RFID BASED AUTOMATED LOW COST DATA ACQUISITION SYSTEM FOR PUBLIC TRANSPORT

Anirban Patra¹, Dr. Arijit Saha²

¹Assistant Professor, ECE Dept., JIS College of Engineering, Kalyani, West Bengal (India)
²Associate Professor, ECE Dept., B P Poddar Institute of Management & Technology, Kolkata (India)

ABSTRACT

In public transport system, particularly in bus collecting ticket is really a problematic issue. Transport Company has to employ one or two personnel for this purpose. They have to knock everybody for this purpose. It is very common practice for few people to travel without ticket or do not give proper fare. Sometimes there is a rough argument during the journey regarding fare. Also bus personnel have to monitor whether a person has purchased ticket or not. Again having no government authority to take control or keep an eye over the whole scenario, the private sectors are creating a monopoly, taking control over the public transport and autocratic raise in bus fare. To overcome this problem, RFID technology can be used. RFID technology has long been recognized as an efficient method for identifying a single entity. RFID technology also provides for greater security in the system. The ticketing systems using RFID can be merged to solve the above mentioned problems.

This paper actually suggests a much more public friendly, automated system of ticketing with the use of RFID based tickets. This system is suitable for megacities like Kolkata where a large no of customers avail public transport system daily.

Keywords: RFID Reader, 8051 Microcontroller and Display Unit

I INTRODUCTION

Radio Frequency Identification (RFID) systems use radio frequency to automatically identify products. The RFID system contains two parts, Reader and Tag. Ticket friend solution mainly proposed to overcome the problems in traditional ticketing method like transferring tickets from one person to another to avoid confrontation. This system introduces RFID technology. RFID technology has long been recognized as an efficient method for identifying a single entity. RFID technology also provides for greater security in the system. The ticketing systems using RFID can be merged to solve the above mentioned problems. Automated Fare calculation for Public transport system is an Economic and Management Approach for Transit system. This provides a wealth of resourceful information to everyone with interest in mass transit. All the conventional systems are prepaid system. Another disadvantage is
that the passenger has to carry a smart card and there is no scope of recharge at the bus. This system is postpaid system. So if anybody forgets to bring the card, he can ride the bus easily.

II. RFID SYSTEM FUNDAMENTALS

Basically, an RFID system consists of an antenna or coil, a transceiver (with decoder) and a transponder (RF tag) electronically programmed with unique information. There are many different types of RFID systems in the market. These are categorized on the basis of their frequency ranges. Some of the most commonly used RFID kits are low-frequency (30-500kHz), mid-frequency (900kHz-1500MHz) and high-frequency (2.4-2.5GHz).

2.1 RFID Antenna

The antenna emits radio signals to activate the tag and read/write data from/to it. It is the conduit between the tag and the transceiver, which controls the system's data acquisition and communication. The electromagnetic field produced by the antenna can be constantly present when multiple tags are expected continually. If constant interrogation is not required, a sensor device can activate the field. The reader emits radio waves in the range of 2.5cm to 30 meters or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and communicates to the host computer for processing.

2.2 RFID Tag

It comprises a microchip containing identifying information about the item and an antenna that transmits this data wirelessly to the reader. At its most basic, the chip contains a serialized identifier or license plate number that uniquely identifies that item (similar to bar codes). A key difference, however, is that RFID tags have a higher data capacity than their barcode counterparts. This increases the options for the type of information that can be encoded on the tag; it may include the manufacturer's name, batch or lot number, weight, ownership, destination and history (such as the temperature range to which an item has been exposed). In fact, an unlimited list of other types of information can be stored on RFID tags, depending on the application's requirements. RFID tag can be placed on individual items, cases or pallets for identification purposes, as well as fixed assets such as trailers, containers and totes.

2.3. Electronic product code (EPC) Tags:

EPC is an emerging specification for RFID tags, readers and business applications. It represents a specific approach to item identification, including an emerging standard for the tags—with both the data content of the tag and open wireless communication protocols.
2.4. RF transceiver

RF transceiver is the source of RF energy used to activate and power the passive RFID tags. It may be enclosed in the same cabinet as the reader or it may be a separate piece of equipment. When provided as a separate piece of equipment, the transceiver is commonly referred to as an RF module. RF transceiver controls and modulates the radio frequencies that the antenna transmits and receives. The transceiver filters and amplifies the backscatter signal from a passive RFID tag.

III BLOCK DIAGRAM OF THE SYSTEM

![Block Diagram of the System](image)

IV CIRCUIT OPERATION

The RFID tag is used as an identity for a particular user. If the identity (serial number of the tag) of the user is matched with the one already stored in this system, he gets the actual fare of the travelled distance. This RFID based is a secured access system with many additional features. For example, a new passenger’s database will be installed into the system. A registered passenger can also withdraw his entry from the system in case of mistake. These features can be accessed by pressing a tactile switch connected to the microcontroller.

In beginning, the user is prompted to scan his tag or ID which will be given to him through a smart card. The information regarding starting of the journey will be stored into the system. At the end of the journey, the passenger has to produce the smart card to the system. The serial code of the tag is identified by the reader module and is sent to AT89C51 for checking. If the ID is matched by the microcontroller, the user will the amount of the total fare.
A new passenger needs to press the switch to register after which his identity is verified twice with RFID tag. The new record is stored by the microcontroller. Again the verification is carried out and the user is deleted after his journey will be over.

V RESULT

![Block Diagram](image1)

![Circuit Image](image2)

Fig 2 BLOCK DIAGRAM  Fig 3 PART OF THE CIRCUIT

Passengers have to carry a RFID based card that will have a unique ID number. Information regarding starting point will be stored into the card. According to the route distance between departure & destination as well as considering bus type, it will calculate the ticket fare. If a passenger is given the card mistakenly (passenger's destination is not in the same route, then no fare will be calculated. The passenger has to submit the card immediately). During get down, passenger has to submit the card. The information regarding fare will be displayed based on total distance travelling. Data regarding bus stoppage will be updated after every stoppage. This is a postpaid system. After the days trip, from the system the total amount of money collected will be displayed.

VI ANALYSIS

![Simulation Image](image3)

Simulation in LABView 2014
The program is written in C language. Then it is converted into hex file using KEIL software. For simulation part, I have used LABView 2014 evaluation version whose picture is shown above.

VII CONCLUSION

All the conventional systems are prepaid system. Another disadvantage is that the passenger has to carry a smart card and there is no scope of recharge at the bus. This system is postpaid system. So if anybody forgets to bring the card, he can ride the bus easily. The manual fare collection system has many issues which are overcome by our proposed system. Automated fare collection system for public transport is an innovative idea which reduces man power. It is believed that by implementation of these system problems such as underutilization of buses fleet will be reduced. So both passenger and bus station administrators will benefit from the system as Real time information are provided. The ticketing systems using RFID can be merged to solve the above mentioned problems. This project actually suggests a much more public friendly, automated system of ticketing with the use of RFID based tickets. This system is suitable for megacities like Kolkata where a large no of customers avail public transport system daily.

REFERENCES

Journal


Conference Proceedings

