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"Automated Toll System for Number Plate Detection and Collection"

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Abstract: In this system named automated toll system for number plate detection and collection emerges as a convincing solution of the problem to the manual toll collection system applied at tollgates. Time, efficiency, fuel and pollution are a matter of present day. In order to remove the major issues of vehicle congestion and time consumption, image processing technology is used. In this system images and videos will be passed as an input or can be browsed from any location. Using images and videos the number plate is detected and further process .This system various modules are RTO admin, Toll admin, Police admin, Super admin and the general public. The role of the Super admin is to register toll centers at various locations using User name and Password. These credentials are sent to the toll admin, using which he login into the account. Toll admin module is basically used for the calculation purpose of toll deduction based on vehicle type. The RTO registers the vehicle information and associates it with the number plate of the vehicle. In case a stolen vehicle passes through the toll collection center, the number plate is detected and the notification is send to the Police admin module. Toll deduction takes place through e-wallet assigned to the concerned number plate of the vehicle that belongs to the owners' account. Additionally the daily toll collection information can be obtained and send to the Government for verification.

Keywords: E-wallet, Number plate detection, Toll collection, Vehicle number recognition.

Domain-The system's working domain is Image Processing. The image or video is first take as input and then match with the database this process is related with the image processing domain.

I. INTRODUCTION

This system is defined automated toll collection technique where collection of tolls can be done automatically using image processing technique where we can detect the number plate of a vehicle and there by deduct the toll amount.

The vehicle s number plate images and videos are maintained in the database, with the help of those images the image processing technique will be implemented to extract the registration number of the car from the number plate, with the help of this extraction the details of the vehicles owner will be take from the database and particular amount will be deducted, if the vehicle owner acquires a e-wallet, even that information will be take from the database because that person has already paid the toll amount in advance for a respective duration and the toll amount won't be collected from him/her. In order to overcome the biggest issues of vehicle congestion and time consumption, the e-wallet system is used.

In the proposed system video will be passed as an input or can be browsed from any location. Using this video the number plate is detected and further process continues. Various modules of this system are RTO admin, Toll admin, Police admin, Super admin and the general public. The role of the Super admin is to register toll centers at various locations using User name and password.

Toll deduction takes place through e-wallet assigned to the concerned number plate of the vehicle that belongs to the owners' account.

The main motivation of this system is to provide a base for building automatic number plate detection using image processing for toll collection at toll checkpoints. This system will help to save time as well as help to reduce congestion at toll checkpoints.

This system will also help in monitoring any fraudulent behaviour that takes place at the toll checkpoints. The proposed system will maintained the database of captured images placed at the toll checkpoint and will perform certain processes to detect the number plate of a vehicle. In this system video will be passed as an input or can be browsed from any location. Using this video the number plate is detected and further process continues.

II. PROBLEMS IN THE EXISTING SYSTEM

1. Corruption in money collection at toll booths:-
On the tollbooth corruption is occurred at the time of paying the toll tax, the toll cashier collect the correct amount of money but not give the collected count of money to toll admin at that time mostly chances of corruption.

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2. Increasing rate of stolen vehicle:-
In previous system, there is no any mechanism to detect the stolen vehicle which is pass through toll this increases the rate of stolen vehicle.

3. Vehicle congestion at toll booths:-
In the existing system, the owner pass the vehicle through the toll then the cashier was give the receipt to every owner and by this the existing system is got slow and by this lots of vehicles is get waiting in the queue and by this vehicle congestion is occur.

4. Toll deduction is time consuming:-
In the existing system, the payment of toll tax is as manual process, the toll payment is done by hand, giving cash due to the manual process the system is time consuming.

5. Manual system and Wastage of paper:-
The payment process of existing system is manual process not an automatic process and the user of the vehicle pay the toll tax by hand and the cashier provide the paper receipt as the payment acknowledgment to the user by this the paper waste is more.

6. Handling cash and carrying credit cards:-
The previous system is manual system and the payment of tax was the manual process hence a user always had to carry the cash or the credit cards for the payment of the tax.

7. Fuel consumption:-
In previous system the vehicle got congested in queues and waiting for the toll tax payment in that case many more users not turn off the vehicle by this the fuel got waste.

III. LITERATURE SURVEY

a. Automated toll booth system:-
Author name:- Rama Takbhate, Prof. S. D.Chavan
The number plate detection is done with the help of camera and process by using the image processing.

b. Number plate detection with application to electronic toll collection system:-
Author name:- Kannan Subramanian
The toll tax collection is done from the owner of the vehicle and from owners account and the deduction message is send to the owner and by this the time is save and no wastage of papers.

c. Automated toll booth and tracking system for theft vehicle:-
Author name: - S.R.Jog, S.D.Chavan, Rama Takbhate
The stolen vehicle which is by through toll plaza is find by RTO admin by this vehicle stolen rate is decreases.

d. Portable stolen vehicle detector:-
Author name: - Yun Chung Chung, Jung-Ming Wang
The stolen vehicle is detected.

IV. PROPOSED METHODOLOGY

For using the best methodology or algorithms in the proposed system following study and survey is done as follows:-

1) Automated toll booth system:-
The research paper automated toll booth system uses an algorithm i.e. Template matching algorithm from this The Indian number plates following the new format can be off lengths 8, 9 or 10. Format of the number plate is as shown below.

AA 11 BB 1111

Where AA is the two letter state code; 11 is the two digit district code; 1111 is unique license plate number and BB are the optional alphabets if the 9999 numbers are used up.

2) Number plate detection with application to electronic toll collection system:-
The above research paper uses the template matching algorithm and the gray scale image representation technique.

A. Template matching algorithm: The templates of all characters will be defined with some test points. The character will compare to that templates. The template with the maximum match point will be characterized as an image. The system is capable to recognize vehicle plate number automatically. After recoganization the plate number will be compared with the list of number plate in database. If the number plate is in the database of numbers plate then the system will allow further processing.

B. Gray scale Method: m pixel x n pixel image can be represented as matrix. Value(m, n) represent the gray scale intensity in the form of either 0 or 1 with 0=black and 1=white.

C. True color RGB: In this method image can be represented as the 3 dimensional double matrixes. Each pixel is having a red, green and blue component along with the third dimension with value (0, 1).

3) Portable stolen vehicle detector:-
For comparing the similarity between two license plates, the Chamfer distance map is utilized to define the cost of the operations. The fast Chamfer distance map calculation method uses Chamfer mask in both forward and backward passes.

4) Optimal Character Recognition (OCR):-
OCR is the mechanical or automatic conversion of images of kinds, the handwritten or printed text into machine encoded text, whether from a scanned document, a picture of a document, the scene photo or from a subtitle text superimposed on an image.

It is widely used as a form of data entry from printed paper of the data records, passport documents, invoices, bank etc.

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V. FLOW-CHART OF THE PROPOSED SYSTEM

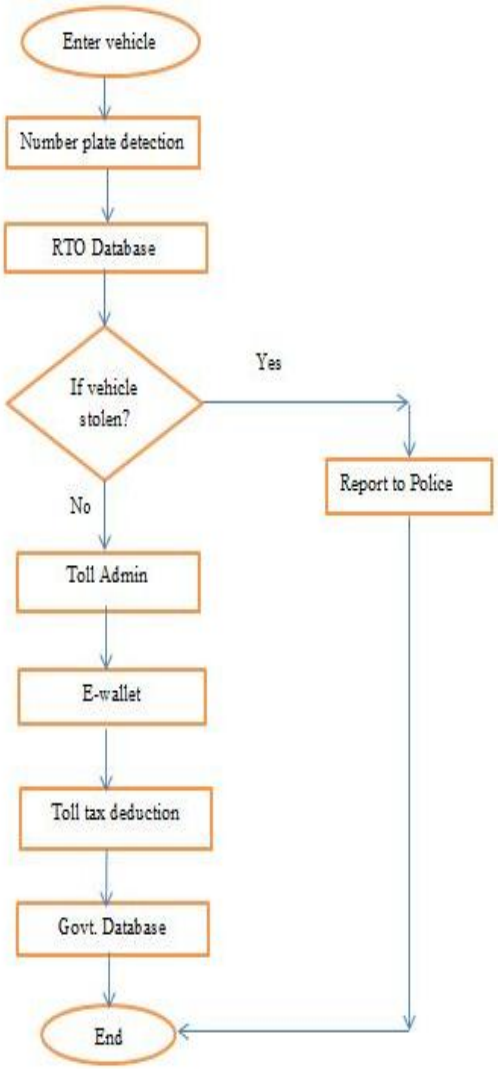

Fig. Flow-chart of Automated toll collection for number plate detection.

In the above flow-chart the flow of the system is start when the vehicle is get entered at toll booth, then number plate is detected it can be the pre-recorded video of the images or the image then that video or the image of the vehicle is compared with the stolen vehicle record. If the system will find that the vehicle is stolen vehicle then the toll admin will send the notification to the police admin that the detected vehicle is stolen vehicle. If the vehicle is not match with the record of RTO admin then the toll admin will cut the toll tax according to the vehicle type by e-wallet which is the less time consuming process and the correct collected count of money or toll tax will give to the super admin that is Government and the process is end.

VI. APPLICATIONS

1. Applicable at Highways where more traffic is created:-
The proposed system is applicable mostly at highways for the automated toll collection and for time saving.

2. Applicable at Companies and Parking areas:-
Mostly peoples regularly go at the places where traffic is more and there is the process is manual for paying the parking payment the e-wallet system is used at that place for time reduction for payment.

3. The e-wallet system is applicable at an areas where the payment is done manually:-
There are so many places in the world where the payment is done manually at that place the proposed system is applicable for payment.

4. The e-wallet system is also applicable at cinema ticket booking canters:-
Peoples always like to go at cinema halls most people's go regularly at cinema hall the peoples which goes regularly for that peoples the e-wallet will be applicable for cinema ticket cutting.

VII. CONCLUSION

The proposed system uses less cost to implement and require fewer changes to the current system. It provides the tracking system for theft vehicle which is secured and highly reliable. E-toll system can help to achieve proper traffic management, appropriate toll collection and improves security. Thus a system used as an Automated Toll collection booth, based on image processing saves the time at toll booth, minimizes the fuel consumption during the ideal condition of the vehicle. In turn we can save the environment from emission of extra carbon monoxide (co2). Hence we can save our country.

Also it serves in providing the detecting system for theft vehicle which is secured and highly reliable can be achieved. It can be used to overcome all drawbacks with the current system such as time and human efforts.

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