

Travel Card For State Transport Corporation Using RFID

M. Pandaravel Kannan, R. Pitchai Kumar Arun, P. Ponselva Kumar, R. Vasanthan, N. Sankar

Abstract: Our project aimed to automatically identify the passenger and deduct the passenger's fare according to the distance travelled. The Radio Frequency Identification (RFID) card is used to make the identification of passenger and transaction very precise. Compared to the paper-based ticketing system, using of RFID cards are more convenient, user-friendly and reusable. RFID cards will be distributed among the public. By collecting the personnel details, an account will be created and unique ID will be assigned to each person with RFID cards. By accessing this database, it is thus possible to identify the traveler, check his account and deduct the fare from their account. Creating database facilitates efficient filtering of anti-social elements and gives firm assurance to both passenger and Public Transport System (PTS) about the transaction. The web-based application is used to send push notifications and also for the RFID card renewal process. This system was intended to develop an application for Transport system to perform functionalities like accessing the basic information of a passenger for authentication. This project reduces the time for issuing tickets, eliminates the use of paper tickets and coin exchange.

Index Terms: Automatic Fare collector, Paperless, Reusable card, RFID, Smart Card, Travel Card, Ticket.

1 INTRODUCTION

Transportation plays a key role in the most of the people routine's life. Modes of Transport can be individual and group. Railways, Roadways and Airways are the most common forms of group transportation. Based on the people requirement like distance, time and cost, railways and roadways play a major role in daily or seasonal commutation. Since roadways reach each nook and corner of most of the places, road transport preferred by most of the commuters. In terms of Government point of view, Railway require high initial cost and lesser flexibility in destination and routes. Bus Transport provides last mile connectivity in group transportation and takes the public to the nearest location of their final destination. Passenger Buses play a key role in the life of a common man and is the lifeline of transportation of every state governments. Tamil Nadu is one such state. It has a robust bus transport system which is mainly provided by State Transport Undertakings. These State Transport Undertakings cover the length and breadth of the state with local town and rural buses with connectivity for longer distance routes as well. Inter-state services are also provided. The State Transport Corporations of Tamil Nadu have a fleet strength of 21,744 buses including 2,254 spare buses as on 31.03.2018. The Government have taken various measures to improve the performance of the State Transport Corporations. In this project, Metropolitan Transport Corporation Chennai Limited (MTC) of Tamilnadu State Transport Corporation is taken as a model to implement the proposed system. MTC is the largest Monopoly Public Transport Service provider in Chennai city and operates city services in the Chennai Metropolitan area and in the adjoining areas in Kanchipuram and Thiruvallur Districts. MTC provides various fare concessions for passengers like student passes, senior citizen concession, monthly bus passes, one-third concession bus passes.

- M. Pandaravel Kannan, R. Pitchai Kumar Arun, P. Ponselva Kumar and R. Vasanthan are currently pursuing bachelor degree program in electrical and electronics engineering in National Engineering College, Kovilpatti.
- N. Sankar is currently working as an assistant professor in department of electrical and electronics engineering in National Engineering College, Kovilpatti.

So far paper-based ticketing, online electronic ticketing machine, e-ticketing system are used to collect fare from the passengers. Passengers with bus passes have to collect it from the transport corporation, by filling the form and paying the money for the desired route and destination. This is a time-consuming process and passengers has to show the pass as a proof of ticket every time when board. The ticket collector has to check the passenger for pass details and if there are any discrepancies, he/she have to collect the required amount from the passengers. For conventional paper-based ticket and online electronic ticketing machine, there are problems like use of papers, proper tender exchange, giving ticket to each and every passenger at the peak hours and there is a chance of passenger going ticketless. During peak hours these problems might result in verbal fight between passenger and ticket collector. This project travel card using RFID will eliminates the above-mentioned problems for both bus passes and daily travel through conventional tickets. The passenger can collect the travel card from the transport corporation as a one-time procedure and he/she can choose the amount to be added, required concession or monthly passes by submitting appropriate proof by online or offline. Payment can be done in online and offline also. Once the passenger travel with the travel card, there is no need for money exchange, showing proof of authentication. Amount will be deducted from the travel card based on the source and destination. Hence it reduces the problems raised in conventional method. Further, the passenger can update their fare concession in online, which will avoid the conventional method of renewing the passes monthly or seasonal basis by visiting the state transport corporation in person.

2 EXISTING SYSTEM

Smart Bus Fare Collection System was proposed by Nandhini M S [1] describes the use of RFID, cloud computing and a user-friendly app "SwipeNgo" for automatic fare collection system which eliminates the usage of paper tickets. The proposed system has a drawback of passenger has to install an app in their personal mobile phones. Automatic Bus Fare Collection System using RFID was proposed by Sunitha Nandhini. A [2] describes the use of RFID card for fare deduction by entering the destination by passengers to calculate the total fare. The proposed system needs the

passenger to enter their destination, hence during the peak hour this will result in chaos and time consuming. Automatic Bus Fare Collection System using GPS and RFID Technology proposed by Karthika J [3] discussed about the financial loss in paper-based fare collecting system. The paper also discussed the use of GPS to calculate the distance travelled by the passenger to deduct the final fare to be collected. Automatic Bus Ticketing System proposed by K.S. Vairavel [4] discussed about the fare collection using RFID, IR sensor, U-slot sensor and motor to collect the distance travelled and deduction of fare from the smart card. The use of RFID card and IR sensor plays a vital role in most of the existing system.

3 PROPOSED SYSTEM

The proposed system aimed to collect automatic fare using RFID card and RFID reader. Each passenger will provide with a travel card i.e., RFID tag with unique ID which can be collected from the transport corporation as a one-time registration process. Passenger can update their Travel card by online or offline. Each bus is provided with a RFID reader, IR sensor, GPS Module, Wi-Fi Module, a Arduino unit. RFID reader reads the passenger ID and calculate the distance traveled using the GPS module. The Arduino unit reads the RFID information, GPS locations and calculate the fare. The fare details and travel details of the passengers will be sent to the database using WIFI module. Based on the information received from the Arduino unit, amount will be deducted from the passengers account. IR sensor is used to calculate the number of passengers boarded and departed. If the number of persons and number of RFID read are not equal, alarm will be triggered to notify the ticket checker for malpractice. Thus, avoiding ticketless travel. The cloud is used for database management. From the proposed system, there is no need of paper-based ticket, exchange of currency, waiting for getting the ticket. Thus, the information of each and every travel, traveler is get updated in the cloud, which will be helpful to calculate the overall money collected. The database will also be helpful to find the route with minimum, maximum passengers, hence by taking necessary action to improve the profit of the transport corporation.

4 WORKING DIAGRAMS

The block diagram and flowchart of the working model is shown in Fig. 1 and Fig. 2. The block diagram shows the main components of the hardware unit. The flowchart shows the working sequence of how fare is deducted from the passenger id or travel card. The power supply is a main component, which can be supplied from the bus battery or by using dedicated power supply. For the hardware set 230 V AC is converted to required DC voltages based on the component specifications. For the prototype, database of 10 passengers are added with different concessions and fare is calculated based on the distance travelled i.e., GPS location between 50m inside the college campus.

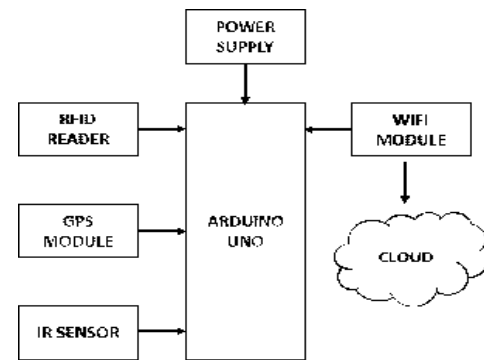


Fig. 1. Block Diagram of the Proposed System

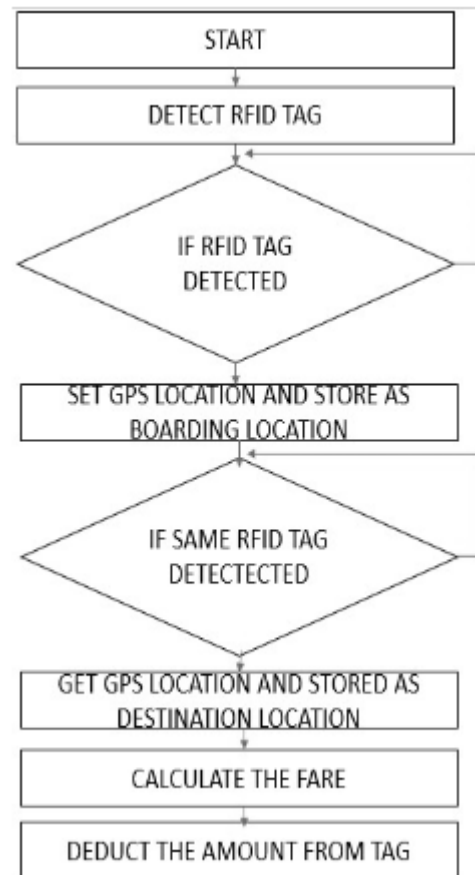


Fig. 2. Flowchart of the Proposed System

The flowchart gives the sequence of operations excluding cloud and initial set up process. The first and last GPS location alone taken into account for the fare calculation. Hence there is no problem if the same ID is detected multiple times. The timestamp of entry and exit also update in the database. The process of getting the travel card involves the passenger to apply in person by visiting the transport corporation or in online by visiting the official website. For the prototype purpose simple database alone used and travel data are retrieved using the database queries like select, update, delete. For the main idea to be implemented proper facilities for cloud, website and database management has to be created with the official approval from the state transport corporation.

5 HARDWARE COMPONENTS

The required components and facilities for the proposed system is listed below

- 1.Arduino UNO
- 2.RFID card
- 3.RFID reader
- 4.GPS module
- 5.WiFi Module
6. IR Sensor

The main components and its functionalities are discussed below.

5.1 Arduino UNO

Fig.3 shows an open source microcontroller based on the Microchip ATmega328P developed by Arduino.cc. It contains both Digital and Analog pins that interfaced to various modules and elements of the circuit. It is programmable one and programmed with the help of Arduino IDE. It has a memory of 32 KB and the clock speed of 16MHz.



Fig. 3. Arduino UNO

5.2 RFID Card

RFID card as shown in the fig.4 uses electromagnetic fields to read the data stored in the RFID. These cards are issued to every passenger. It has information about the passenger including balance amount of passenger.



Fig. 4. RFID card

5.3 RFID reader

RFID reader as shown in the fig.5 is used to gather data from the RFID card. It is attached in the bus to gather information.



Fig. 5. RFID reader

5.4 GPS module

Global Positioning System (GPS) which is shown in Fig6, plays a major role in this project. This module locates the boarding and destination location. And also collect the fare which is calculated automatically by the distance between the boarding and destination places.



Fig. 6. GPS Module

5.5 Wi-Fi Module

The Wi-Fi module as shown in fig 7 which is used to access Wi-Fi network by these Wi-Fi modules, we will connect the cloud with the system in the buses.

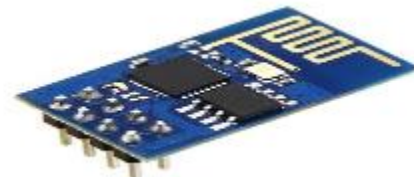


Fig. 7. Wi-Fi Module

6 CONCLUSION

The proposed system eliminates the use of paper-based tickets, reduces the time in getting the ticket and avoid unnecessary fight between passenger and ticket checker. Use of the travel card helps the passenger to bring exact coins for exchange of tickets and eliminates the need of renewing the bus passes in person to the transport corporation. This project can be extended in future to create an app where passenger can view the exact location of their route bus i.e., live running status of the buses, the amount pending in the card and UPI payment gateways to complete transactions with the help of app. Also, a feature must be added to deactivate the stolen or lost card to avoid misusing of another passenger's travel card. Thus, this travel card will eliminate the common issues faced by the passengers, ticket checkers and helps the transport corporation to improve the financial profit by rendering innovative features.

7 REFERENCES

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