

# SMART BUS FARE TICKETING SYSTEM USING RFID TECHNOLOGY AND GSM MODULE

ANTONY FERNANDAS.F<sup>1</sup>, LOKESH.S<sup>2</sup>, HARIKRISHNAN.N<sup>3</sup>, KARTHIKRAJA.M<sup>4</sup>.

Assistant Professor<sup>1</sup>, Final Year U.G Students<sup>2,3,4</sup>

Affiliation: Department of Electronics and Communication Engineering, SRM Institute of Science and Technology.

[lokeshsivakumar97@gmail.com](mailto:lokeshsivakumar97@gmail.com) [harikrishnanxyz42@gmail.com](mailto:harikrishnanxyz42@gmail.com)

## ABSTRACT:

The objective of this paper is to issue collect money and issues ticket to each passenger. It will take a lot of time as well as create manual error. To overcome this problem, a new system is proposed. In this proposed system, Smart card used here is an RFID. This is user friendly system, which will automatically identify the passenger and deduct the passenger's fare according to the distance travelled. A message will be sent to the concerned persons mobile with well security system. The security system is provided with the help of GSM modem. IR sensor is used to count the number of persons entering and exiting the bus.

**Keyword-**RFID, Network security, Ticket issuing, GSM modem.

## I. INTRODUCTION

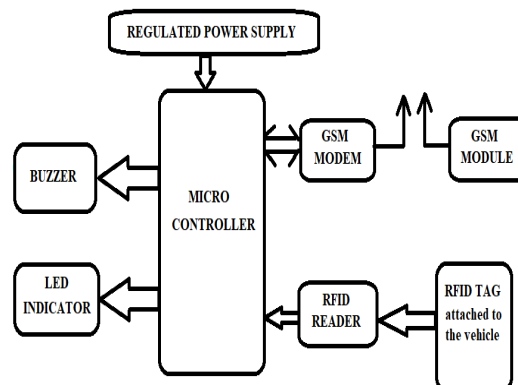
The Public transport system is a major source of income in developing countries like India. But, this public transport system faces several problems. The conductor will face various problems in issuing the tickets. But, this new system will provide the tickets automatically and deduct the fare for the distance travelled from the passenger's account. It is also used for passenger's identification. 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 main idea behind this project is to collect the fare automatically using the RFID technology and GSM modem.

## II. LITERATURE REVIEW

Literature review was carried out throughout the whole project to gain knowledge and improve the skills needed to complete this project. The main sources for this project are previous related projects, research thesis, books, journals and online tutorials. This chapter focuses on the basic concepts

and all fundamental theories which related to this project and the drawbacks of the current system. 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 main idea behind this project is to collect the fare automatically using the RFID technology and GSM modem.

## III. BLOCK DIAGRAM



RFID TAG holds information about passengers, the information is about the passenger is contact number and name. RFID READER used to reads a RFID TAG and with the help of MICROCONTROLLER programs are declared in secure manner to get a ticket. Tickets which contain information about the source and destinations and price of the distance travelled. With the help of GSM modem ticket is downloaded or displayed on mobile phones.

#### IV.EXISTING SYSTEM

In the general way, every bus is controlled by a conductor. The conductor will collect money from each passenger and issue ticket. Initially, printed papers or tokens are used as tickets. This will take more time and waste of human resource as well as energy. Even handheld ticketing machine is comparatively slow and need trained person to operate it. In existing system to overcome these difficulties, using a RFID with keyboard in which the passenger has to enter the designation where he/she is going to get down. The RFID reader will read the respective information about the passenger from the RFID tag. The respective amount is debited from the passenger account with the help of the RFID tag. But the security system is poor because anyone can access the RFID tag. So the implementation of ticketing system with well addition of application of GSM modem is introduced to secure RFID tag.

#### V.PROPOSED SYSTEM

##### 1. One time password:

A one-time password (OTP) is a password which is usable and valid for only one login requirement or transaction. The number of shortcomings is avoided by OTPs which are associated with familiar known-as static passwords. The hackers are not able to replay attacks because the most important shortcoming is addressed by OTPs and it is vulnerable comparing to static passwords. The captured old OTP will be no longer valid when you have used it already to log into your account or make a transaction so potential hackers cannot abuse it. Because OTPs are difficult for most of people to memorize so they require more advance technology to get this done.

##### 2. RFID Based Automatic Bus Ticketing:

In near a future public transport bus system with advanced technologies like Radio Frequency Identification Device (RFID). The smart card has

the passenger details and account balance that is credited at the time of card issue, if the account balance reaches the minimum fixed balance it is intimated to the passenger by message then the amount is credited again. The RFID reader system is fixed in the public bus stand. When the passengers enter into public transport the RFID reader detects the smart card and the current location of the travel (i.e.) source is detected using number of bus stops at bus stand (number of bus stops is counted using IR sensor). Every destination of the route is displayed in the LCD display. By selecting the source to destination then the distance is calculated. The bus fare is collected using distance selecting process. After selecting the destination RFID reader require one-time password (OTP) and from passenger mobiles OTP is selected to RFID reader. A Messaging system is introduced which messages the information about the boarding point and the destination. The count on number of people travelled, peak time (rush hour) are calculated for further reference. IR sensor is used to calculate the number of passengers entering and exiting the bus. For example: If the passenger lost the smart card there is a chance of misusing the card by strangers it can be overcome through one-time password (OTP) system user can only access the smart card.

#### VI.HARDWARE DESCRIPTION

##### 1.RFID reader

Radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes. However, the RFID tag does not have to be scanned directly, nor does it require line-of-sight to a reader. The RFID tag it must be within the range of an RFID reader, which ranges from 3 to 300 feet, in order to be read. RFID technology allows several items to be quickly scanned and enables fast identification of a particular product, even when it is surrounded by several other items. RFID tags have not replaced bar codes because of their cost and the need to individually identify every item.



**2. RFID tag**

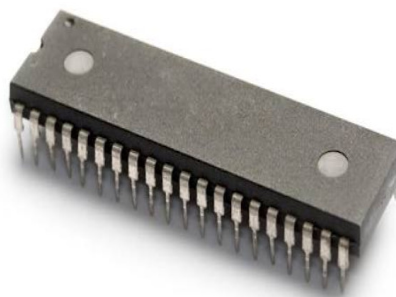
A Radio Frequency Identification Tag (RFID tag) is an electronic tag that exchanges data with a RFID reader through radio waves. Most RFID tags are made up of at least two main parts. The first is an antenna, which receives radio frequency (RF) waves. The second is an integrated circuit (IC), which is used for processing and storing data, as well as modulating and demodulating the radio waves received/sent by the antenna. A RFID tag is also known as a RFID chip. On receiving any signal from a tag it passes on that information to the data processor. These tags can be either active or passive. While the active tags have on-chip power, passive tags use the power induced by the magnetic field of the RFID reader. Thus passive tags are cheaper but with lower range (<10mts) and more sensitive to regulatory and environmental constraints, as compared to active tags. The RFID device serves the same purpose as a barcode that provide a unique identifier for the object, but it was a scanning technology rather than using radio signal.



**3. Microcontroller**

Micro-controller is heart of the system. It has number of features and its controlled over all process we can write code and load the controller

for control real time application process A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application. It contains memory, programmable input/output peripherals as well a processor. Microcontrollers are mostly designed for embedded applications and are heavily used in automatically controlled electronic devices such as cameras, cell phones, microwave ovens, washing machines etc.



The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno

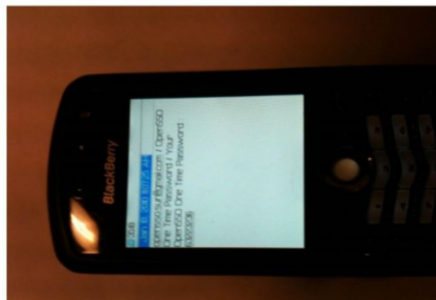
**4. GSM modem**

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

**VII.BENEFITS OF RFID IN BUSES**

- An RFID smart card-based fare collection system may reduce operation costs in the long run.
- Fine amount will never be collected.

- Tickets must be taken by the user compulsorily.
- Well secured.
- Misuse of smart card will never happen.
- Cashless money and paperless ticket.



### VIII.WORKING IMPLEMENTATION

1) Instead of doing this in the bus,the passenger could do this kind of similar process while waiting in the Bus stop.The passenger could swipe his/her RFID tag while waiting in the bus stop.



2) Every time when a passenger enters the bus, passenger needs to swipe his RFID tag/token in the RFID reader. The RFID tag has unique passenger ID, status register, balance and other blocks.

3) IR sensor is used to count the number of passengers entering and exiting. Thus avoiding the passengers commuting without tickets.

4) The card is valid, then the next step is to check the balance.

5)IF the balance is less than a threshold value, then LCD displays "Insufficient balance, please recharge your card" else the passenger is requested to enter the destination point.

6)In this proposal,we introduced a secure system to protect RFID tag. If the passenger lose the smart card,there is a chance of getting misused. Inorder to avoid this, one-time password is introduced.

7)One time password will be sent to the user's mobile and this has to be entered to get the ticket.Then the card number,the boarding point and the destination point is sent to the database and corresponding amount is deducted from the account.



### IX.FUTURE SCOPE

1) To ensure no or lesser passengers without ticket a QR based ticket system can be introduced which must be scanned before getting into and after leaving the bus.

2) Piezoelectric electric based charging system can be introduced in the bus. These sensors can be placed beneath the seat of the passenger and in case when the passenger is out of charge in his phone (He could not show his ticket to the checker). He could charge his phone with the energy obtained from it.

### X.CONCLUSION

The proposed system overcomes the manual fare collection issues. Automated fare collection system for public transport using GSM modem and smart card is an innovative idea which reduces the calculation of bus fare and man power. Advanced technology of smart card to secure is implemented in this project. This innovation has made more desirable and economical. This project "SMART BUS FARE TICKETING SYSTEM USING RFID AND GSM MODEM" is designed with the

hope that it is more economical and helpful for passengers and conductors during journey. Passengers have the idea of amount detected for each travel in public Transport. Pre-recharge the card so that the passengers have knowledge how much they are spending for Transportation.

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