

AUTOMATIC BUS TICKETING SYSTEM USING RFID

Shraddha Pandurang Powar¹, Akash Suresh Patil²,

Nikhil Dilip Parit³

^{1,2,3}Department of Electronics

Bharati Vidyapeeth's College of Engineering, Kolhapur,(India)

ABSTRACT

Bus pass is used by regular bus passengers to make frequent intercity travel trips at profitable costs as compared to daily bus fares. In existing system, user's bus pass registration and authentication is done manually with no computerized user details record saved. It is important that the information like user details, documents verification related details, records of user's travelling details should be stored at some secure location so that it can be reused whenever required. Our strategy involves design, development and building a smart card authentication system for bus passengers that scans user related details from RFID tag and match the details with the database and authenticate it. If the user is found authentic, then only it allows use of the pass otherwise it shows an error that card is invalid. This system will also help users in making better travelling decisions independently.

I. INTRODUCTION

This system consists of an RFID reader which is used to identify the passenger, a control unit which uses the database to monitor factors like account balance, ticket charge etc. The system also includes a distance measuring unit which uses the GPS to find leaving place and arriving place to calculate distance, and an internet access for updating database. PTS remains the major source of income in most of the developing countries like India. But PTS now faces severe malfunction and various security problems. First, there is a lot of confusion between the passengers regarding fares which lead to quarrels and corruption. In addition to this, nowadays there is a severe security crisis in PTS due antisocial elements. The user friendly automated ticketing system suggested here will not only automatically deduct the passenger's fare according to the distance travelled but also detect the passenger's identification. This is possible by use of RFID cards and GPS, and can be used to make the transaction and travelling very precise . This system basically deals with the identification and ticketing of the passengers travelling by the bus. Also discusses possible future extensions of this system in areas such as Internet-of-Things (IoT).RFID has been an emerging technology in recent years. RFID technology can be effectively employed in number of applications due to its penchant for efficiency. As for its application, it's been a widespread tool for both tracking the transit transports. A fundamental system of RFID consists of two primary components: The reader circuit and tag, details of which are discussed later.The proposed system mainly acts to bring out the consistency among various bus agencies that will conclude in uniform access of passengers in daily rides through an automated server being updated every single time the passengers travel by carrying the RFID based tickets.[1]

II. SYSTEM WORKING

This system consists of an RFID reader which is used to identify the passenger, a control unit which uses the database to monitor factors like account balance, ticket charge etc. The system also includes a distance measuring unit which uses the GPS to find leaving place and arriving place to calculate distance, and an internet access for updating database. Basic block diagram of the system is shown in Fig. An RFID system consists of a tag, basically a microchip with an antenna and an interrogator or reader with an antenna. Most RFID tags contain at least two parts, One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. The passenger entering the desired bus should display/place the RFID tag in front of the reader. When the tag is placed before the reader circuit, the tag gets energized and the reader reads the unique digital data behind it[2][5]. Hence the tag reveals relevant information to the reader circuit. The reader circuit stores this information in its internal memory temporarily and also links to the common database system which has all the details of the particular passenger. It verifies the identity of the person. Having linked with the common database.

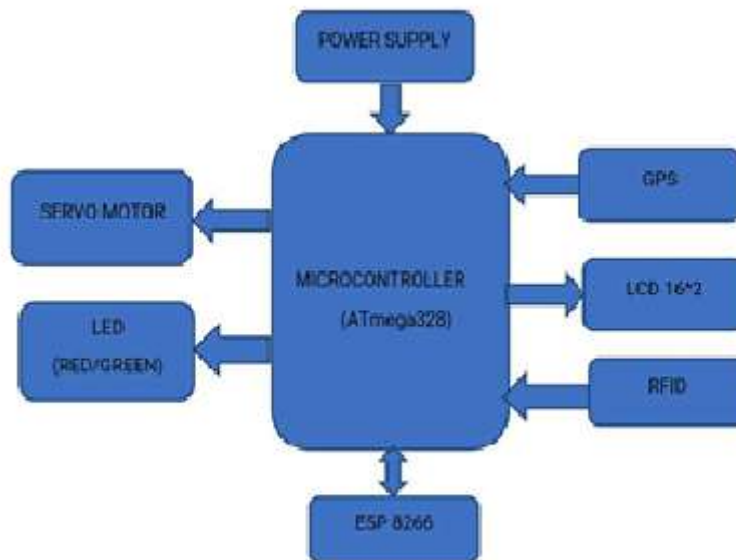


Fig.1 Block Diagram of the system.

III. HARDWARE DESCRIPTION

1. RFID Tag: RFID tags are the components which are utilized for the purpose of identification. The tag has a microchip and an integrated antenna. Corresponding to each tag, the microchip contains unique digital data. The most significant feature of RFID tag is the uniqueness exhibited by each of them. When the tag is read, digital data in the chip is send through radio frequency interference technique. These cards may be of different size and range. Passive tags with no batteries have long life and shorter reading range and are ideal for mass identification process giving the advantage of low cost.

2. RFID Reader: The unique digital data of tag is decoded with the use of RFID reader. The RFID reader transmits an electromagnetic wave which is input to the tag. RFID tag is energized due to these electromagnetic waves hence resulting in the production of a confined magnetic field, which has an interference pattern. This interference pattern which when read by a RFID reader would produce the unique number assigned to the RFID tag and thus the address of the tag is obtained. It should be noted that the address differs from each RFID tag as they are provided by EPC global and hence it offers complete resistance to duplication.



Fig.2 RFID Reader

3. GPS Module: GPS is the latest technology used in various fields such as navigation, tracking and also in some of surveillance application. Here used GPS to calculate the distance travelled by the passenger. GPS module 01 used can be configured to generate the latitude and longitude of the current position of the bus. The position of the bus can be monitored continuously using this GPS module. Combining GPS technology and smart cards we can design a complete bus ticketing system[4].

4. Servomotor: A servomotor is a rotary actuator that allows for precise control of angular position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Door handling system is controlled by servomotor. For heavy loads, stepper motors can be used instead. Selection of motor depends on the weight of door, its operating mechanism etc.

5 LCD: LCD (liquid crystal display) screen is an electronic display model and find a wide range of applications. A 16X2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16X2 LCD means it can display 16 characters per line and there are 2 such lines.

6. SERVER: The Server can be used to store all the information as well as reply to the enquiry done by the user.

IV.COMPARATIVE STUDY OF EXISTING AND PROPOSED SYSTEM[6]

Table

Existing system	Proposed system
Bus pass of paper is used.	RFID tags will act as bus pass.
Manual entry with no user details record saved.	Computerized entry with user details will be saved in the database.
Authentication process handled manually	Authentication process will be handled by RFID reader devices.

V. RESULT

The system is fully automated, reliable, transparent and convenient. The cards being reusable, they are much more convenient compared to the paper based ticketing system. Also fare calculation is done through internet, fare is crystal clear and provides no room for confusion. Cash is no longer necessary, contactless smart cards can be loaded with large amounts of money, passengers no longer need to carry the correct change.

VI.CONCLUSION

This system has presented a fully automated, reliable, and transparent for ticketing in PTS. Powerful program algorithm can make system to publish real time location data in internet, ensuring time keeping of services. System also holds bright promises towards different transportation fields, including transportation of school students ensuring better level of safety.

VII. FUTURE ASPECTS

The major advantage of this system when compared to previously suggested RFID based ticketing system is that this stays closer to future ticketing system. RFID system and database used here can be useful in IoT formation as object and human information collection is the biggest challenge in IoT. So implementation of such a system can be considered as primary step towards fully operational IoT[7]. Also Raspberry Pi provides a huge room for future improvements. This minicomputer is sure to be replaced by smaller and better performing components in future, but remains the best choice till the date, considering near future. The program can be slightly modified to obtain safe travel of any transportation system such as Railways, school buses etc. More powerful algorithms can provide real time location information in internet, ensuring in time keeping of services.

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