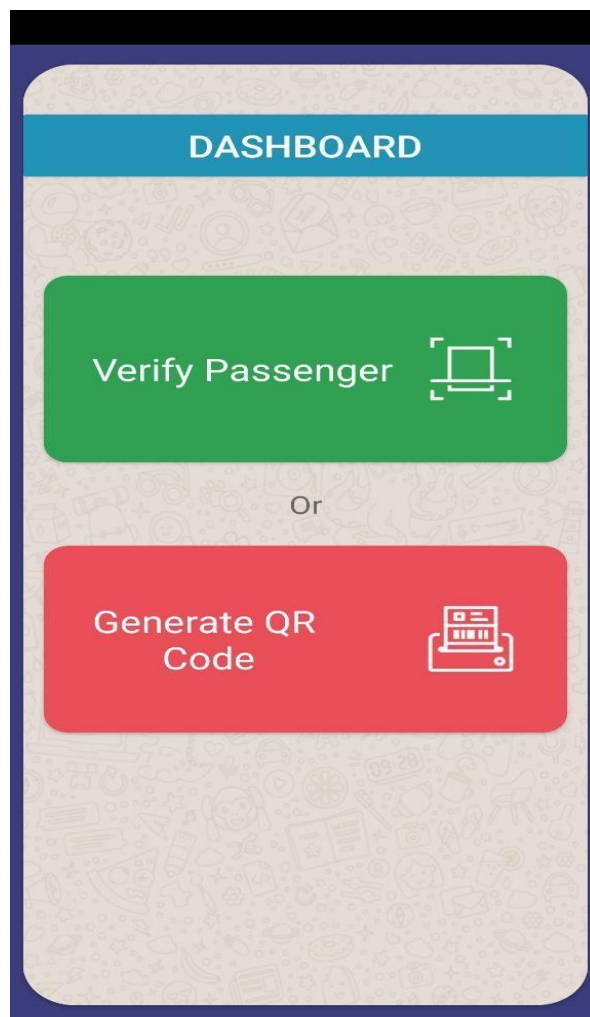
7. RESULT

Dashboard:

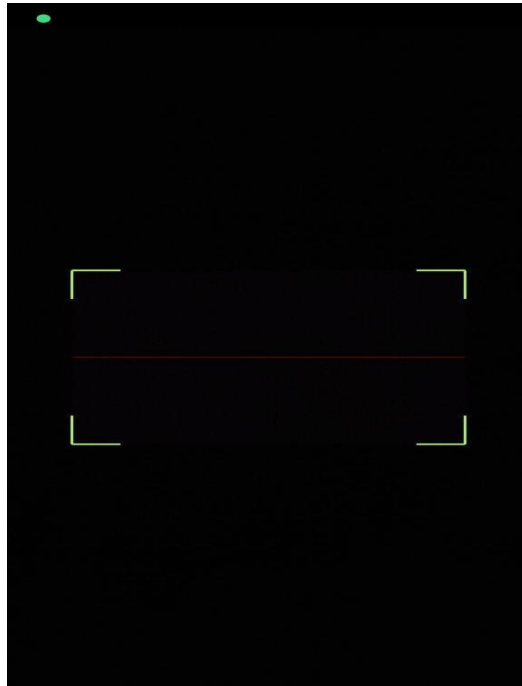
This is a mobile app dashboard with two main options:

Verify Passenger: This option allows users to verify the details of a passenger.

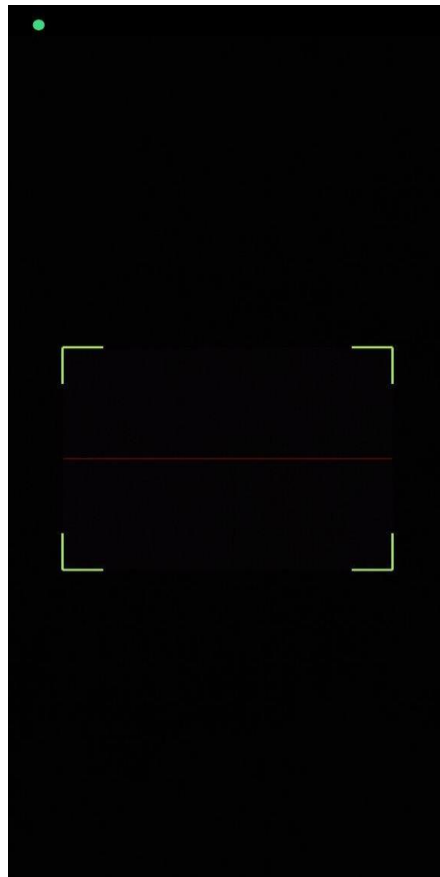
Generate QR Code: This option lets users generate a QR code, likely for boarding a train or accessing another service.



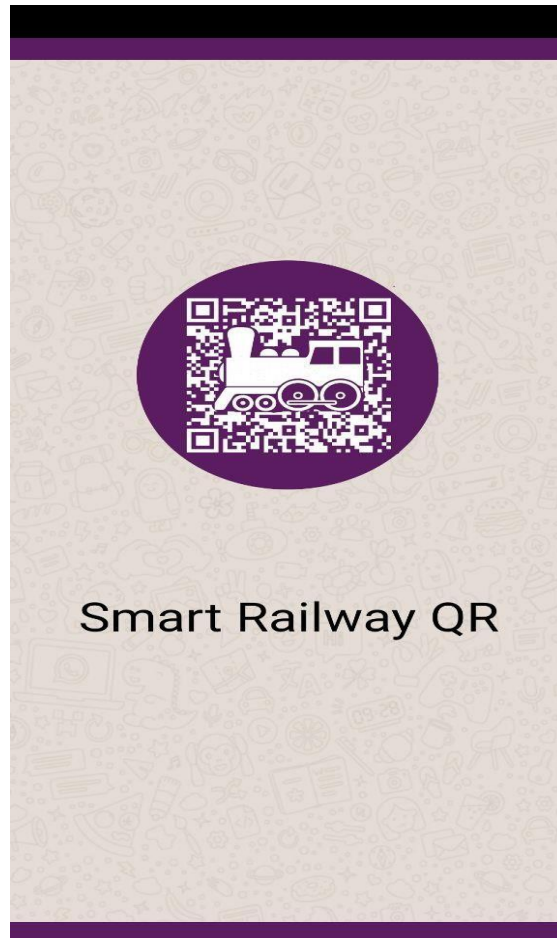
QR Code Scanner Interface: A screenshot showing the QR scanner interface, with a red scanning line centered within a green outline, ready to scan QR codes for railway information.



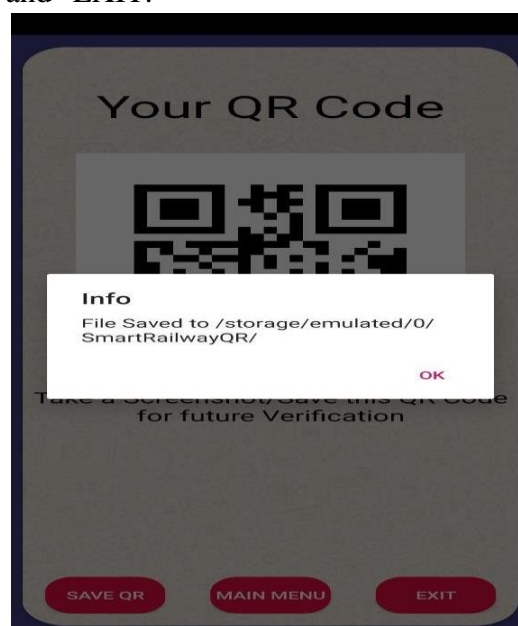
Permission Request Screen: This image shows a pop-up prompt asking the user to allow the Smart Railway QR app to access the camera for scanning purposes, with options for access levels.



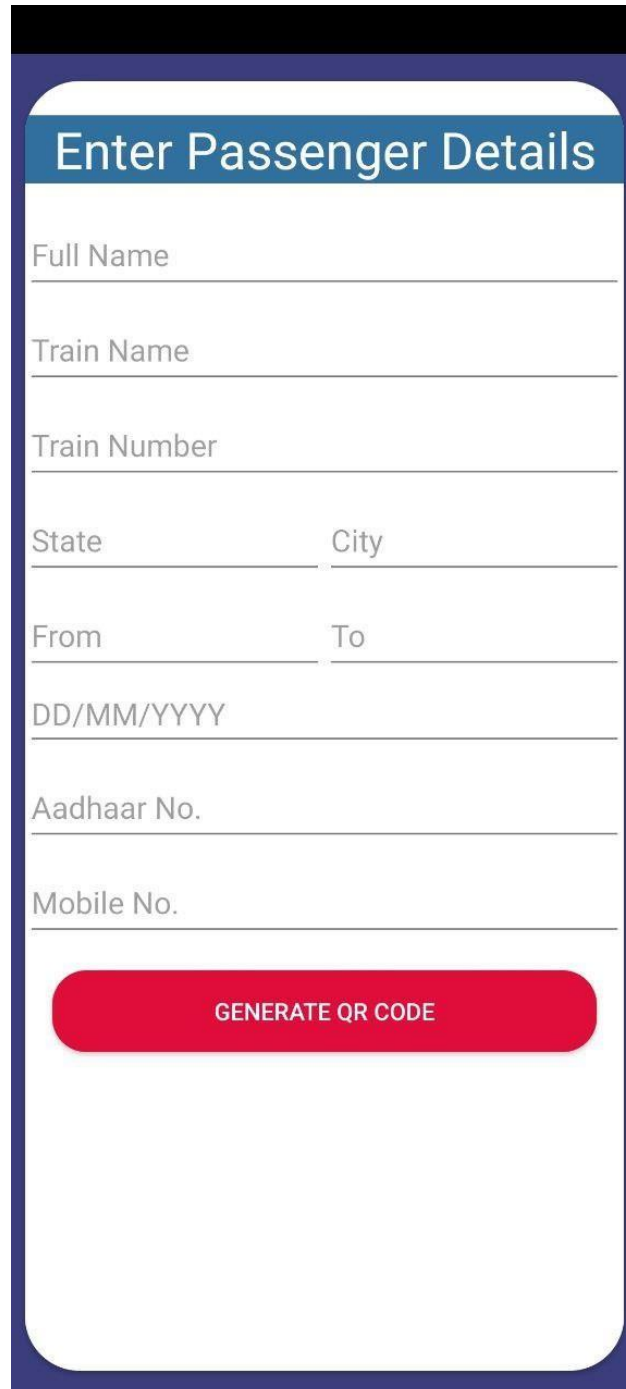
Smart Railway QR Logo: This image displays the Smart Railway QR logo, featuring a QR code with a train graphic in the center, representing the app's focus on railway-related digital solutions.



QR Code Saved: This image shows a mobile screen displaying a generated QR code. A pop-up message indicates that the QR code has been saved to a specific file path on the device. The user is also reminded to take a screenshot or save the QR code for future verification. There are three buttons at the bottom: "SAVE QR," "MAIN MENU," and "EXIT."



Passenger Details Entry Screen: The image shows a mobile screen where a user is required to enter passenger details like name, train name, number, state, city, source, destination, date of journey, Aadhaar number, and mobile number. After filling in the details, the user can generate a QR code by clicking the red button



Enter Passenger Details

Full Name

Train Name

Train Number

State City

From To

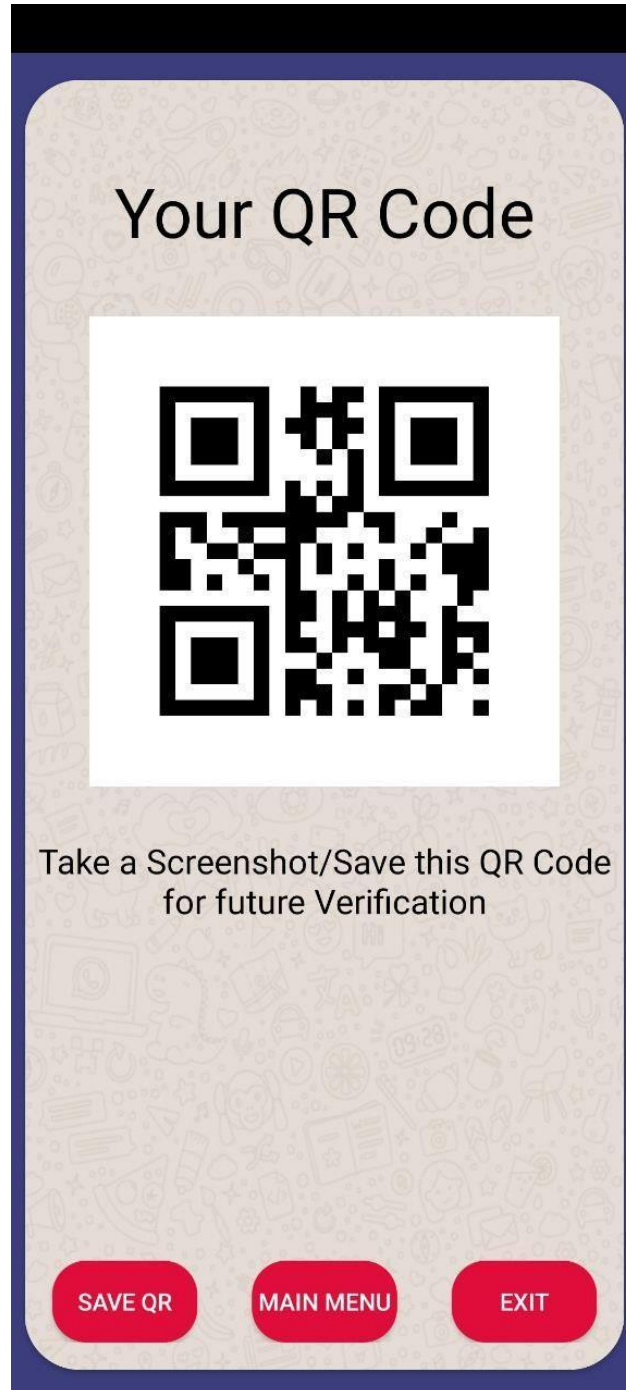
DD/MM/YYYY

Aadhaar No.

Mobile No.

GENERATE QR CODE

Generated QR Code: This image displays a generated QR code on a mobile screen. There's a text prompt to take a screenshot or save the QR code for future verification. The screen also has buttons for saving the QR code, returning to the main menu, and exiting the app.



8. SUMMARY

This paper gives the idea of a mobile ticket application on android phones. This application developed by using smart phones which can change the way people buy their tickets in future. This application can be modified according to any type of transport system. This android application is one of its kinds and finds immense application to buy sub-urban railway tickets through an android mobile. But this is defined exclusively for sub- urban railways. This android application reduces the manual work of both ticket

bookers and ticket checkers. A huge problem of issuing local train tickets can be solved with this new application as no one has to stand in queues and also the headache of carrying the ticket is avoided. Also this app saves a huge work for ticket checkers and also moving from manual ticket checking process to digital ticket checking process by just scanning QR code to validate the ticket.

9.FUTURE WORK

In this project, more advancement modification can be done using GPS(Global Positioning System) to get the current location of the train by fitting the GPS device in the train, to get the location of the user from where the user entered the train which will be beneficial for checker and also to validate or delete the ticket according to the source point and destination point of the user. For station level security we can provide the hardware devices on the respective stations to validate QR Code of the user before user enters or leaves the station. If the QR Code is valid by the hardware device then he will get the access towards platform.

We can also add one feature that is when a user enters a source and destination point and if the user gets down in the middle of the journey then the GPS should track user location and then with respect to his remaining journey the remaining amount should be added to the user account.

10.REFERENCES

1. Prototype Of Train Ticketing Application Using Near Field Communication(NFC) Technology on Android Device. Surya Michrandi Nasution, Emir Mauludi Husni, Aciek Ida Wuryandari.
2. Mobile Ticketing With NFC Management For Transport Companies. Problems and Solutions. U. Biader Ceipidor, c. M. Medaglia, A. Marino, M. Morena, s. Sposato, A.Moroni,
3. P. DiRollo, M. La Morgia.
4. Wallace Jackson's (2011) "Android Apps for Absolute Beginners" A press Publications.
5. Google. Android developers. <http://developer.android.com/guide/basics/what-isandroid.html>, 2012.
6. Android Suburban Railway Ticketing with GPS as Ticket Checker Karthick. SI, Velmurugan.2012.
7. Wallace Jackson's (2011) "Android Apps for Absolute Beginners" A press Publications.
8. SQLite.org. about SQLite, 2010. <http://www.sqlite.org/about.html>, accessed Dec. 2010.
9. Android Suburban Railway Ticketing with GPS as Ticket Checker Karthick. SI, Velmurugan.2012.
10. SQLite.org. about SQLite, 2010. <http://www.sqlite.org/about.html>, accessed Dec. 2010.
11. Google.Android developers
12. <http://developer.android.com/guide/basics/wh at-isandroid.html>, 2012.