

GPS Validation for QR Railway Ticket using Android

Sneha Singh¹ Sagar Chandane² Sneha Bhagat³ Prof. D. R. Ingle⁴

^{1,2,3,4} Computer Department

^{1,2,3,4} Bharati Vidyapeeth College of Engineering Navi Mumbai, India

Abstract---With the advancement of technology, new software and devices are being developed to ease man's work. Waiting for ticket in long queues is a time consuming process. Some people use the Automatic Teller Vendor Machine(ATVM)card i.e. smart card to buy ticket but it also has long queues for buying ticket .If people forget to take their card or they do not have balance in their card they will have to stand in queue. The operating system, Android, has led to great increase in use of mobile phones .Today almost all of the work can be carried out through phone. The Android application proposed in this paper eases the task of buying railway tickets. People can buy suburban tickets (local travel) using just a smartphone application. The main thing about the paper is the "GPS" validation of ticket because of which we get to know the position of the user .The details of the ticket will be stored in the form of a Quick Response(QR) code in the phone itself thereby avoiding loss of ticket. Saving the information in database ensures easy retrieval and security. Also the ticket checker is provided with a ticket checking application to validate ticket either by QR code or by searching ticket details in database.

Keywords: Android, GPS, MySQL, QR Code

I. INTRODUCTION

In the past few years there were much advancement in the field of technology. The railway authorities have always tried to ease the task of buying railway tickets by bringing up different new schemes and services. It initially introduced a website which facilitated online buying of tickets .But this website was only limited for long distance journey and provided no facility for suburban ticketing system. The authorities then brought up the concept of coupons and smart cards, but they too helped little to reduce the long queues at the ticket windows. Similar concepts found in foreign countries are Oyster Card in London and Octopus Card in Hong Kong. But people have to suffer by standing in long queues if they forget their travel card.

The QR railway ticket being an Android application can run easily on any smartphone. This enables a user to buy suburban railway ticket on his way to station thereby saving a lot of precious time. The ticket will be stored as a QR code in user's smartphone and also in the database. This dual method of storage enable easy validation of ticket in case of failure of one of the validation methods .The ticket checker can use either a QR code scanner or database to validate the ticket.

II. DIFFERENT TECHNOLOGIES USED

The different technologies used in the application are mentioned in this section

A. Android Operating System

Android is a Linux based operating system designed for mobile devices like smartphones and tablet. Initially,

developed by Android, Inc., which was later purchased by Google in 2005.The first Android-based phone was sold in October 2008. It is open source and Google provides the code under the Apache License.

Android is running on the Linux kernel and their applications are written in Java programming language, so Android applications are running on a Java virtual machine named Dalvik virtual machine. In Android system, there is a tool named dx, included in the Android Software Development Kit (SDK), transforms the Java Class files (which compiled by a regular compiler) into the .dex format. The .dex format files integrate all Java class files and delete redundant information in every Java class files [2]. Android architecture consists of four layers [11]:-

- Application
- Application Framework
- Layer is divided into two parts : libraries and Android Runtime
- Linux kernel

Features of Android as mentioned in [1] are

- 1) Application Framework – enabling reuse and replacement of components.
- 2) Dalvik Virtual Machine – optimized for mobile devices.
- 3) Integrated browser – based on the open source Web Kit engine.
- 4) Optimized Graphics- powered by 2D, 3D graphics library.
- 5) Media Support – MPEG 4, H.264, MP3, JPG, PNG.
- 6) Bluetooth, EDGE, 3G and Wi-Fi.
- 7) Camera, GPS, compass and accelerometer.

B. Quick Response Code (QR Code)

A QR code is a type of matrix-barcode first designed for the automotive industry. More recently the system has become popular outside of the industry due to its fast readability and comparatively large storage capacity [1].A QR code consists of black modules (square dots) arranged in a square grid on a white background, which can be read by an imaging device (such as a camera) and processed using Reed–Solomon error correction until the image can be appropriately interpreted. Data is then extracted from patterns present in both horizontal and vertical components of the image.

For encryption it uses Reed-Solomon algorithm. Also QR code provides error correction in case the QR Code gets damaged due any unwanted errors. The different error correction levels in QR code are Low, Medium, Quartile, and High.

- In Low (L), about 7% of the code can be recovered. Thus, it has the lowest correction rate.
- In Medium (M), about 15% of the code can be recovered.

- In Quartile (Q), about 25% of the code can be recovered.
- In High (H), about 30% of the code can be recovered. Thus, it has the highest error correction rate.

C. 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.

D. MySQL

MySQL is the world’s most popular open source database , enabling the cost-effective delivery of reliable, high-performance and scalable Web-based and embedded database applications.

III. PROPOSED SYSTEM

In our proposed system, there are two parts, one for the user and other for the ticket checker. The QR railway ticket can be bought using an Android phone

The flowchart for the two parts i.e. user’s part and ticket checker’s part is given in Fig. 1 and Fig. 2

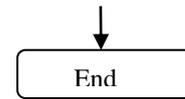
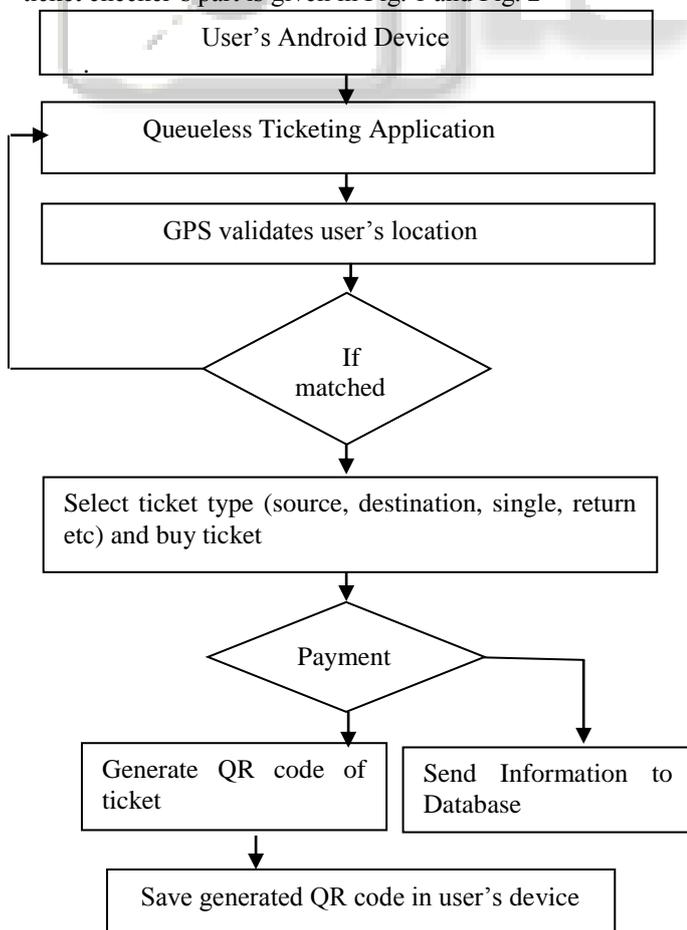


Fig.1: User’s part

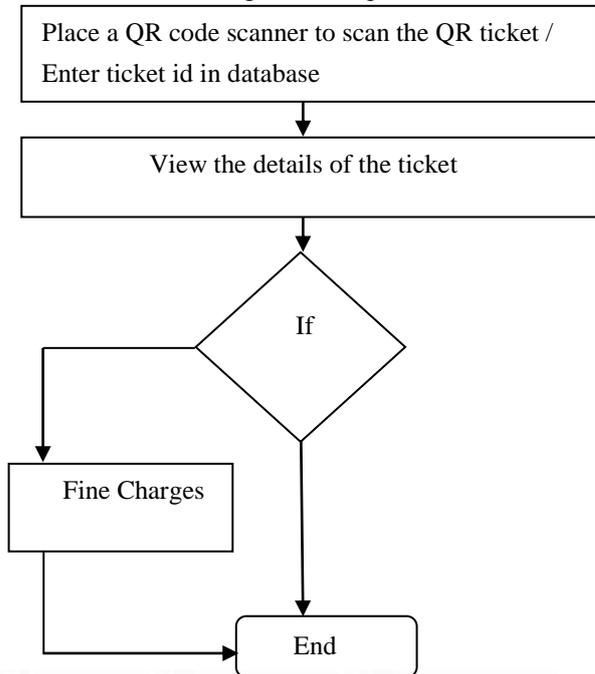


Fig. 2: Ticket Checker’s part

Our proposed system is divided into five phases: Login phase, Selecting Ticket Details phase, GPS Validation phase, Buying Ticket and QR Ticket Generation phase, Ticket Checking phase.

A. Login phase

After opening the application in the mobile device i.e. smartphone or tablet computer the user will be asked to provide his login credentials. The phase provides a checkbox given the name “admin” which is used to differentiate between users and railway authorities like ticket checkers. It also has an option called “Register” to enable new users to register themselves with the application.

B. Selecting Ticket Details phase

After validation of login credentials the user is forwarded to user’s homepage. Here user selects the “Book Ticket” option and is directed to a new page providing different fields required to be filled in order to buy a ticket. The different fields to be included in the ticket are:

- Source, Destination
- No. of adults and children
- Journey type i.e. single or return

C. GPS Validation phase

In this phase the source provided in the previous phase is validated using GPS. Android phones have built in facility allowing use of GPS in any Android application. Thus GPS plays the role of a location checker allowing users to select only the appropriate source location. Thus helping prevent any malpractices. In case the source does not match with the current location user is directed back to the homepage.

D. Buying Ticket and QR Ticket Generation phase

After validation of source by GPS and filling in of other details this phase enables buying of ticket using any payment method like deducting balance from the mobile itself by the service provider. Then a QR code is generated containing details of the ticket. The generated QR ticket is also stored in the internal memory of the phone. This feature prevents loss of ticket thereby overcoming the drawback of the present ticketing system where ticket is provided in paper form.

E. Ticket checking phase

This phase is visible only to the railway authorities. After selecting the “admin” checkbox in login phase the railway authority will be directed to their homepage. At this page the ticket checker is provided with ticket checking option where by entering the ticket id, the ticket details can be validated directly from the database. Other than this the ticket checker can use QR code scanner to scan the QR ticket provided by the user. Thus the system provides dual validation.

IV. IMPLEMENTATION

The implementation of the Android application based on the previously mentioned proposed system is shown in this section. The below given figures show the different phase of the system. Fig. 3 represents the login page containing options for both login and register. This page is same for both the user and the railway authorities. Fig. 4 represents the “Book Ticket” page for buying ticket with required details. Fig. 5 shows the QR ticket generated after validation by GPS and then by selecting the buy option on the “Book Ticket” page. Fig. 6 shows a list of the tickets generated until now, along with a unique ticket id. Fig. 7 shows the page where ticket checker uses the ticket id option to validate a ticket using the database. Other than database the ticket checker can use a QR code scanner to validate the QR ticket.

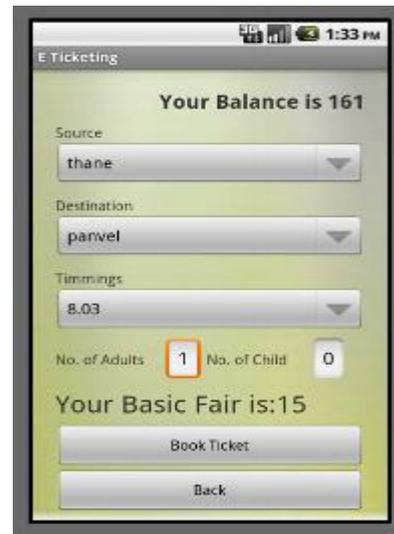


Fig.4: Book Ticket page



Fig.5: QR Ticket generated



Fig.3: Login page

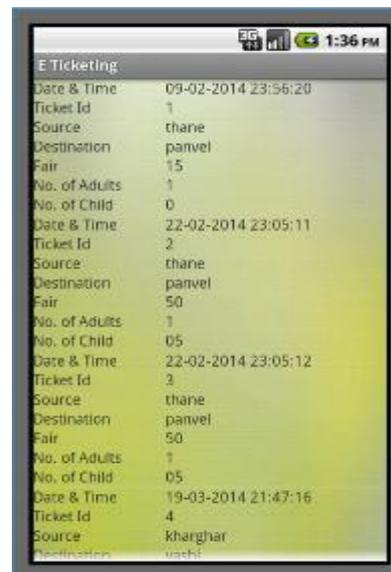


Fig.6: List of all tickets generated



Fig.7: Ticket checking from database

V. CONCLUSION

In this paper we have presented a mobile ticket application developed for Android which can change the way people buy their tickets in future. This kind of ticketing application can be applied to any kind of transport system. The Android application is one of its kinds and finds huge application to buy sub-urban railway tickets through android mobile. Also the application will save a huge amount of time of the ticket checker through the use of QR ticket thereby moving from manual ticket checking process to digital ticket checking process. As ticket is generated in digital form it reduces the use of ticket as paper indirectly also helping the environment. Hence a huge problem of issuing local train tickets would be solved with this new application.

REFERENCES

- [1] Karthick. S, Velmurugan. A, "Android Suburban Railway Ticketing With GPS As Ticket Checker", IEEE International Conference On Advanced Communication Control And Computing Technologies (ICACCCT), 2012.
- [2] Jianye Liu, Jiankun Yu, "Research on Development of Android Applications", Intelligent Networks and Intelligent Systems (ICINIS), 2011.
- [3] Bajaj, R, Ranaweera, S.L.; Agarwal, D.P., "GPS: Location-Tracking Technology".
- [4] Mark Murphy's, "Beginning Android 3" - Apress Publications, 2011.
- [5] Wallace Jackson's, "Android Appsfor Absolute Beginners" Apress Publications, 2011.
- [6] Jeff" Javajeff" Friesen's, "Learn Javafor Android Development" - Apress Publications, 2012.
- [7] Young – Gon Kim, Moon-Seog Jun, "A Design Of User Authentication System Using QR Code Identifying Method", Computer Science And Convergence Information Technology (ICCIT), 2011.

- [8] Dey, S.; Nath, A.; Agrawal, S.; "Confidential Encrypted Data Hiding And Retrieval Using QR Authentication System", Communication Systems And Network Technologies (CSNT), 2013.
- [9] Ariffin, A.A.B.; Aziz, N.H.A.; Othman, K.A., "Implementation of GPS for Location Tracking", IEEE Control and Systemgraduate Research Colloquium (ICSGRC), 2011.
- [10] Chao Wang, Wei Duan, Jianzhang Ma, Chenhui Wang, "The Research Of Android System Architecture And Application Programming", Computer Science And Network Technology (ICCSNT), 2011.
- [11] Monika Bazard, Sonia Bhardwaj, "Overview On Android- The New Mobile Operating System", ISSN No. 0976-2140, Volume 2, Issue 1, Pp 25-34, April, 2011.