

# Smart Toll and Penalty Collection System

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**Abstract** - Developing countries like India need a significant improvement in infrastructure such as Roads or Highways. Construction of these highways is a costly affair, which can't be invested by the government alone. Normally Public private partnerships are made to construct such a huge projects. The money spent on these projects can be regained by collecting toll from the passengers who use the roads. The toll collection system, especially in India faces some problems such as long queue lines, escaping from toll plazas etc. These systems can service only 300 vehicles per hour, and if more than that number of vehicles arrives at that plaza, server traffic jams may occur[7]. With the increase in the number of vehicles on road, there has been a marked increase in the number of crimes involving vehicle theft. In spite of several stringent laws being in place and security measures taken by car manufacturers, thieves still find a way to remain one step ahead and vehicle theft is still among one of the most reported crimes worldwide. Due to the expensive nature of motor vehicles, there is ample incentive for petty thieves to attempt thefts. To solve both problems we propose QR Code base toll collection system. QR Code is generated at the time of registration of vehicle in our proposed system. On toll collection booth we collect toll as well as identify vehicle is stolen or not. Second module is to give easy work to traffic police to collect penalty through smart application.

**Index Terms** - Dynamic pricing; dynamic shuttle; dynamic traffics; Mobility on Demand (MoD); transitive control; urban mobility, QR Code, Penalty collection, toll plaza, etc.

## I. INTRODUCTION

If you're driving a long distance and are trying to get there as quickly as possible, you will probably travel along highways and interstates that allow you to travel faster and have fewer, if any stops. Of course, certain types of roads have occasional stops where you have to pay money to travel on the road. These types of roads are called toll roads. Sometimes they also go by other names, such as toll-way. To travel on a toll road, you have to pay a fee or penalty called a toll. Sometimes you have to stop every so often to pay additional tolls to keep traveling on the toll road. Most roads are built with local, state or national government money raised from taxes. Tolls are like a tax that applies only to the users of the toll road. Toll roads allow new roads to be built and maintained without raising taxes on the general public. A toll road doesn't always stay a toll road forever, though. Sometimes tolls are removed on roads once the cost of construction has been recovered from the tolls collected.

You'll know you're on a toll road when you encounter a toll plaza. A toll plaza is a gated area where you have to slow down or stop to pay a toll to continue travelling on the road. There are usually many available lanes with toll booths to keep traffic moving as quickly as possible. Some lanes may have people working the toll booths, so that you can pay with change or cash. These lanes are getting slower and slower day by day because number of vehicle gets increase rapidly. To solve this problem in this system use QR Code. QR is short for Quick Response Codes. They are used to take a piece of information from a transitory media and put it in to your cell phone. You may soon see QR Codes in a magazine advert, on a billboard, a web page or even on someone's t- shirt. Once it is in your cell phone, it may give you details about that business (allowing users to search for nearby locations), or details about the person wearing the t-shirt, show you a URL which you can click to see a trailer for a movie, or it may give you a coupon which you can use in a local outlet. The reason why they are more useful than a standard barcode is that they can store (and digitally present) much more data, including URL links, geo-coordinates, and text. In our project we are going to use QR Code to store all information of vehicle as well as vehicle owner. QR Code will contain vehicle owner name, address, mobile number, email id, owner driving licenses number, vehicle number, vehicle type, user type like pass holder/ non pass holder, etc. Toll collector and traffic police will scan the QR Code to vehicle authentication and toll collection as well as penalty collection.

## II. OVERVIEW OF SYSTEM

### 1. Problem Statement:

The most common approach for collecting tolls was to have the driver stop and pay a toll collector sitting in a tollbooth. A manual lane can process approximately 100 vehicles per hour. So there is multiple lanes on toll booth. These increase the labour cost, fuel consumption, required time, financial loss. To find the stolen vehicle police need to search separately. Hence we proposed a system "Smart Toll Collection and Penalty Collection System"

### 2.Goals & Objectives:

- Develop effective and fast toll collection system.
- Effective in term of, it eliminate financial leakage.
- Fast means toll collector just scan QR-Code to identification of vehicle and toll collection.

- Collection of toll and vehicle identification is done at the same time because of this time delay get eliminate.
- System maintain stolen vehicle database. Every single vehicle cross check with this database.
- To detect stolen vehicle easily.
- To provide easy and better way to toll collection system.
- To avoid paperless work, time consumption, cashless work.
- To reduce time at tollbooth and traffic police.
- To reduce work of traffic police and easily collect penalty without any hardware device.

III. LITERATURE SURVEY

“Automated toll collection system using GPS and GPRS”[7]. In this paper they suggests proposing to create geo-fences using GPS by giving latitude and longitude of the corner of the toll plaza. By comparing the position of the vehicle and toll plaza the owner of the vehicle can be charged from the account.

“Automated fault detection inviolation enforcement cameras within Electronic Toll Collection systems”[9]. Electronic Toll Collection facilities offer travelers the ability to pay toll electronically, most commonly via Radio Frequency Identification (RFID) transponders placed within the vehicle. Algorithmic tools that can be used to automatically review images to detect any potential camera faults, thus, reduce human workload and increase maintenance efficiency. Wherever possible, use no-reference or reduced-reference approaches for fault detection.

“Automated toll collection with complex security system”[8]. The paper is concerned with automated toll collection system using the active RFID tags; vehicles are made to pass through a sensor system that is embedded on the highway just before the tollgate. The system will electronically classify the vehicle and calculate the exact amount to be paid by the vehicle owner, ensuring no pilferage of the toll amount. Vehicle owners, who frequently pass through tollgates, are required to have a prepaid smartcard, which will deduce the appropriate amount, by using an automated smart card reader.

“Secured short time automated toll fee collection for private group transportation”[10]. toll fee. Using the retrieved vehicular id the details of the owner and linked bank accounts are collected from database. The toll fee is deduced from bank account if amount is available else manually paid. If more than one vehicle belonging to a particular organization is present nearby toll then these vehicles are clustered to reduce the number of transactions made. One vehicle is selected as a cluster head and this vehicle represents all the cluster members and an ID based multi signature scheme is used for authentication.

Number plate recognition is used increasingly now a days for automatic toll collection, secure stop or even slow down to pay the toll. The application utilizes image processing and pattern recognition methods for Open Road Tolling. Open Road Tolling (ORT) using number

plate recognition. The Number Plate Recognition (NPR) techniques consist of two modules: histogram based number plate localization and number plate recognition using template matching. This is an being faster[11].

“Automated Toll Collection System Using RFID” In this 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 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 vehicle passes the toll naka, 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[6].

IV. PROPOSED SYSTEM

In this system contain combination of toll collection and vehicle identification system. User registers on system, after registration QR code get generated. QR code contains all the information about vehicle and owner. On tollbooth, toll collector will scan QR code and identify user and vehicle. If user is regular user then deduct amount according to one way or two way travelling toll charges. At the same time we identify vehicle is stolen vehicle or not. Final module is traffic police in that existing system there is and separate hardware device to check details through number plate and collect penalty. Hence in this system to generate secure QR Code in that information stored in encrypted format and at traffic police scan QR Code through his/her mobile phone and check details and collect penalty.

V. SYSTEM ARCHITECTURE

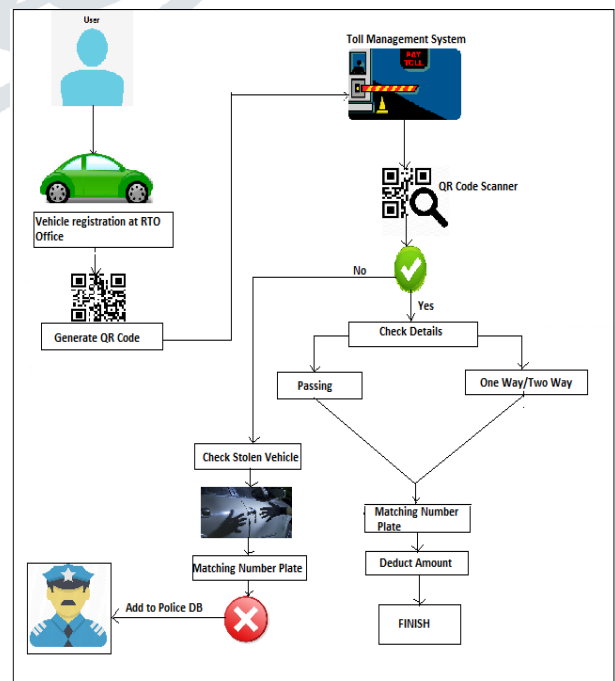


FIG: SYSTEM ARCHITECTURE

## VI. CONCLUSION AND FUTURE SCOPE

QR-Code is effective way to store information also effective way to handle stored data securely. Propose effective and transparent toll collection system. Toll collector just need to scan QR-Code; all other operations are done automatically. Automation toll collection reduces the time required for toll collection. Also propose system is capable of identify vehicle is stolen or not and penalty collection. This feature will track stolen vehicle. Finally at traffic police can scan QR Code and collect penalty through his/her android phone. As of in future we are plan to make this system more accurate. Also we will be probably implement facility of post charging user account.

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