

# SMART BUS TICKETING USING BARCODE SCAN-ONE TIME BARCODE TICKETS ON ANDROID APPLICATION FOR TRAVELLING THROUGH METROPOLITAN BUSES

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**Abstract-** Smart bus ticketing using barcode scan is a work that intends technical advancement in the metropolitan bus transportation. The objective is to replace the traditional paper tickets of the metropolitan buses with the barcode tickets on the traveller's smart phone application. As a result of which the traveller can travel in the bus without carrying money and intervention of a bus conductor. The system includes bus door automation and a digital wallet.

**Keywords-** Smart Bus, Embedded system, Android application, Raspberry pi, Barcode Scan, digital wallet

## I. INTRODUCTION

Smart bus ticketing system using barcode scan is an embedded system, which is designed in order to automate and cater the issues in the current public bus transport system. The "Smart-T" android application - a part of the proposed system, has to be installed on the traveller's smart phone. The traveller should register in the Smart-T application, thus a unique account is created per traveller. The traveller's account includes his personal details and an associated wallet. The traveller recharges his wallet periodically through online banking. When the traveller wants to travel, he logs into his account and makes a request for the barcode ticket by entering the details like starting point and the destination. The server will send a onetime barcode ticket to the traveller's smart phone. Concurrently the stipulated amount for the journey is deducted from the traveller's wallet. The traveller scans the barcode ticket using the scanner which is installed at the doors of the bus. The bus door opens if the barcode ticket is a

valid one for the journey. In the proposed system a barcode ticket on the traveller's smart phone application will substitute the traditional bus tickets. As a result of which the traveller can travel in the bus without carrying money and intervention of a bus conductor.

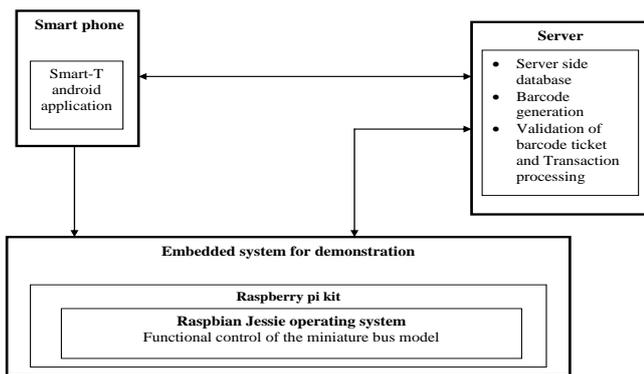
## II. EXISTING SYSTEM

The existing bus ticketing system in India is a traditional paper based ticketing system. This ticketing system, though widely accepted over period of time is in a need of renovation with on-going technology. The system involves a conductor who is responsible for the issue of paper tickets. On boarding the bus, the passengers pay cash to the conductor to buy the ticket. The conductor issues ticket to the passenger from the boarding stop to the desired stop. The passenger is expected to possess the ticket throughout his journey by the bus. These tickets are priced on the basis of stages that are pre-defined by the governing authority. The transport system has declared these tickets as non-transferable.

## III. PROPOSED SYSTEM

The "Smart bus ticketing using barcode scan" is a system proposed to cater all the former mentioned problems of the existing system. The system completely rules out the idea of the traditional paper tickets. Any passenger intended to travel by the bus, is expected to have a smart phone with internet connectivity and the "Smart-T" android application installed.

The user/passenger needs to do an initial sign up for the application, where the user enters his personal identification details. These details entered by the user are maintained in the database at the server side and are used for processing during the user transaction. The user shall priority recharge his wallet on the application through online payment (The details of the wallet are also stored in the server database). After all these prior requirements are furnished, the user is ready to travel by the bus.



Once the passenger is ready to travel, he needs to login into the “Smart-T” application and request for a barcode ticket. For this, the passenger needs to enter the following details: The bus route number, the starting bus stop from where he intends to travel, the destination bus stop and number of seats (a drop down menu is provided where ever possible). The details entered by the passenger are communicated to the server. The server generates a barcode ticket and sends it to the user. The corresponding amount of travel is deducted from the user’s wallet. The barcode ticket image sent by the server is stored in the “Smart-T” application storage as well as in the media storage of the smartphone. Once the passenger is about to board the bus, he is expected to open the barcode ticket in the application and scan it to the scanner screen embedded at the bus entrance. The embedded system is programmed in such a way that, it processes the barcode ticket, decodes the ticket number and sends it to the server for verification. The server will check if it is valid

and will send the corresponding information to the embedded system in the bus.

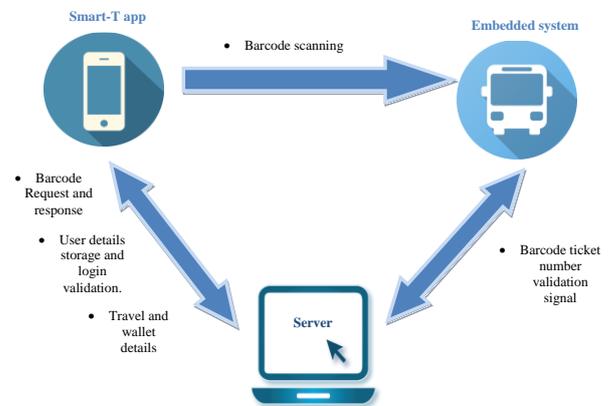


Fig 2 Overall system architecture

The door automation system will open the bus door if the received signal is “valid” else will not open the bus door and the user needs to make a new barcode ticket from the application. The passenger can board the bus on the signal being valid.

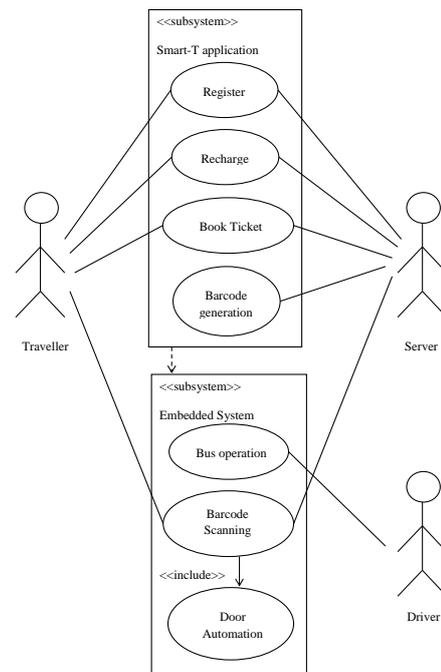


Fig 3 Use case diagram for the proposed system

Once the passenger's destination bus stop is reached, the passenger needs to scan the barcode again before getting down from the bus to indicate the server that his travel is complete. After the travel is complete the barcode ticket will lose its validity.

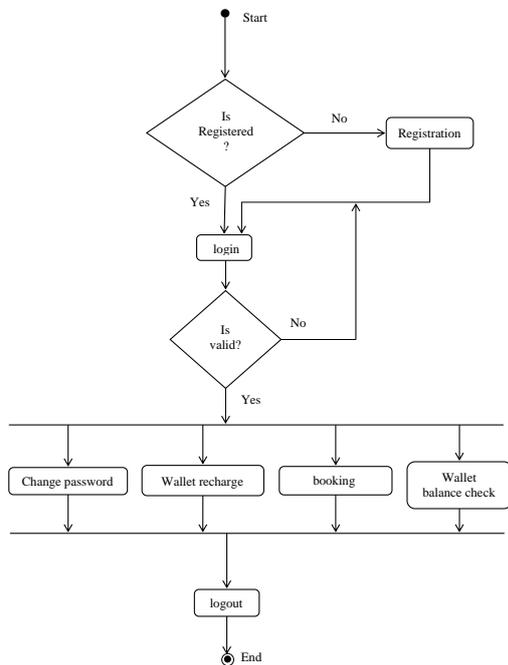


Fig 4 Activity diagram for the traveller

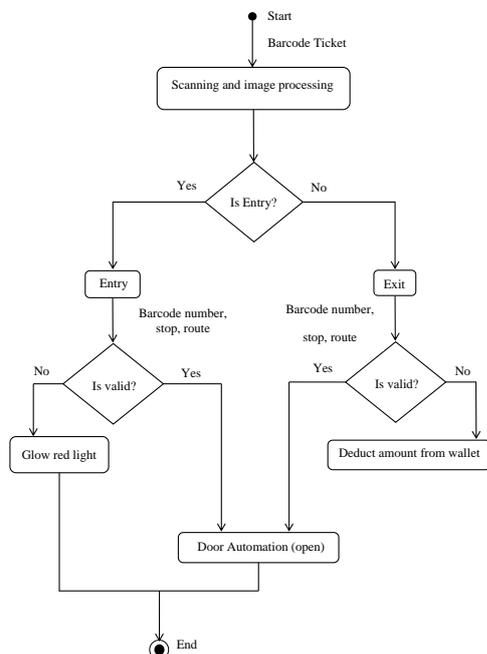


Fig 5 Activity diagram for the embedded system module of the proposed system

1. SMART PHONE MODULE:

This module acts as the client side device in the system. The smart phone should support android operating system. The "Smart-T" android application of the proposed system needs to be installed on the smart phone. Whenever the user wants to use this application, the smart phone should ensure internet connectivity.



Fig 6. Home screen of the Smart-T android application

- Through the smart phone, the user can enter his personal details which will be communicated to the server database (using Ajax or Http core). Later this information is used for user-login and transaction processing.

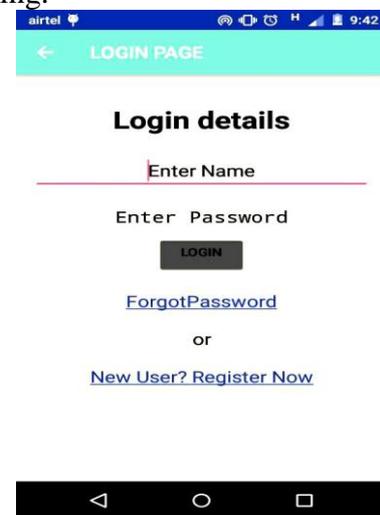


Fig 7 User Login

- The user selects his bus route number, the starting bus stop from where he intends to

travel, the destination bus stop and number of seats through the application installed on the smart phone. On doing so he is all set to make his barcode ticket.

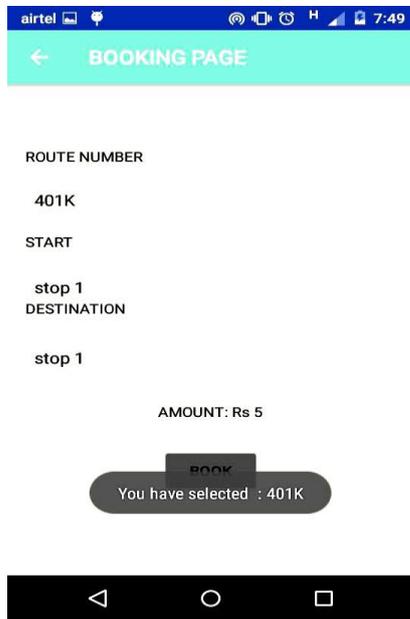


Fig 8. Ticket Booking

- The barcode ticket sent by the server is stored in the application storage and is displayed on the screen of the smart phone to get it scanned by the scanner.



Fig. 9 Barcode ticket from the server

## 2. EMBEDDED SYSTEM MODULE:

This module acts as the intermediate device in the system and is a modelled version of the public transportation bus. The major part of this module is constituted by the ‘Raspberry pi’ kit (which is a miniature computer).

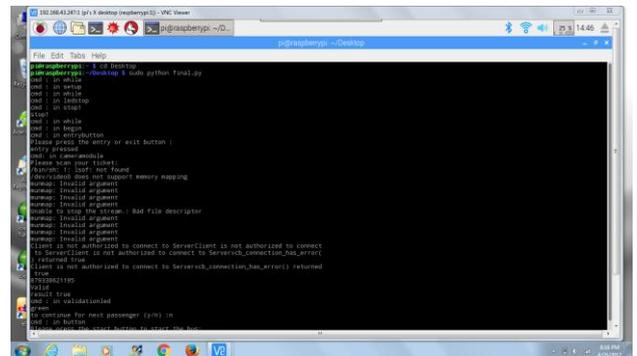


Fig 10. Raspberry pi terminal

The kit functions include the following:

- The barcode scanner software is programmed on pi. The scanning process happens through the raspberry pi’s camera module.
- Later the pi processes the scanned barcode to decode the ticket number. The ticket number is communicated to the server with the aid of HTTP POST and GET methods.
- Based on the ticket validation signal received by the server, the kit controls the door automation system in the miniature bus.
- The moving of the bus miniature is controlled by the aid of push buttons (This is done manually and is the duty of a driver in the proposed system).

## 3. SERVER

This module constitutes the server side device of the proposed system. Practically a computer system can be assumed to be the server (which uses online website host: 000webhost).

- The server maintains a database that stores details about the user and his transactions. The details about the bus transportation like: route number, bus stops, ticket rates, generated barcode ticket and its corresponding number, timings etc. are also stored in the database (MySQL database).

- The barcode ticket is generated at the server using the java barcode generation code, once it is requested by the user and is sent to the user application using HTTP POST and GET methods.
- The server receives the barcode number from the embedded system module, checks its validity and sends the corresponding result to the intermediate module.
- At the same time the server module updates the database (like wallet statistics) based on the transport transactions occurring at the user and intermediate modules.

#### IV. RESULTS

The “Smart Bus Ticketing System Using Barcode Scan” can thus be implemented in the metropolitan city buses, which results in the digitalization of the tickets, automation of the bus door and technical advancement in the traditional public bus transportation system. The digital wallet concept included in the system will empower the cashless transactions. The system is exclusively designed for countries like India, where automation of public bus transportation has remained a challenge due to increased population rate and failure to reach cent percentage of literacy rate. Since the system proposes an android application with possibly simpler user interface, the system is bound to be a success in achieving its objectives.



Fig 11 Overall system assembly

#### V. CONCLUSION

The “Smart Bus ticketing system” is a beneficiary work with regard to the public bus

transportation system. The following are the advantages gained on the implementation of the proposed system and will serve as justification to the former claim that it is a beneficiary work;

1. Rules out the involvement of a conductor in the bus transport system.
2. Use of barcode tickets will save paper used for traditional tickets.
3. Cashless transaction on bus transportation system.
4. Avoids the unnecessary delay in the travel time due to ticket issuing and checking procedures followed in the traditional ticketing system.
5. Automation of the bus doors.
6. No consequences of illegal transferring of the tickets.
7. The improper cash transactions and issues in denomination exchange are completely discarded.

Thus the proposed system will stand a witness to technical advancement in the terms of tickets and door automation for a bus transportation system (within the limits of its defined scope).

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