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# A Review on Automated Toll System Using Number Plate Detection

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**Abstract:** Number Plate Detection using Image Processing is used for Toll System Management. At Present day Time, efficiency, fuel and pollution are a matter of priority. Image processing technology is used to overcome the important issues of vehicle time consumption and congestion. In this system image of the number plate of vehicle will be captured as an input. Using this image (or video) the number plate is detected and further process continues. Various modules of this system are RTO admin, Super admin, Toll admin, Police admin and the general public. Super admin roll is to register toll centers at various locations using User name and password. These credentials are sent to the toll admin, using which he logs in to the account. Based on vehicle type Toll admin module is used for the calculation purpose of toll deduction. The Regional Transport Authority (RTO) enrolls the vehicle information and links it with the vehicle number plate. The number plate is detected and the notification is send to the Police admin module in case of any stolen vehicle passes through the toll collection center. Toll deduction happens through e-wallet assigned to the respective number plate of the vehicle that belongs to the owners' account. The information of daily toll collection can be obtained and send to the Government for verification purpose.

**KEYWORDS:** Detection, e-wallet, Congestion, Verification.

### I. INTRODUCTION

At the present time vehicles are appropriate essential element of Traffic control structure at toll. This system is defined automated toll collection technique where collection of tolls can be done electronically with the help of image processing technique where we can detect the vehicle number plate and there by deduct the toll amount. Automated number plate recognition is image processing technique in which vehicles owner are recognizing by using only their number plates. Automatic number plate recognition plays an imperative role in automatic monitoring of toll systems [1]. The vehicles number plate will be detected using a camera that will be captured at the toll checkpoint. An image processing technique will be put into effect to extract the registration number from the number plate of the car, with the help of this extraction the vehicles owner details will get extracted from the database and respective amount will be deducted, if vehicle owner acquires smart card even that information will get extracted from the database because that person has already paid the amount of toll in advance for a respective duration and toll amount will not be collected from them. In order to overcome the major issues of vehicle congestion and time consumption, image processing technology is used [2-3]. In this system video will be passed as an input to the camera or can be browsed from any of the location. Using this video the number plate is detected and further process get continues. Different modules of this system are Super admin, RTO admin, Police admin, Toll admin and the general public. With username and password, the Super admin register toll centres at various locations. Through e-wallet, toll deduction takes place that are assigned to the concerned number plate of the vehicle that belongs to the owners' account.



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## II. RELATED WORK

There are different techniques which were implemented previously are mentioned below

### 2.1 Manual Toll collection

In existing system, a manual toll collection can process near about 400 vehicles per hour in comparison to a free flow freeway lane, with huge capacity approaching 2,000 vehicles per hour significant congestion at many of these toll plazas. There are many high costs associated with this method of payment. In India, Manual toll collection is most widely used collection method. It needs a toll collector. Depend upon the vehicle type; cash toll is received by the toll collector. The toll collector, who also provides change, also may accept and sell scrip, coupons, tickets, making an entry of the vehicle that passes from toll in the system and issuing receipt to the patron [4]. Due to manual intervention, the processing time of manual toll collection is highest.

### 2.2 NFC Based Automated Toll System

In existing system, using NFC based Automated Toll System Mobile payment method via NFC faces significant challenges for wide and fast adoption, due to the lack of supporting type infrastructure, standards and complex ecosystem of stakeholders. In this system transactional payments may easily fail as messages get lost and messages sending can be slow and it can take hours for a merchant to get receipt of toll payment. Consumers do not wish to be kept waiting more than a few seconds and it could be high cost [5].

### 2.3 RFID Based Automated Toll System

In existing system, Using RFID based Automated Toll system include difficulty in duplicating tags, installing tags on an uneasy location and requirement of power(Active Tags) to transmit information. Low frequency results in lower maximum data rate, although it is fast enough to allow multiple transmissions to increase reliability [5].

### 2.4 Automated Coin Machine for Collecting Toll

Automated Coin Machine (ACM) is used in Automatic toll collection. Coins and tokens both are accepted by operating agency. It is based on collection rate of toll. This method reduces processing and transaction time also reduces cost of operation. Transaction and processing time is more in manual toll collection method. When vehicle stops at toll booth, the operating agency accepts tokens and coins. Automatic Toll collection is easier and better as compared to manual toll collection method. Automatic toll collection system speed up the processing time but it needs some improvement. [5]

### 2.5 Electronic Toll Collection

In this method a vehicle equipped with a transponder or valid encoded data tag as it moves through a checkpoint or toll lane. Electronic Toll Collection (ETC) is a system automatically identifies that transponder or data tag. Instead of the patron having to stop to pay the toll, the ETC system then charge to a patron's account or posts a debit. [5]

ETC increases the lane throughput the reason is that the vehicles need not stop to pay at the toll booth. E-Tolls aim to eliminate the delay which occurs on toll road. All this process is done by collecting tolls electronically. The car that passes through is enrolled in the program or not that is having already is determined by ETC and then alerts are enforced for those that are not. Then it electronically debits money from the accounts of registered car owners. Hence there is no need to stop there are at toll booth. But again security is the matter of concern [6].

### 2.6 Hough Transform for Skew Detection

Hough transform is a commonly used detection method. It can detect and locate straight lines in image. It transforms binary images into Hough parametric space and detects targets by extreme point in the parameter space. To reduce the computational complexity and achieve the purpose of rapid detection the Hough transform is only applied on the weft boundary instead of all pixels. What's more, a rotation algorithm based on the image linear storage structure is also adopted to reduce the computational complexity and operation time of image skew correction [7].

### 2.7 Projection Profile Based Technique

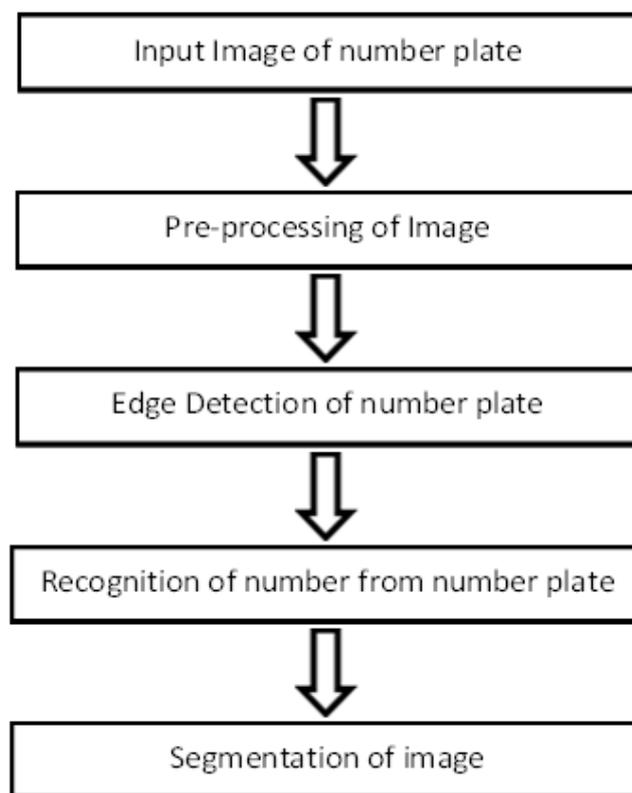
When we observed extracted sub-images separately then it can be seen that characters are separated by very few pixels of white color and generally they maintain same distance from each other whereas regions consisting full of noise do not have such kind of observation. To gain this, vertical black projection profile has been extracted on sub-images to calculate or determine high density black region [8].

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## III. ARCHITECTURE



**Figure:1 A Automated Number Plate Recognition (ANPR).**

ANPR has six imperative parts like Image Acquisition from vehicle, Pre-processing of image, Edge Detection, segmentation, feature Extraction and Recognition (Figure 1).

## IV. CONCLUSION

In this system we have discussed the image processing technique to implement the automated toll collection in order to reduce fraudulent behavior and congestion at the toll checkpoints. The proposed of the system will help in reduce the human intervention at the toll collection areas. The named automated toll collection system using Number Plate Detection by using Image Processing emerges as a convincing solution to the manual toll collection method employed at tollgates.

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