Online Toll Payment System

Fathima .G[1], Jayamala .J[2], Keerthika .S[3]

[1]*Prof IT, Department of Information Technology Adhiyamaan College of Engineering, Hosur, Tamilnadu, India.*
[2,3]*Department of Information Technology, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India.*

Abstract:Transportation has emerged as a prevailing part of India. Toll plazas play a vital role in maintaining the road transportation. At present, manual toll collection is most widely used collection method in India. Due to manual intervention, the processing time at toll plazas is highest. Traffic congestion at Toll plazas leads to huge economical loss in terms of fuel wastage and also causes pollution. Online Toll Payment System is an android application which is developed for lessening the over congestion in toll plazas that has become part of the metropolitan cities these days. When this application is used 1-2 km before the toll plaza, a notification will be sent to the mobile phone of the approaching user with Toll Name and applicable Toll Fee. The notification process is done by using GPS. Payment can be facilitated through mobile wallets. An electronic receipt is generated, with QR code which can be scanned by the QR readers at Toll Booth. A list of all the toll plaza and toll tariffs is available in the application.
Keywords: Android application, toll plaza, QR code, GPS, etc.

I. INTRODUCTION

Along with the growing number of vehicles in major cities, Toll plaza is an option for smooth transportation. The increasing use of toll roads will be followed by the increase in highway infrastructure to support optimum service to users. In late 90s toll plazas were controlled manually. Those systems require two people for opening and closing of the gate and another two are for reception of the money and also data keeping. Later on, in the year of 1995 the development of Express Highway Systems introduced semi- automatic toll plazas, in which data is stored in computers and operation of gate is automatic. Two persons are required for single toll plaza. The notable advantage of this technology is the opportunity to reduce the traffic congestion in toll plaza during festive seasons. The manual toll collection system has number of drawbacks like illegal toll collection, it require more man power, leads to vehicle congestion and high wastage of fuels due to long waiting time. Online Toll Payment System is an android application which is developed for lessening the over congestion that has become part of the metropolitan cities these days. This system makes the work easier at both sides (i.e. Toll user & collector), to keep track, as well as amount payment in very efficient way. Global positioning system (GPS) technology has become the new trend which is used in toll plazas nowadays. It is used to find the position of the vehicle as well as toll plazas accurately. When the destination toll is near to the user, an alert message is sent to the user. 1-2 km before the toll plaza, a notification will be sent to the mobile phone of the approaching user with Toll Name and applicable Toll Fee. Payment can be facilitated through mobile wallets. An electronic receipt is generated, with QR code which can be scanned by the QR readers at Toll Booth.

II. IMPORTANCE OF ONLINE TOLL PAYMENT SYSTEM

The main objective is to develop a mobile application for reducing the congestion rate, fuel wastage, pollutions and man power at the toll plaza. It is user friendly to use and it consist of toll statistics.

III. EXISTING SYSTEM

FASTag is a toll collection system in India, operated by the National Highway Authority of India (NHAI).It employs Radio Frequency Identification (RFID) technology for making toll payments directly from the prepaid or savings account linked to it. A radio-frequency identification system uses tags, or labels attached to the objects to be identified. The tag can be purchased from official Tag issuers or participating Banks.
RFID tags can be either passive or active or battery-assisted passive. According to [3] and [4] RFID tags contain at least two parts: an integrated circuit for storing and processing information. It also includes either fixed or programmable logic for processing the data. In this system sensors were placed above roads and vehicles get charged, a sensor identifies the vehicle number and the details were sent to server, which is processed and toll is collected. But this technology has some risks. RFID technology is based on image processing technique in which number plate is scanned as an image, afterwards further processing on that image is done and remaining task get finished regarding toll collection of particular vehicle. In the current scenario number of lanes following Fastag is utmost one, remaining are operated normally. But problem with this system is that, if due to mud or any other reason number plate of vehicle gets covered and not visible properly then sensors cannot detect it properly. So, it raises a problem while identifying the vehicle and obviously toll collection cannot be completed. In this paper the above

problem is eliminated by using GPS technology and Payment can be facilitated through mobile wallets. According to [4] the toll collection systems in Philippines are based on E-Pass system.
The drawbacks are:
It can be used only in single registered path.
Image processing technique cannot detect the vehicle number plate if it is covered due to mud or any other reason.

IV. PROPOSED SYSTEM

The proposed system eliminates the disadvantages of manual toll collection process and the RFID method. It is an android application which is user friendly to use and make payment. Two different apps are created namely Toll-Employee app and customer app. In customer use app, the registration must be done to become the user. 1-2 km before the toll plaza, a notification will be sent to the mobile phone of the approaching user with toll name and applicable toll fee. Interested user can pay the toll fee using mobile wallet through the app. After successful payment, user will get the QR code then the user will be listed in the toll-Employee app. If the QR code in the user app matches with QR reader in toll plaza verification message will come to the user. The list for all the toll plazas and toll tariffs is available in the application. Advantages:
1. Avoid the fuel loss.
2. Saving of time in toll collection.
3. Monitoring of the traffic flow.
4. Cash handling is eliminated
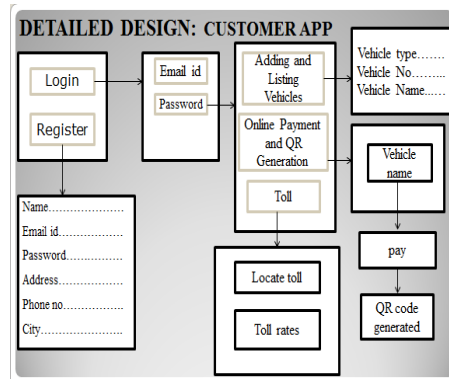
V. BLOCK DIAGRAM OF PROPOSED SYSTEM

Fig 1: System Architecture of Customer App

Fig 1 shows the system architecture of customer app and describes the overall structure.
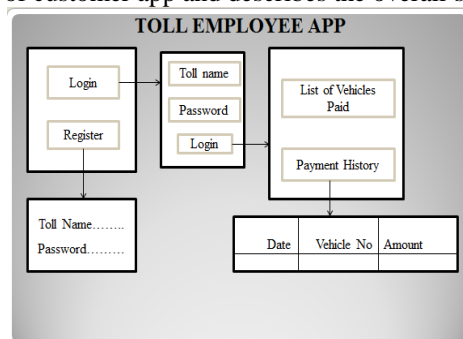

Fig 2: System Architecture of

5.1 Toll-Employee App
Fig 2 shows the system architecture of Toll-Employee app and describes the overall architecture.
Systemarchitecture is the conceptual model that defines the structure, behaviour, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system. It represents the Architecture diagram of online toll payment system.

A system architecture can comprise system components, the expand systems developed, that will work together to implement the overall system.

VI. SYSTEM IMPLEMENTATION

MODULES

The system after careful analysis has been identified to present itself with the following modules:

CUSTOMER APP MODULES:

Registration Module

Login module

Add and List Vehicles

Online Payment

Paid toll

TOLL EMPLOYEE APP MODULES:

Registration Module

Login module

List of Vehicles paid

Scan QR code

View verified vehicle

MODULE DESCRIPTION

CUSTOMER APP MODULES:

REGISTRATION MODULE:

To become user of the app, user should register into the app using their details which involves Name, email id, Address, Mobile number etc.

LOGIN MODULE:

By using their email id and password, they login into the app.

If login is successful they can

1. Add and List their Vehicles.

2. Do Online payment

3. View nearby tolls and rates

6.1 Adding And Listing Vehicles:

In this module the user can add and list the number of vehicles they own. Adding process involves details of vehicle number, vehicle type and vehicle name. Fig 3 shows the adding process. This module is very much useful for the user as they can enroll all the vehicles they own in the app. During the payment process the user can just select the vehicle number for which they want to pay from the list of vehicles. Other details of the vehicle are obtained from the database. This process reduces the time consumption during payment.
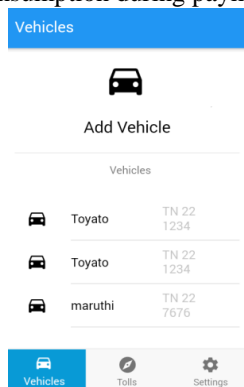

Fig 3: Adding Vehicle

6.2 Online Payment Module:

The toll payment is paid by the user through this module using their mobile wallet. It consists of the details like type of card, CVV number, expiry date of the card etc... During the payment process they can select the vehicle for which payment can be done. Fig 4 provides the view of online payment process. If the enrollment is not done before they can also enter the details during the payment. The payment process is user friendly to do. It is done in easy and efficient way. Once the payment is successful, QR code will be generated. It also contains the payment history of the

user. The payment history consists of the details which include vehicle type, vehicle name, vehicle number, pay type, date, time and amount paid. Once payment is done vehicle details is also listed in the toll employee app.
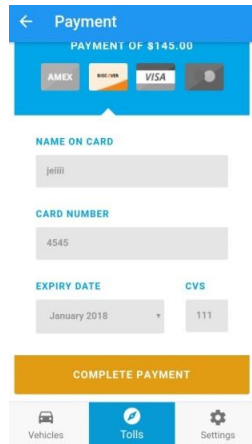

Fig 4: Online Payment

6.3.Paid Toll

After the successful payment the list of vehicles paid is added and viewed in paid toll module. It consists of the details like type of vehicle and the amount paid. The QR code is viewed by clicking on the vehicle in paid toll. Once the QR code is scanned by the QR reader in the toll employee app the details of vehicle paid is deleted from the paid toll module and it is viewed in the verified vehicles module in the toll employee app module.

6.4 Toll Employee App Modules:

LOGIN MODULE:

By using Toll name and password, they login into the app. If login is successful they can

View List of Vehicles paid.

Scan QR code

View verified vehicles.

List of vehicles paid is viewed by the employee once the payment is successful by the user in customer app module. It consists of details like vehicle type and amount paid. The pay type involves single and return. If the user is paying for single once the QR code is scanned for single time, the QR code will be removed. If the payment is done for return then the QR code remains there for 24 hours. The employee scan the QR code generated in the customer toll app. The QR reader reads the code and verifies whether the code is matching or not. If it matches it shows the message matched or else error message is sent. After the successful verification the vehicle is listed in the verified module of toll employee app. It consists of details like vehicle name, vehicle number, amount paid and date.
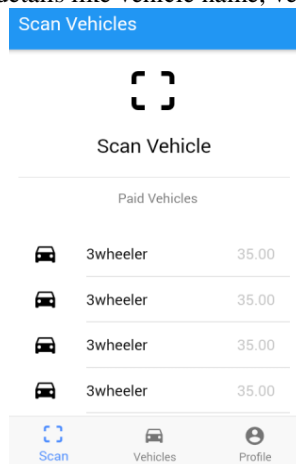

Fig 5: Scan Vehicle

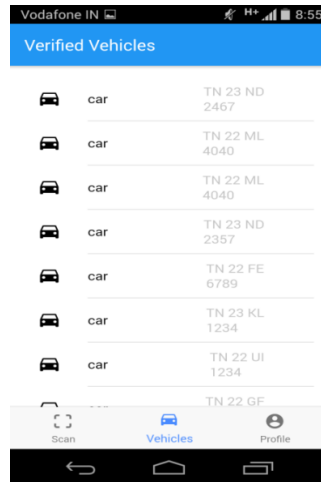Fig 5 shows the list of vehicles paid and the scanning part.

Fig 6: Verified Vehicle

Fig 6 provides the list of vehicles verified by reading the QR code.

VII. SYSTEM SPECIFICATIONS

SOFTWARE IMPLEMENTATION
 PHP, XML and Ajax are used in designing the front end of the software. Java is used in the back end and for logical parts. The Android Studio is used for delivering the application.

VIII. CONCLUSION:

This paper presents an "Online Toll Payment System" which helps in paying the toll amount through android application.This system makes the work easier at both sides and to pay the amount in very efficient way. Wastage of time and fuel because of the large traffic jams has been solved by implementing this android application which is user friendly to use and make payment. It uses the GPS technology to find the nearby toll for the approaching user to the toll plaza.

IX. REFERENCES

[1]   ARMAmol A. Chapate, D.D. Nawgaje Electronic Toll Collection System Based on International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 1, January 2015.
[2]   Galande, Oswal, Gidde ,Ranaware N. S. Bandgar, Automated Toll Cash Collection System For Road Transportation', IJCSMC, Issue 1, 2015.
[3]   K. LakshmiSudha, Reversible Data Hiding using QR Codes for Android International Journal of Computer Applications Department of IT SIES GST L, India July 2014.
[4]   S. Lauren, B. Mariko, Electronic Toll Collection Online, 2007, June 20.
[5]   Satyasrikanth P automatic toll collection system using RFID, Bangalore International Journal of Computer Science and Mobile Computing.