Smart Phone Based / Contactless Bus E-Ticket

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Abstract

Electronic tickets are convenient from the past few years. Technologies can be used to provide convenience for passengers using public transport. In today's public transportation system like PMPML, each time passenger have to take a ticket from the conductor according to the passenger's route and also pay for the ticket accordingly at the same time. This is a problematic task for the passengers who travel daily through public transport because everyday passenger has to arrange the change for the fare as conductor can't provide the change for each passenger. Another problem is that it is a tedious task for the conductor to give the ticket to each passenger using Electronic Ticket Machine (ETM), taking the fare from the passenger, and in case passenger don't have change for the fare then the conductor has to arrange it from the fare paid by other passengers. This creates a problem for both, the conductor as well as the passenger. Also, considering the current situation of COVID-19, we can't afford to risk the life of both, the conductor as well as the passenger by exchanging a ticket and the fare manually. So, we present a model where, as the passenger gets into the bus, he/she can use our application and book a ticket from starting location to the destination, fare get calculated automatically, QR code is generated and the e-ticket is displayed. This will be beneficial for the passenger as well as the conductor because now the job of conductor will only be to ensure that whether the passenger has an e-ticket or not. All the sensitive information of user stored in our application is secured using various encryption algorithm. A huge amount of data such as each passenger's confidential data, routes travelled, fares paid, weekly and monthly pass details are maintained by our system at the admin side. This huge data is difficult to manage hence data mining, analyzing, processing techniques can be used to provide user convenience.

Keywords: *Data privacy, information security, intelligent transportation systems, mobile communication, Public transport, electronic ticketing, transport planning, e-ticketing, security, user-friendliness, Data cleansing, data mining*

I. Introduction

In many countries public transportation service is being used for traveling and accordingly Passenger would prefer this public transportation services must be scheduled properly; it should be on time and the frequency is increased to use mobile phones for it. Every public transportation service organization and passenger must get details of the vehicle. People will monitor and track the Buses with the help of our Android app and can book tickets using app and get QR codes for the same. Our Application also consists of a transaction system for the Ticketing system. This Cashless Transaction will not only help the individual but also the Bus Organization. We are also going to provide a virtual Bus-Pass Having a QR-Code. The conductor just needs to scan the QR- Code of the respective individual and automatically it will get punched into the Database. The Existing system still uses the non-efficient way of ticketing. We will be providing an Easy On-time Ticketing. As the entire data will be saved on a Firebase cloud, it will be helpful for the Bus Organization in the future to increase the use of public transportation.

In this current situation of COVID-19, there is a risk to the life of both, the conductor as well as the passenger by exchanging a ticket and the fare manually. Smart ticketing system will allow the passenger gets into the bus, he/she can use our application and book a ticket from the starting location to the destination, fare get calculated automatically, QR code is generated and then the e-ticket is displayed. This will be beneficial for the passenger as well as the conductor because now the job of conductor will only be to ensure that whether the passenger has an e-ticket or not. It is very necessary to protect user data. All the sensitive information of the user is secured using various encryption algorithms of security. A huge amount of data such as each passenger's confidential data, routes traveled, fares paid, weekly and monthly pass details are maintained at the admin side safely. This huge data is difficult to manage hence data mining, analyzing, processing techniques can be used to provide user convenience. Admin can check this information at any time. Users can also view the history of tours.


II.   Literature Survey

Author	Paper Title	Publication	Technology used	Limitations
Vinayak Nair, AmitPawar, D. L. Tidke, Vishakha Pagar and NikitaWani	Online Bus Tracking and Ticketing System	Journalpaper	Android studio and SQLite fordatabase	No facility for busPass. We have to book ticket daily.
Mohamed K. El Mahrsi, Etienne Côme,Latifa Oukhellou, and Michel Verleysen	Clustering Smart CardData for Urban Mobility Analysis	IEEE Paper	MachineLearning, UnsupervisedLearning, ClusteringMethods	Trip purposes werenot identified
Maurizio Arnonea*,Tiziana Delmastroa, Giulia Giacosaa, Mauro Paolettib, Paolo Villatab	The potential of e- ticketing for public transport planning: the Piedmont region case study	Conference Paper	Android studio	No bus pass is added in this system as well as nowallet in app.
Ricard Borges andFrancesc Sebé	A Construction for Providing Reusability to Mobile Phone-Basede-Tickets	IEEE Paper	AndroidStudio, Cryptographictools	Application remains effective only in online mode
Mazen Kamal Qteishat,Haitham Hmoud Alshibly, Mohammad Atwah Al-ma'aitah,	The impact of e-ticketing technique on customer satisfaction:an empirical analysis	JournalPaper	Androidstudio, MySQL, Security Algorithms	Transaction Failure not Handled

Figure 1. Literature Survey of smart phone based contactless Bus E-ticket System

III.   Proposed Framework

1. Registration and Login - User have to register to the system to use it's functionality. All the information of the user is saved in database. All the journeys of the user and fare is also recorded.
2. Selecting E-ticket or Pass functionality – Our app provide many functionalities like E-ticket and Daily or monthly pass. User have to select for which functionality user want to apply.
3. Finding the ride – The user is required to choose source and destination address for the journey. Then app will show the buses covering that route.
4. E-ticket confirmation - After choosing the ride user have to confirm ride as per fare and time. Then if user confirms the ticket payment window will be displayed. User also have facility to generate pass for a month or a day.
5. Payment – Once the user confirms the ticket at the same time money deducts from user account. It is not needed to carry money each time while travelling.
6. Ticket or Pass Generation – After successful payment E-ticket or pass is displayed and maintained in mobile phone of user.
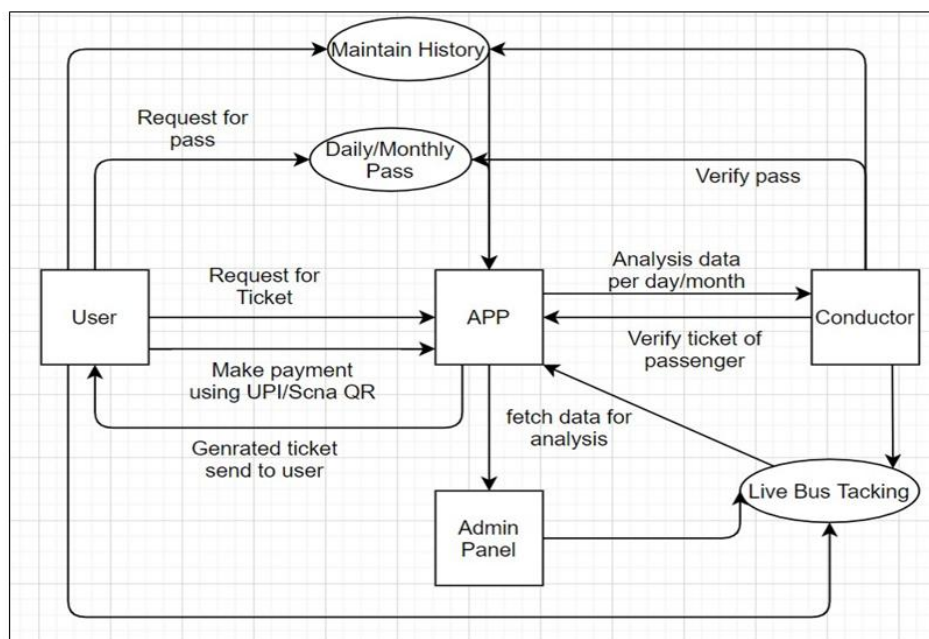
Figure 2. Architecture diagram of smart phone based contactless Bus E-ticket System

IV. Mathematical Model

The mathematical model for a system consists of inputs received by system. Inputs are requiredfor every system to get expected responses. Response is given by the system based on input given by the user.

Every system starts from one initial state and ends at one final state.

Several functions are also required to show how data flows in system. Functions are used to showdata flow, relations between states and result from dynamic contents.

General mathematical model can be stated as-

$\{q0, F, I, O, \partial\}$ Where,

q0 - Initial state of system. The initial state of our system is user registration.

F - Final state of system. The final state of our system is Displaying generated Ticket or Pass

I – Set of inputs. It includes user information, payment details, source and destination location.O – Set of outputs. It includes ticket, pass and fare of the travel, QR code for trip.

∂ - Set of function. It includes user data submission, finding routes from source to destination, Farecalculation and QR code generation.

V. Experimental Setup

Software Setup

* Front End : XML, JAVA
* Back End : Firebase
* OS : Microsoft Windows 7/8/10 (32- or 64-bit)
* IDE: Android Studio

Hardware Setup

* RAM : 4 GB RAM minimum 8 GB RAM recommended
* Disk Space : 2 GB of available disk space minimum 4 GB Recommended
* Display : 1280 x 800 minimum screen resolution

VI. Expected Results

* The system have a Search Bus functionality. Passenger have to enter source, destination and time for journey according to that bus list will be displayed.
* After selecting the bus, passenger have to scan QR code in buses to proceed further for payment.
* The app will provide in app wallet facility which will help in online payment and paperless ticket booking.
* After successful payment ticket will be generated in app.
* The system will also generate Daily or monthly pass after successful payment.
* App also have live tracking facility to save passenger's time.

VII. Conclusion

Customer satisfaction in e-ticketing is a complex thing that is shaped by a wide range of variables including customer technical support, data security and user-friendliness. Smart ticketing system will help us in many ways like, ticket booking will be paperless, the E-Pass will help user to travel for specified period without any trouble Online transaction will reduce problem of money exchange. In current situation of COVID-19, it will avoid physical contact.

In large amount of local travelling systems, data is easily managed and maintained. E-Tickets are more secure. They are impossible to lose and hard to steal. Smart ticketing system provides pass system which will reduce daily overhead. In this way by smart ticket system Public transportation system will get facilitated and travelling will be easier and convenient.

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