



# AUTOMATIC TOLL TAX SYSTEM

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## ABSTRACT

The paper refers the Automated Toll Tax System used for collecting tax automatically. In this we do the identification with the help of radio frequency. A vehicle will hold an RFID tag. This tag is nothing but unique identification number assigned. This will be assigned by RTO or traffic governing authority. In accordance with this number we will store, all basic information as well as the amount he has paid in advance for the TOLL collection. Reader will be strategically placed at toll collection center. Whenever the vehicles passes the toll tax, the tax amount will be deducted from his prepaid balance. New balance will be updated. Incase if one has insufficient balance, his updated balance will be negative one. To tackle this problem, we are alarming a sound, which will alert the authority that this vehicle doesn't have sufficient balance and that particular vehicle can be trapped. As vehicles don't have to stop in a queue, it assures time saving, fuel conservation and also contributing in saving of money. Here a large database of Toll Tax System is maintained. This is the database from which the RTO number of the vehicle is identified. Here for the automatic transaction there is a RTO account number for every person. This is the account from which the toll tax is deducted. This account is only used for payment of toll tax.

**Keywords:** - Automatic Toll Tax System (ATTS), Radio Frequency Identity (RFID), Automatic Transaction

## I. INTRODUCTION

In the fast paced life, Toll Tax System on the highways are supervised and operated by human assistance. On most of the Toll Tax Center, you will find queues. It is time consuming and also requires human assistance. The main objective of this project is to make Automatic Toll Tax System which reduces the manual assistance, deliver secure and time efficient solution for the busy roads. Automatic Toll Tax System maintains the data base of the vehicles. By entering the data of lost/Stolen vehicles, these vehicles can be tracked through the system. Automatic Toll Tax System does not allow unregistered or lost vehicles<sup>[2]</sup>.

Considering the present toll collection system where each vehicle has to stop and pay taxes. Suppose the manual toll collection system is very efficient then for one vehicle to stop and pay taxes total time taken is 60 seconds. And suppose 100 vehicles cross the toll plaza. Then, time taken by 1 vehicle with 60 second average stop in a month is:  $60 \times 30 = 1800$  seconds Yearly total time taken =  $1800 \times 12 = 21600$  seconds = 6.0 hours On average each vehicle that passes through the toll plaza has to wait 6.0 hours in engine start condition yearly.

The figure is staggering if on an average we take 100 vehicles pass through the toll plaza each day, then yearly 36000 vehicles pass through the toll plaza. And each year 36000 vehicles just stand still for 6.0 hours in engine start condition thereby aiding pollution and wasting fuel and

money. This study is if the system is very efficient but what if the vehicle has to wait for 5 minutes? This is a figure considering one toll plaza. If considering 50 toll systems the above figure will drastically increase and the wastage of fuel, money will increase and pollution will also increase<sup>[4]</sup>. In order to reduce our time, money and consumption of fuel this project is designed. Because this is efficient and definitely reduce all of these factors. Automatic Toll Tax System using microwave technology is an element of Intelligent Transport Systems (ITS) that allows for non-stop toll collection and traffic monitoring. It is to uniquely identify each vehicle, electronically collect the toll, and provide general vehicle/traffic monitoring and data collection. New technologies and infrastructures provide the necessary capabilities for future applications such as incident management, alternate route guidance, and travel demand management. Properly implemented, system can reduce congestion, increase operating efficiency, improve travel time, reduce pollution, and improve safety of the roadway facility and surrounding corridors. All automatic toll tax systems using microwave technology all over the world have the same structure, which utilizes vehicles equipped with transponders (electronic tags), toll and control gantries, in-road/roadside detection and classification sensors, computerized system (hardware and software) and wireless communication, as well as enforcement technologies.

## II. AUTOMATIC TOLL TAX SYSTEM

The presence of the car is detected with the help of the Infrared sensor. All the cars have to do is registration for the Automatic Toll Tax System. Registered car has RTO number as a identity. The sensor detects the identity. This identity is compared with the database of the Automatic Toll Tax System. If the identity matches with the data base, then vehicle is allowed to pass through the barrier and necessary toll tax amount (depending on the category of the vehicle) is deducted from the amount of the vehicle. If database do not contain the vehicle data, then vehicle can be registered. Database also check for the lost Vehicles information, if the vehicle is found to be lost/stolen it is not allowed to pass through the Toll Tax barrier. Automatic Toll Tax System allows recharge of the account, if the balance is lower than some threshold; driver is notified for the recharge of the account. The balance amount is also displayed on the LCD Display. The whole idea is to make secure, automatic, failsafe Automatic Toll Tax System<sup>[1]</sup>.

The simplest way to pay the automatic toll is to register company and vehicles with the toll tax database system. A registered user can have an On-Board Unit installed and participate in automatic log-on and use all possible means paying the toll (credit account, or credit card). Immediately after registering into the database, you will receive a personal user account number and a master PIN number for security. After vehicle registration, we will send you a vehicle card for each truck, containing the most important information about the vehicle.

System has control gates equipped with IR detection equipment and high resolution cameras able to pick out trucks via profiling. Toll enforcement and the punishment of violations are the responsibility of the Road Transport Inspection. The RTI has provided with the technology needed for an effective enforcement system so that RTI can enforce correct booking of the toll, thereby ensuring that all toll payers are treated equally. With the aid of this system, RTI can determine if a vehicle is has an obligation to pay toll and if it has met this obligation fully, partially, or not at all.

The control system distinguishes between automatic enforcement through control gates, enforcement by stationary and mobile teams, and company-level enforcement. This combination guarantees comprehensive, continuous enforcement of the requirement to pay toll and allows the control system to be constantly adjusted to meet prevailing circumstances.

## III. SYSTEM FEATURES

Whenever the matter of Integration of systems comes to mind, we think of a system having the following important features viz.

1. Accuracy: All the functionally bonded logical dependencies must be integrated.
2. Efficiency: The whole system should work under all circumstances and on a long run it should work efficiently irrespective of their proprietary format.
3. Cost Effectiveness: As our software do not require any special software for implementation hence is less costly as compared to other existing system.
4. Any Prerequisite for the use: As the existing systems are not altered, and integration is done at the background hence there is no need for any training<sup>[5]</sup>.

## IV. ADVANTAGES

1. Very efficient saving of time.
2. Speedy transport.
3. Less congestion on the roadways.
4. Comparatively less maintenance cost.
5. Reduce auto emissions.
6. Reduce wait time at toll booths.
7. Increase fuel economy.
8. Increases highway capacity.
9. Processes 250 – 300% more vehicles per lane, reducing delays and traffic congestion.

## V. LIMITATION

1. The only limitation of ATTS is that is unable to detect whether the vehicle is loaded or empty and if it is loaded then what is the weight of goods. To overcome this limitation we have to make separate lane for light vehicles as well as for heavy vehicles<sup>[5]</sup>.
2. A customer's account can be subjected to hackers.
3. Job loss- attendants replaced with automatic tolls.
4. There are Undetected Incorrect Reads – referring to the incorrect read of a tag that the registration hardware or software does not catch. This scenario constitutes either a “free ride” for the motorist, or an undeserved fine for failure to pay .

## VI. RESULT ANALYSIS

- I. These systems saves the 60 seconds of the every vehicle wasted during the pay of manual toll tax.
- II. On an average every vehicle engine are in start condition for 6.0 hours in a year.
- III. Definitely this system saves the time of the vehicle wastage at the toll tax.

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IV. Also these systems save the fuel consumption of the vehicle. On an approx about two liters of fuel per vehicle should be saves from wastage in a year.

V. Definitely it will save the money as our fuel would be saved.

VI. Also the environment pollution should be decreased<sup>[6]</sup>.

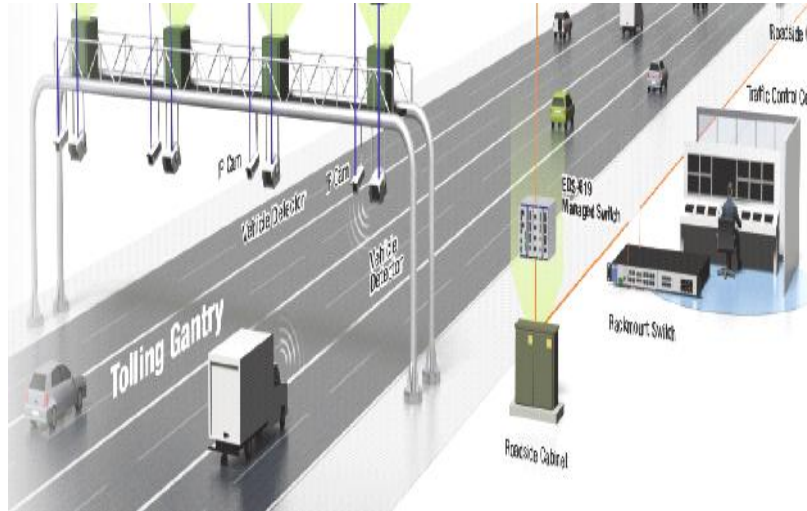


Figure 6.1: ATTS Demonstration

Table 6.1 Comparative Analysis

Manual Toll Tax System	Automatic Toll Tax System
1. Time Consuming i.e. 60 second by every vehicle during paying of toll tax.	1. Saves time as the toll tax automatically paid.
2. On average 6.0 hours every vehicle engine are in start condition in a year.	2. No such situation occurs.
3. A lot of fuel consumption definitely.	3. No fuel consumption occurs.
4. Wastage of money.	4. No wastage of money.
5. Environmental pollution should be increased.	5. Environmental pollution should be decreased

## VII. CONCLUSION

RFID is not replacement of Bar code but it is a technology offering various features. RFID offers highly reliable data collection in harsh environments. RFID technology can provide new capabilities as well as an efficient method to collect, manage, disseminate, store, and analyze information It not only eliminates manual data entry but also inspires new automation solutions. It fundamentally changes how processes are managed and how businesses operate. RFID's attributes provide greater automated tracking capability than existing technologies, and thus create the opportunity to reduce abhor, improve inventory management and generate better market intelligence, leading to lower operational costs and increased revenue generation<sup>[2]</sup>.

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