

# RFID BASED TOLL PLAZA SYSTEM

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Abstract- RFID based toll plaza system is the solution to the manual toll collection method. This method gets information about the vehicle passing through the toll gate and deducts toll tax from the owner's account. This can allow the vehicle to move straight without stopping on tollgates. This reduces traffic on highways where streams of traffic increased and causes traffic jams. This leads to a convenient way for the tollgate transaction and reduces waiting time, fuel consumption and also pollution levels.

Keywords – Radio Frequency Identification, Radio Frequency, Graphical User Interface, Liquid Crystal Display, Global System for Mobile communication

## I. INTRODUCTION

There are many toll booths on highways and hundreds and thousands of vehicle pass through a single toll gates every hour. If toll taxes are manually collected then it takes lots of time, the vehicles have to form a queue and wait for long time to cross the toll plaza. Since people are running busy, they are eagerly waiting for their turn and reach their destination on time. The fact is that they need to wait in a line to pass through a toll gate, involves the process of queuing in a line, stopping at toll gate, taking ticket, paying and then passing through the gate. The entire process is time consuming. There is also a waste of time and fuel during the waiting process. Hence, there is a need to develop a system that would help to reduce the complexity of the process. There are many people who developed such systems where vehicles could just pass through the toll booths without stopping. Here drivers will not wait for paying in cash or to get a token from the toll manager to cross the toll plaza. This paper contains one such system that provides a convenient way for the vehicles on highways. This system is based on RFID technology which is able to tell if the vehicle is registered in a toll payment system, by matching the unique ID for each vehicle recorded in the system with the unique code stuck to the windshield of the vehicle. When the vehicle pass through the plaza the respective amount from the owner's bank account is deducted. This entire process will be done before the vehicle reaches the toll plaza and automatically opens the gate allowing the vehicles to pass. If there is no unique code on the vehicles or if the vehicle is not registered then they need to wait in queue and pay tax manually. The advantage of this technology is to reduce the congestion in toll plazas and also inconveniences regarding manual payments. RFID (radio frequency identification) is a technology which uses radio frequencies to uniquely identify objects remotely. There are different types of RFID all over the world. RFID consists of two tags called as active and passive

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tags. It also consists of reader/writer, antenna and computer host. Active tag owns power supply and thus it has longer reading range. A passive tag does not have power supply and it has shorter reading range and it uses external power to operate. RFID reader is known as interrogator. This is placed at toll gate where vehicles are passed. RFID reader has an RF module and which acts as transmitter and receiver of radio frequency signals. RFID reader generates the signal to receive the data from tag. This received signal send to computer which contain GUI(Graphical User Interface) and the database of all the users. The ID number from the tag checks with data in database and then deducts toll tax. The Microcontroller and computer system connected together such that this microcontroller displays the deposits on LCD and opens the gate.

## II. Proposed Algorithm

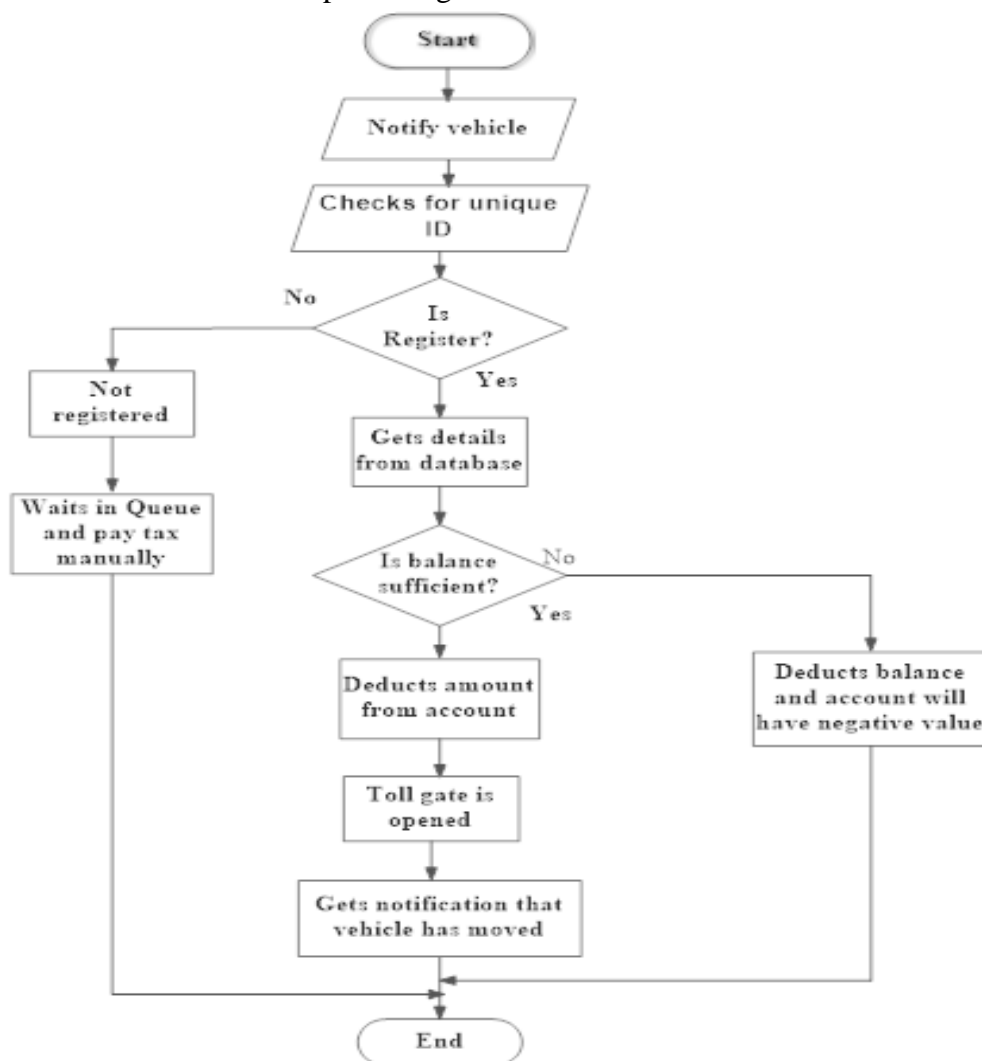


Figure 1: Proposed Algorithm

This system starts to work when it notifies a vehicle approaching towards toll plaza. As soon as vehicle reaches to toll gate it checks for the unique ID stuck to the windshield of the vehicle. If it finds the unique code on the windshield of the vehicle then it checks if that unique ID is registered or not. If it is registered then gets the information about the vehicle. Then it checks if the balance in the account is sufficient for the proper transaction to happen or not. If it has sufficient balance then amount will be deducted from the motorist account. If there is insufficient balance, even then amount will be deducted and account will have a negative value. But toll gate will be opened and no where vehicle will stop. But, if the vehicle is not registered then the vehicle has to wait in a queue for minutes or hours depending on traffic conditions. When the vehicle reaches the gate, Motorists has to pay amount and take ticket manually. And after the payment of toll tax the toll gate staff will open the gate for the vehicles to go.

### III. EXPERIMENT AND RESULT

R. M. Hushangabade, S.V. Dhopte [8] proposed that the system has great influence on transport industry. It keeps track of transportation of goods from point to point through toll plaza. The RFID based toll gate system designed in such a way that it could automatically detect the unique ID that is struck on the windshield of the vehicles and matches it with the code in the database. After that, it bills for the particular vehicle and deducts from the accounts. As this system deducts the amount, it automatically informs the account holder of that vehicle. These were the highlighting points in the paper, among other objectives also achieved which include tracking of the vehicles and remote database connection.

Siuli Roy, Somprakash Bandyopadhyay, Munmun Das, Suvadip Batabyal, Sankhadeep Pal proposed to design an intelligent and fully automatic system that will reduce the congestion on the highways and manage the traffic on the highways to ensure traffic flow in ease with the use of Active RFID devices. Khalid Al-Khateeb, Jaiz A. Y. Johari proposed that RFID based toll plaza system avoids problems that usually arise with manually toll tax collection systems.

S. Nandhini, P. Premkumar [9] proposed that the automatic toll tax payment system automatically deducts the amount from the balance in the account holder's (motorists) account and the amount transaction information i.e.... the information about the deducted amount sends through the GSM modem technology to the given cell phone number. It is one of the technology for expressway network automatic toll collection solution. This paper gives information about the RFID based toll collection which prevents people from heavy traffic and saves time. Thereby enabling a more efficient toll collection by reducing traffic and also eliminating possible human errors.

Venkatesh Suvarna and Jeet Patalia [1] explained one among the automated toll collection system which is used to collect the toll tax automatically using RFID technology.

Saurabh Narkar, Ankit Hendre, Sunil Redekar, Pranay Targe [4] explained that RFID based toll gate system gives a solution for manual toll collection employed at toll gates and also since time and efficiency are greater priority in these days, automated toll plaza system is of greater help these days.

Ganesh K. Andurkar, Vidya R. Ramteke [2] explained that RFID based technology in this RFID system uses RFID tag and RFID reader which collects all information and automatically debits the toll amount which reduces the human error and traffic congestion. They also analyzed that this is applicable to environment such as traffic jam, congestion in toll areas which is beneficial for both toll authorities and toll customers.

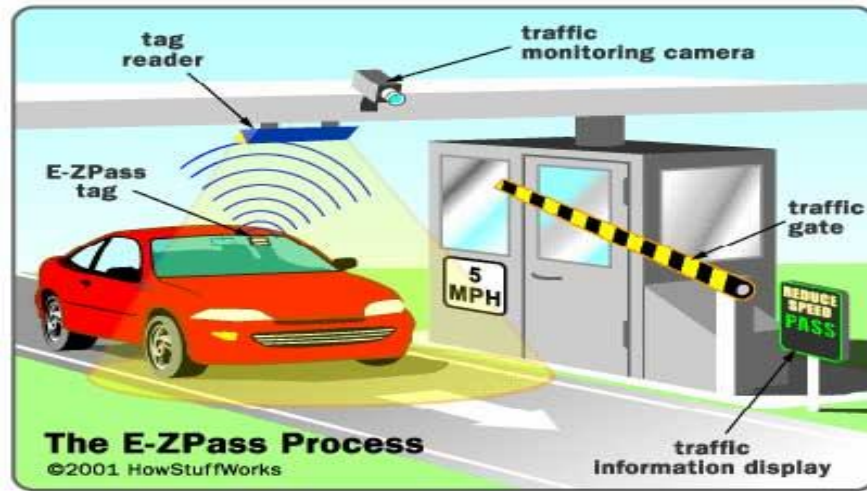


Figure 2: RFID based Toll gate system

#### IV.CONCLUSION

By doing this automatic toll tax collection based on RFID technology we can have the best solution over traffic jam and time waste. Using this, we can make the toll collection system more efficient. This method is also reduces the man power required to collection of toll tax. The RFID technology is the best technology among all automated technology. This system mainly focused upon research and development work for toll tax collection at toll gate on highway with help of RFID technologies. It has very welltracking capacity than existing system. RFID will not replace bar code, but it will offer various features. It provides features like efficient method to store database and analyze information, collect toll tax, manage them.It replaces the manual entry data system and inspires new technology. This system is designed just to give solution to all traffic and toll plaza related problems. Motorists can also know the total amount spent on new road and the validity of toll plaza using a large LCD (Liquid Crystal Display) screen.

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