

# Survey Paper on Automated Number Plate Recognition Using Centralized Database

**Akshit<sup>1</sup>, Avantika Sharma<sup>1</sup>, Sangam Rai<sup>1</sup>, Ram Kumar Sharma<sup>2</sup>**

<sup>1</sup>Student, Computer Science & Engineering, Raj Kumar Goel Institute of Technology, Ghaziabad, India.

<sup>2</sup>Assistant Professor, Computer Science & Engineering, Raj Kumar Goel Institute of Technology, Ghaziabad, India.

Corresponding Author: akshit029903@gmail.com

**Abstract:** - Electronic toll collection mainly aims to eliminate the delays caused by current toll collection process. Currently there has been a controversy because of the time consumed on RFID manual collection of toll tax for every vehicle passing the road. The aim is to style a system which automatically identifies an approaching vehicle by capturing the vehicles number plate and perform the net toll charges for ongoing vehicles no end on toll station When the vehicle number plate is captured it's automatically processed and also the system opens the gate and a predetermined amount is automatically deducted from his or her vehicle pre-paid account.

**Key Words:** — *Automatic number plate recognition, Image Processing, e-challan.*

## I. INTRODUCTION

As the number of vehicles is rapidly increasing nowadays, the city needs to establish the effective and efficient automatic traffic system for the management of the traffic law enforcement. Automatic Number plate recognition can provide the significant role in this condition. The number plate recognition is an image processing technique to extract the image of license plate on vehicle taken by digital camera to identify the vehicles using their number plate.

The Number Plate Recognition system recognizes characters on license plate through the combination of various techniques and algorithms, including image pre-processing, object detection, character segmentation and recognition.[2] It consists of a camera which help in detecting the number plate object and processing the process and extract the characters and interpret the pixels into numerically readable characters. The ANPR system has been used for enforcement of traffic laws by including speed camera, traffic light camera, stolen car detection, and border monitoring. This technique can also be used for the building parking management and gate control.

With the rapid development of highway and the transportation facilities, people were attracted towards the advanced, efficient and accurate intelligent transportation systems (ITSs). The Number plate recognition task is quite challenging as view point changes due to movement of vehicle. It is very difficult to distinguish when vehicle bodies and licence plate have similar colour and availability of number plate in multi-style format, and the non-uniform outdoor illumination conditions during image acquisition.

Machine learning approaches can help to solve the problem in a different way. The basic idea is to make a training dataset considering of large number of number plates and develop the system which can learn from these training datasets. In other words, the machine learning uses these training datasets to infer rules automatically for detecting and recognizing number plate. Furthermore, by increasing the number of training datasets, the developed system can learn more about numbers and characters, and so improve its accuracy.

## II. EXISTING SYSTEM

The currently technology used for charges of auto at toll stations is operated in a semi-automatic system (RFID system) which employ the number of procedures to perform toll tax charges per single vehicle. RFID is that the technology which uses electromagnetic waves that have a wavelength fitted to use in radio communication. Radio frequencies range from very low frequency (VLF), which features a range of 10 to 30

Manuscript revised April 28, 2022; accepted April 29, 2022.

Date of publication May 02, 2022.

This paper available online at [www.ijprse.com](http://www.ijprse.com)

ISSN (Online): 2582-7898; SJIF: 5.59

KHz, to extremely high frequency (EHF), which features a range of 30 to 300 GHz.

Radio Frequency Identification (RFID) is an automated data capture method which makes uses of radio frequency waves so that transfer of data can occur between a reader and a movable item so it can be automatically identified. This system does the work of detecting, billing and accounting for vehicles as they undergo a toll station using RFID as the identification technology which uses a card and bar code scanner for tickets. Along with the development of vehicle transport the use of highway traffic are going to be more and more and therefore the toll tax charges sort of manual and semi-automatic will not meet demand of the charging management system and many vehicles may be blocked at entrances causing huge economic losses when it reaches a certain edge. The use of automatic vehicle number plate detection on the highway shows a great potential in solving these problems. For ETC applications, a sufficient communication time interval is important to permit for the entire transfer of all the knowledge between a roadside unit (detection components) and server while the vehicles are rapidly passing through the toll station.

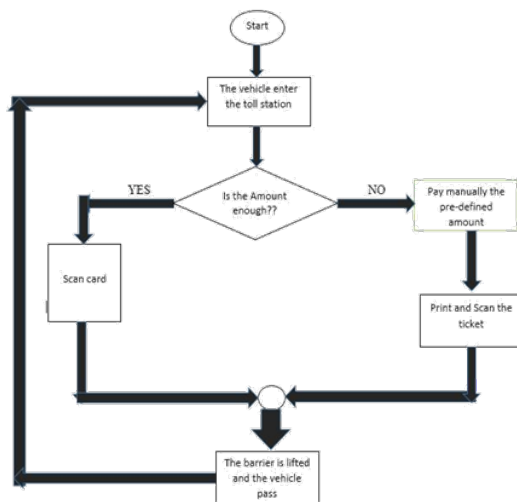


Fig.1. System flow of the Existing system

### III. OVERVIEW OF PROPOSED SYSTEM

The proposed system is an Automated Toll Collection System is just the perfect solution for the problems and shortcomings of the RFID technology in terms of toll tax collection. An Electronic Toll Collection is a kind of technology that will allows the electronic payment of tolls and it can help to determine whether a vehicle has been registered or not registered in an ETC toll payment database, if toll

payment violation occurs it will also alert the enforcers and debit the corresponding account.

Considering [4] the application of an ETC system the driver does not have to stop the vehicle to implement toll payment because an ETC system is an electronic automatism toll collection system that would be used in the highway, bridge and tunnel the use can be extended to parking lots. Its obvious advantage is not any parking toll collection and therefore the vehicle are often at a high speed throw the toll station rather than which has got to hamper before toll station and park to charge. The development of auto transport and therefore the use of highway traffic is going to be more and more and the toll form of manual and semi-automatic won't meet demand of the charging management system and many vehicles may be blocked at entrances and exits causing huge economic losses when it reaches a certain edge. The use of no parking on the highway shows an excellent potential in solving these problems.

### IV. METHODOLOGY

#### 4.1 Number Plate and their Properties

Number plate identification on material and size needed so as the camera may descry and allow the processing of signals to perform functions as the ETC system. Number plate is distributed by the following factors

##### 4.1.1 Material

Aluminium is the most generally accoutrements used to manufacture number plates because the material possesses great capacity to reflect infrared radiation hence due to its infrared glass rates make it the ideal essence for number plate manufacturing worldwide.

##### 4.1.2 Size and consistence

340 \* 180 mm, 520 \* 110 mm and 240 \* 125 mm for different vehicle designs and a consistence of 1 mm.

##### 4.1.3 Colour categorizations

Number plates are also distributed into four different colours  
*Unheroic*: – For private auto and exchanges on normal exertion.  
*White*: - This is generally applicable to business vehicles and buses especially for rental matters and passengers.

*Red*: – It displays the temporary enrolment number in white handwriting. d) Herbage-are exclusive to Electric Vehicles (EVs).

*Black*: - all tone- driven or rental vehicles (two-wheelers and four-wheelers) must bear a black number plate with unheroic handwriting.



#### 4.2 Database

The database system holding all the necessary information related to the vehicles registered to use a risk station. This includes fields like its enrolment number, the balance, quantum paid for the vehicle, details of its listed vehicle and the details of its proprietor.

#### 4.3 Phases of implementation

To seize the photo of the wide variety plate and its processing to attain the variable characters and numbers innovative cameras are particularly used sort of cameras and is completely encouraged due to the fact they're capable of lure the photo with the car on range (consciousness area) for the car in movement.[1] The detection of the wide variety plate and method the photo for Electronic Tollgate Collection (ETC) machine can be performed in each hardware and software program through the subsequent steps:

- The digital digicam is located brief distance in advance the car or truck and seize the photo of the wide variety plate constant at the car through infrared radiations controlled through digital digicam.
- As the car enters and settles withinside the discipline of the sensor (Camera). Through the infrared sensor (integrated digital digicam) experience a car and seize the wide variety plate photo of the car and method it.
- The wide variety plate is then in comparison to the legal wide variety in database to verify its validity and in the end presents sign to microcontroller to govern the device hardware.
- The incorporated ETC device gadget with software program component for the registered motors to a database permit the device to carry out the subsequent task:

Check if the car is registered or now no longer.

- Check the quantity if fulfil or now no longer.
- Perform on line debit transactions.
- Notify the Driver (owner) if car now no longer registered, quantity now no longer enough.

- The device will carry out the obligations as sign despatched from or to microprocessor to both open the tollgate or caution sign for quantity top-up or unregistered car detection.
- The device will perform again and again as motors input the sphere of sensor (Camera).

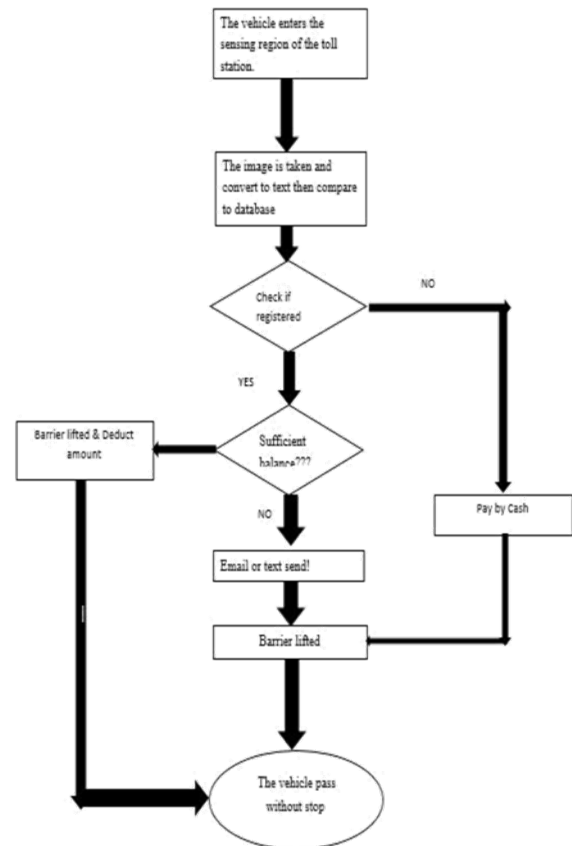


Fig.2. Flow chart of the system operation

### V. PROCESSING AND RECOGNITION PHASE

#### 5.1 Image Acquisition-Input image of number plate is captured with help of camera

##### Image Pre-processing: -

5.1.1 RGB To Gray Conversion: - Colour photo does now no longer assist to become aware of crucial edges and different features. Processing of RGB photo is complicated and it calls for greater processing time, so first we must convert coloured photo to grey scale photo.

5.1.2 Image Enhancement: - Adaptive histogram equalization is to beautify comparison of photo (grey colour photo). In this we assemble numerous histograms every for wonderful area in

photo. This is high-quality due to the fact in regular histogram, unmarried histogram is for whole photo.

Median Filtering-To do away with noise withinside the photo.

*Edge Detection:* - Edge [5] is a boundary among areas with quite wonderful grey degree properties. It detects discontinuities in depth values.

The primary step in popularity of plate is to locate plate size (rectangle), as a result we must locate fringe of square plate. Using the sobel operator, the rims in photo are highlighted. This in flip reduces quantity of statistics withinside the photo and approaches the desired statistics for similarly use.

*Morphological Image Processing:* - Structuring detail is to create output of equal size. Using dilation and through including pixels to the boundary of the item to boom the thickness of the edges. Using Shrinking operation, thinning the photo to take away inappropriate parts.

*5.1.3 Threshold:* - In this method, awesome stages are provided to pixels which might be above and under to the chosen threshold fee. To separate the item from a history photo is transformed in binary form. Gray stage threshold is an easy process. The fee of threshold (T) is chosen and in comparison, with the pixel of the photo. It additionally transforms the enter photo (K) into an output binary photo (F) that is being segmented. In worldwide threshold, the histogram of the photo is partitioned the use of an unmarried threshold fee. Threshold manner the extent of grey stage falling among baseline boundary which lies among the pixels located withinside the foreground and history.

$$F(x,y) = 1 \quad \text{If } K(x,y) \geq T \quad (1)$$

$$= 0 \quad \text{If } K(x,y) < T \quad (2)$$

$$F(x,y) = 1 \quad \text{For Image Object}$$

$$F(x,y) = 0 \quad \text{For Background Object}$$

T = Threshold.

*5.1.4 Segmentation:* - Character segmentation is a bridge among a number of plate extraction and individual reputation. In this, special characters on a number of plate location are segmented. Various motives including lighting fixtures variance, plate frames and rotation are the ones which avoid the segmentation work. A segmentation technique is likewise referred to as a boundary field analysis. By this technique, characters are assigned to related additives and those are extracted the usage of the boundary field analysis. The

segmentation system is finished upon discount of noise withinside the image.

*5.1.5 Character Recognition:* - The technique of individual reputation is finished through the usage of function extraction to extract the functions of characters and their special category techniques. A device getting to know set of rules is used for reputation of characters from the range plate.

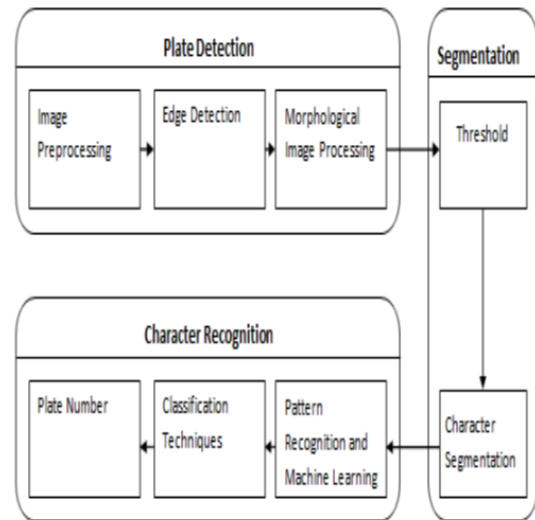


Fig.3. Image Processing Algorithm

## 5.2 Data storage phase

Vehicle record management in terms of registration, payment and online transaction needs to be stored and kept for verification and proper system operation because vehicles of different type may pass through and with different toll tax amount while neglecting Military vehicles, Police and Ambulances which are treated as toll free tax as they pass the bridge. To manage this variations and different records makes database to exist and support all the functions in record management.

## VI. CONCLUSION

Some of the challenges of this design are making the system work in risk points, each with its specified database for keeping records of the accounts for the separate vehicles. Also, the capability of the system to descry a vehicle is irrespective of the rainfall condition like inordinate rain or heat and irrespective of the area of position within a specified distance. Achievements of the design include successfully integrating the contrary modules with the microcontroller. The microcontroller is thus entering signals from the PIR Sensor and Camera

whenever it detects a unique and listed vehicle number plate. Also, the system database and the graphical stoner interface has been successfully designed. This has thus been enforced only with minor problems within the controlling the database to microcontroller periodical communication for data transmission data between them.

Some of the unborn reaches for advancements are like integrating it with network for quick response lather than keeping the whole program in a single computer also the use sensitive detectors and Camera since some plat manufacturers ignore the standard of number plate for an APR to function well.

### REFERENCES

- [1]. Hemalatha, J.; Roseline, S.A.; Geetha, S.; Kadry, S.; Damaševičius, R. An Efficient DenseNet-Based Deep Learning Model for Malware Detection. *Entropy* 2021, 23, 344.
- [2]. Subhadhira,S., Juithonglang, U., Sakulkoo, P., &Horata, P. (2014). "License plate recognition application using extreme learning machines",2014Third ICT International Student Project Conference (ICT-ISPC).
- [3]. Singh, A. K., & Roy, S. (2015). "ANPR Indian system using surveillance cameras",2015 Eighth International Conference on Contemporary Computing (IC3).
- [4]. Leticia Fernandez sanchez, cranfield university, "Automatic number plate recognition System using machine learning techniques", PHD Thesis, cranfielduniversity,2017-18.
- [5]. Rahim Panahi and Iman Gholampour "Accurate Detection and Recognition of Dirty Vehicle Plate Numbers for High-Speed Applications", *IEEE Transactions on intelligent transportation systems*, vol. 18, no. 4, april2017. *International Journal of Engineering Research & Technology (IJERT)*.
- [6]. Dhar, Prashengit and Guha, Sunanda and Biswas, Tonoy and Abedin, Md Zainal: "A System Design for License Plate Recognition by Using Edge Detection and Convolution Neural Network," *IEEE*, pp.1-4, 2018.
- [7]. A Roy and D.P Ghoshal, "Number Plate Recognition for use in different countries using an improved segmentation," in 2nd National Conference on Emerging Trends and Applications in Computer Science (NCETACS).