
Smart Ticketing System for Public Bus Transportation

Akash Prabhakaran, Aanchal Babar, Bhairavi Bendre, Sonali Auti

Department of Computer Engineering, Vishwakarma Institute of Information Technology, India

E-mail: akashprabhakaran99@hotmail.com

Abstract

We propose a RFID (Radio-frequency identification) based ticketing system for public bus transportation. This system intends to assign a unique RFID smartcard to every person intending to travel using public buses. The card will contain user details along with the balance amount which can be used for transactions. System is developed alongside Android platform that includes applications for commuters and conductors. This is a user friendly system. Conductors' application would facilitate to scan and read a passengers RFID card, enter source and destination of the commuter and proceed with the transaction. It also maintains a count of number of passengers and the total amount collected for that bus. Passenger's application would feature Global Positioning System (GPS) enabled location details of any bus they intend to board, their transactional history and also the balance left on their card. The RFID reader used is EM18. Additional feature of message notification using Google Cloud messaging services to Android users while non-android users would be notified using Global System for Mobile services about their transactions.

Keywords: *RFID tag and reader, global positioning system, android, google cloud messaging*

INTRODUCTION

Public bus transport is important for sustainable development of cities, as it is fairly affordable, helps in coping with the rising demand for mobility and also helps reduce carbon emissions. Common problems faced by the travelers are delayed buses and having to wait for a

long time. Although, the bus schedules are available on the web they provide estimated time of arrival of the buses, they are not updated timely and do not provide real time locations [1, 2]. A bus might breakdown on route but the travelers may be left unaware of the situation. To handle this GPS data of the bus locations is

collected by using the GPS of the conductor's mobile, which will be transferred to a centralized control unit and symbolic representation of buses in the geographic positions on the route map will be shown [3, 4].

Ticket collection on a bus is a major issue. Heavily boarded buses and lack of loose cash creates unnecessary chaos. Introducing smartcards for ticketing would help in alleviating the situation. The system proposed here eliminates the need for paper based tickets in public transport. Fare amount can be debited from the travelers account. Scanning of the cards would create a record of the passengers travelling on the bus. It also provides a fool proof ticketing system to avoid the piracy of passes. The RFID tag emits a radio frequency signal through antenna that is picked up and read by a special wireless RFID reader, conveying information from the tag about the passenger it is allocated to. Our system aims towards improving the user experience [5, 6].

EXISTING SYSTEM

In general way, the conductor will collect money from each passenger and issue ticket. Initially, printed tokens or papers are used as tickets. But nowadays, we can

use handheld machines to print tickets. This system has many disadvantages. Till the end of travel, passengers have to carry the ticket. Also, conductor should ensure that everyone has got the ticket. In this system the time taken for ticketing is comparatively more and more amount of paper is needed to print the ticket [7]. Nowadays, handheld ticketing machine is operated by trained conductor. If a passenger wishes to travel in bus then he has to carry money with him. Specific amount of fare according to the distance between source and destination is collected by the conductor from passengers and then conductor will give ticket. This has to repeat for all passengers. But it will take more time and waste of human resource and energy. Even handheld ticketing machine is comparatively slow and need trained person to operate it. In Existing system Radio Frequency Identification Reader is used to read the RFID tag. But in this system destination should be entered by passenger in keyboard so that amount will be debited automatically from the tag. Here, the bus stops automatically after arrival of particular destination. Fairly such arrangement takes more time in case of accessing of tag by every individual, so to overcome that, implementation of smart

ticketing system developed in this proposal which is more user-friendly.

PROPOSED SYSTEM

We are proposing a system to develop smart ticketing system for public bus transport. Usage of loose cash can be reduced and efficient ticketing can be implemented by using this system. Proposed system is more reliable and faster which allow users to travel with more liberty. In which there will be a RFID card which will work as prepaid card while buying ticket and amount of ticket will be deducted from prepaid account. If the balance in that card is lower than given certain limit, they will get notification for recharging the card. The main components of the system are Android applications-one for the conductor and another for the user. In order to scan and read the RFID cards, additional hardware is required- RFID reader along with RFID cards [8, 9].

APPLICATIONS

The system comprises of two applications based on Android platform. The conductor application will be used to enter the source and destination of the passenger, after successful scanning of RFID card. Fare will be calculated accordingly and then the ticket will be issued via a notification to

the user on his application. The conductor application also keeps a record of total number of passengers along with the daily collection of revenue. Additional feature includes a 'breakdown' to notify the users that the bus won't be available for service. The user application features a provision for searching buses given the source and destination stops. Also, different bus stops on a given route are shown. A user who wishes to find the current location of the bus can do so with the help of additional feature of 'track bus' option made available. Also, a user can check the available balance on his card.

RFID SCANNER-READER MODULE

The RFID scanner-reader module is used to read the data on the RFID card. Each user would be given an RFID card containing a unique id. On reading the RFID card user details would appear on the conductor application prior to the ticketing process, after which the conductor may proceed with the transaction.

In our system we are using a passive RFID card.

- EM-18 RFID Module:



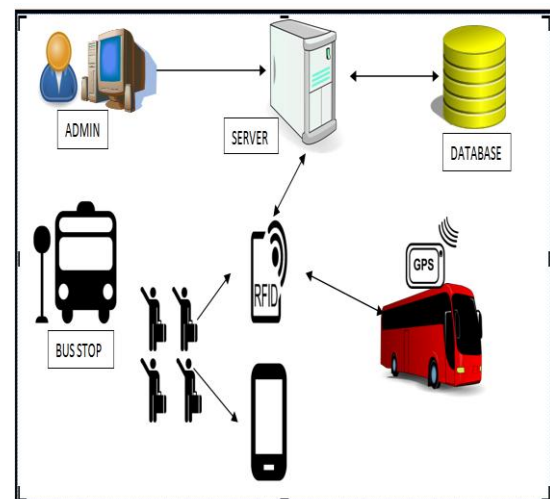
This board is based on the EM18 RFID (Radio frequency identification) Module. It consists of microcontroller which is used to read a card's data. It requires serial connection. Board requires a direct connection to the microcontroller's serial (Rx) pin and it should be powered at 5 V. When the card is brought near the module, the card data is transmitted over the serial line. The board consists of onboard power indication LED. LED and Buzzer are used to indicate the presence of a Radio Frequency Identification Card. All the Input Output pins are brought out to standard clearly labeled header pins which are used to reduce prototyping time and effort.

Tech Parameter for EM-18 RFID Reader

- a. Voltage: DC5V
 - b. Electrical Current: <50MA
 - c. Operating Frequency: 125KHZ
 - d. Read Distance : 10CM.
- An Arduino, HC-06 Bluetooth module:



The HC-06 module is a serial slave Bluetooth module which acts as a serial port through which we can send and receive data. The HC-06 module has a communication range of 10 m. This Bluetooth module consists of a LED indicator which shows a solid light when the paired process is completed, flash when it is unpaired.



IMPLEMENTATION

We have implemented the Smart Ticketing System for public bus transportation to show the functionality and feasibility of our system. In order to implement the system in the real world, it is necessary

that applications must be kept up-to date with the server database so that any change in location and prices related to the application will be traceable by the server database. The application has been implemented in the Android operating system. In this system we have used two android applications:

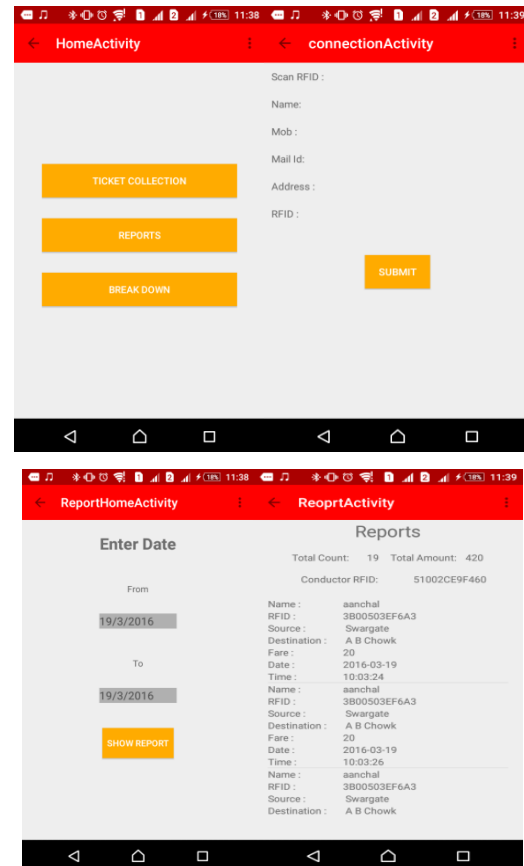
- User Application.
- Conductor Application.

Login and password are provided for security purpose for both the applications. All the passengers will carry a prepaid system RFID based card with unique ID number. Conductor scans the user's RFID card.

After successful scanning, source and destination are selected by the conductor as per the user's request. According to the route distance between source and destination, it will calculate the ticket fare and deduct the credit from user's account using RFID based ticket. Notifications regarding transaction details sent to the users using GSM via SMS.

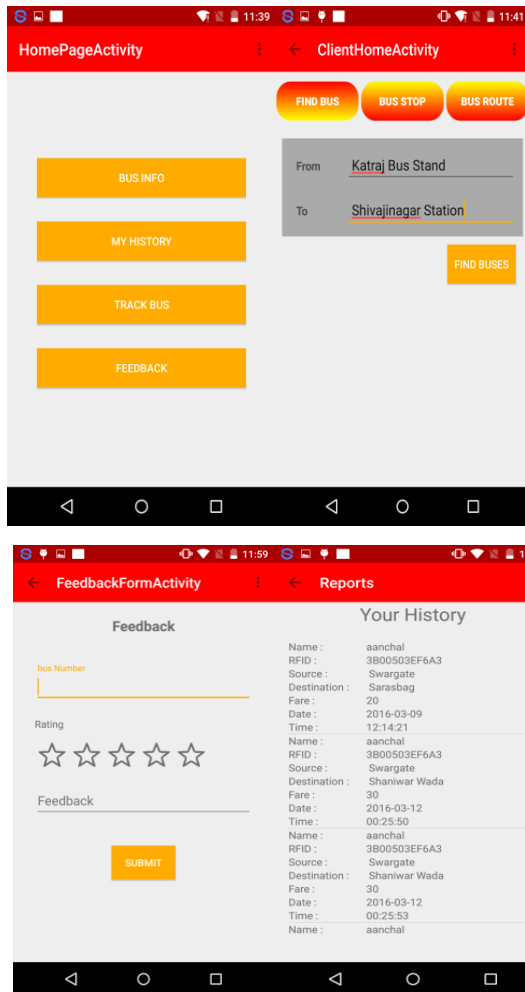
It is done because of the database system has the contacts of all its registered users. The database system transfers the information to the concerned user whenever transaction is carried out using tag.

Conductor App:



Ticket collection, report, breakdown these features are provided by conductor app. Daily transportation reports which consists of total number of passengers travelled per day, total fare collection per day are generated by conductor app. Breakdown feature is provided for the purpose that if bus fails due to some reasons then bus will not be available for service. If bus fails then conductor will press breakdown option in the conductor app. After pressing the button, color of the location pointer which points to the location of bus which is failed will get changed.

User App:



User can track the bus using track bus option provided in the user application. User can see the next coming bus toward its location using GPS. User can able to see the failed bus on particular route. Users can give feedback about the bus transportation system which is stored on server side. So accordingly, modifications are made by the public bus system Administration department for the betterment of passengers.

ACKNOWLEDGEMENT TO THE USER

Notification regarding transaction details will be sent to the user using GSM via SMS. It is done because of the database system has the contacts of all its registered users. The database system transfers the information to the concerned user whenever transaction is carried out using tag.

FOR LOST TAGS

As mentioned previously, each RFID tag has a unique id. The proposed system is designed that the user can be assigned with a new unique id if the person loses the tag. This can be done by the information provided by the user to the authorities. The authorities restore the information of the user in the database system to the new unique RFID tag which the user can use for their future transactions.

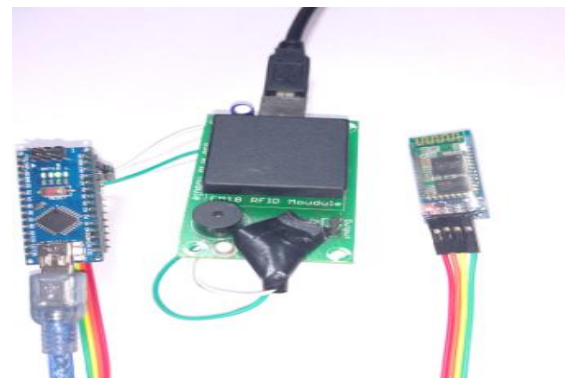
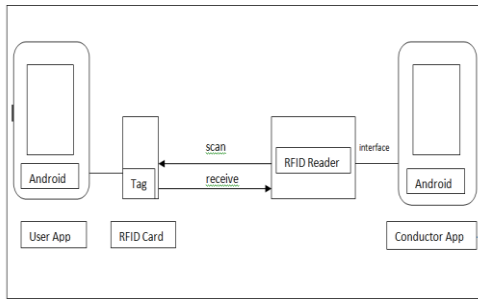


Fig. 1: Hardware Implementation.

Block Diagram



CONCLUSION

Our proposed system intends towards improving user experience by integrating better technologies like RFID and android in the ticketing system for public bus transportation. Elimination of paper tickets and introducing RFID based smartcards would reduce deceitful transactions and misuse of passes. GPS location would allow passengers to get the real time location of the bus.

REFERENCES

1. Ramkumar C, Vijayalakshmi B, Ramesh C et al. Train ticketing system using smart cards. *IJIREEIC*. 2013; 1: 1–6p.
2. Swati Chandurkar, Sneha Mugade, Sanjana Sinha et al. Implementation of real time bus monitoring and passenger information system. *IJSRP*. 2013; 3: 1–5p.
3. Saylee Gharge, Manal Chhaya, Gaurav Chheda et al. Real time bus monitoring system using GPS. *IRACST–Engineering Science and Technology: An International Journal (ESTIJ)*. 2012; 2: 1–8p.
4. R B. Torode. Prestige-Contactless smartcard ticketing on London transport. London; 1996.
5. T. Manikandan, G. Kalaiyarasi, K.Priyadharshini. Conductor less Bus ticketing system using RFID and accident information through GPS and GSM. *IJISET*. 2(9).
6. S. Archana Mala, N. Leela. Automated fare collection system for public transport using GPS. *IJIRSET*. 2014; 3(1).
7. R. Valarmathi, G. Karthika. Smart ticketing system in metro. *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*. 2014; 3.
8. Arun Das S V, K. Lingeswaran. GPS based automated public transport fare collection systems based on distance travelled by passenger using smart card. *IJSER*. 2014; 2.
9. M. Bhuvaneswari, S. Sukhumar, N. Divya et al. Embedded system based automatic ticket vending machine for modern transport system; 2013.