

# RFID Based Automated Toll Collection System

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**Abstract**— Automated toll collection is a system where toll is collected automatically at toll booths. RFID tag is used for the identification. Every vehicle will hold a unique identification number called as RFID tag. This identification number will be assigned by RTO or traffic governing authority. The automated toll collection system will be storing the information regarding the vehicle and the vehicle owner. The information about the amount he has paid will also be stored in the system. Radio frequency is used for the identification of the code. Reader will be placed at the toll booths and whenever the vehicle will pass the toll booth the amount will be deducted automatically from his prepaid account. This is the technology where collection of payments will be possible electronically. The advantage of this system is that it is possible to determine if the vehicle is registered or not, if not then the information will be provided to the authorities of toll payment. The most important advantage of this technology is to reduce the congestion at toll booths especially during the festivals seasons as vehicles need not to be stop and pay the toll. This technology is also about the time saving. This method is also useful to curb the complaints from the vehicle owners regarding the corruption involved manually at toll booths.

**Key words:** result; RFID tag; RFID reader; prepaid account

## I. INTRODUCTION

Automated toll collection is used for collecting the toll amount at the toll booths. In this system, vehicle will hold a RFID tag which will be read by the reader at the booths. And the identification of that tag on the vehicle will be done by the radio frequency. While the RFID tag is a unique identification number which will be assigned by RTO or the governing authority. Each vehicle will have his own unique identification number and with this number the system will store all the information of the vehicle and the vehicle owner, also the information about the amount paid by the vehicle owner in advance. When the vehicle will pass through the toll booths the toll amount will be deducted from the prepaid account of that particular vehicle owner and then new balance will be updated. In case if one don't have sufficient balance in his account then negative balance will be shown in his updated balance. This system is very useful as vehicle don't have to stop in a queue because of which is assures time saving. While fuel and the money both will be saved using this system.

In automated toll collection radio frequency identification is used which is the basic power of this technology. RFID is independent of any hardware that can be used for the good performance of the system. System will be based on the toll deduction using RFID and examine how to make this system more efficient. Each vehicle arriving at toll plaza will hold a RF tag that will be detect by the RF reader at toll plaza and then automatically the amount will be deducted from the prepaid account. Earlier the toll payment system was manually and vehicle owners used to stop and pay the cash to cross the toll nakas. Manual

process has disadvantages as it is time consuming and drivers has to wait in a row for very long time. This system is useful for both drivers as well as for the toll operators. Automated toll collection system uses the radio frequency identification technology which is very fast process and give away the best results. RFID is usually being used for the identification of people or the objects as the technology utilises the radio waves. RFID technology was introduced by Harry Stockman in 1948; it has been implemented in various applications such as library management, theft prevention, attendance system, warehouse management and so on. As RFID is used for the tracing or tracking or identifying the objects. RFID system consists of the transponder, reader, antenna and a host computer. Transponder is a microchip known to be tag. This tag is of two types, either active tag or passive tag. This microchip contains the memory and logical circuits to receive the data and send them back. The reader contains a decoder and a radio frequency module. It could be a portable handheld device.



Fig. 1:

## II. TECHNOLOGY USED

### A. What is RFID

For the understanding purpose of RFID let us look at the similar technology to which we are already familiar with which is known as the Barcode. The basic need of the barcode is the line of sight. RFID readers can read the RFID tags which are in the unique direction i.e. 360 degree. The major difference between RFID barcode is there are obstacles in between them. Also Barcode read one tag at a time and RFID can read the multiple tags at a time. The information in the barcode cannot be changed, Because barcode tags are paper based tags and cannot be overwritten. On the other hand RFID tags are electronic that store the information. Information save in this RFID are of two types one is updated and other is locked (this information is not allowed to update) the type of information is based on application usage. RFID methods utilize radio waves. RFID consist of three components are : RFID tag or smart label:



Fig. 2:

Fig. 3:

### B. Antenna

RFID reader is also called interrogator. An integrated circuit and an antenna is used to transfer data to interrogator in RFID tags. Reader convert radio waves to usable data. Information that is collected from the tag is transfer to host computer system through communication interface. Electronic Product Code: (EPC) is a universal identifier which has unique identity for every physical object. Object can be anywhere and it has identity all the time.

### III. SYSTEM ANALYSIS

-Major requirement is to obtain identifying information, through an RFID channel, RFID readers communicates with tags. Minor requirements are databases, RFID database with tags identifying data with records. Normal requirements are reader and RFID tag.

#### A. Requirements

Hardware requirements used are RFID tag ,RFID reader and host computer .Software requirements are operating systems in windows XP or windows-7, Languages used is C# and .NET and database in SQL SERVER 2008.

#### B. Functional Analysis

##### 1) Registration

While registration vehicle owner has to provide his/her basic details, an account will be created pertaining to the owner. Owner should recharge his account with certain amount. The vehicle information is also necessary to create an account. Every registration to a vehicle issues a RFID tag then and then only the registration will be successful .Second part is the management of toll amounts for every different vehicles coming to the tollbooths. The toll amount will be managed as every different vehicle will be charged different amount to deduct directly from the prepaid account.

##### 2) Tracking

The RFID reader will be placed beneath the toll area so as the vehicle approaches to the toll gate the RFID tag on the vehicle will be read by RFID reader and the amount will be deducted automatically from the account. The message is send to the owner assuring the deduction of amount from his/her account.

##### 3) Recharge

The accounts of each and every vehicle owner will be managed as such account balance can be recharged whenever the balance is low. For using this functionality owner id should be entered first.

##### 4) Complaint

Complaint page will also be available so as to loge any complaint regarding the theft of vehicle. The vehicle details

and the RFID tag number which is of 12 digits should be entered and this will help identifying stolen vehicle at the tollbooths.

### C. Behavior Analysis

#### 1) Performance

Maintenance is when software can be restored within a specified period of time. Extensible is when new capabilities can be added to this software.

### IV. CONCLUSION

In today's time of increasing traffic on the road results the jungle of traffic on the road making life miserable for the people. That is why, what we need is the management of toll collection in a controlled process to avoid the jungle of traffic on the road. It is very challenging to collect toll manually, poor management at the toll plaza results into great loss. Now using RFID technology makes toll collection very easy as vehicle need not to stop and pay toll by their hand. RFID is nothing but a technology which offers various features to vehicle owner. RFID mechanism is very faster than existing technology used for toll collection. It generates better market intelligence and lower the cost and increases revenue generation.

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