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TOLL SYSTEM USING AUTOMATIC NUMBER PLATE DETECTION

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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.

INTRODUCTION

1) 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

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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 maintain 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.

RELATED STUDY

Automatic License Plate Recognition
A Comparative Study Automobiles are an necessary part of our present life. Generally, license plates are used for identification of every vehicle. Automatic License Plate Recognition

(ALPR) is the process of automatically Capturing number plate and extracting license plate information. Access control systems, Parking entrance control, toll road payment collection, and border crossing security are some of the many applications in this area where, ALPR can be effectively utilized. However, perfect detection and reading of license plate contents are vital in making ALPR successful in any of these applications. The perfect reading of vehicle number plate information from an image is a challenging task due to following reasons. Depending on the acquisition time, environment, and climate changes, the background of the vehicle and lighting conditions may changes. The angle between the vehicle and the camera can also change and can have a significant impact on accurate getting of plate contents. In addition, different types of fonts, colors, use of background images and plate standards make the task of automatic license plate recognition quite challenging task.

Automatic toll e-ticketing system for transportation systems The automatic toll e-ticketing system is the approach used for the vehicle when it reaches the toll plaza, this is detected by using

Infrared Proximity Sensor. RFID tags are used to read each vehicle with the help of RFID reader. An IR receiver is used to receive these pulses and sends it to a controller (MSP 430 Launch pad), which then transmits the vehicle number through the RF transmitter located in vehicle. We assume that vehicles have 16-bit identification numbers. The RFID tags to readers read the signal and information about vehicles owners. These RF signals are received by an RF receiver at the toll plaza, which send data to a computers parallel port. A software program running on the computer retrieves vehicle details from its vehicle database.

Development of a GPS-based highway toll collection system The necessity for vehicles to stop or slow down for toll fee payment results in traffic congestion and reduces fuel efficiency. Hence, a system that enables road users to pay the toll fees without stopping or slowing down was proposed and developed. Hardware and software designs were carried out to develop a Global Positioning System (GPS)-based highway toll collection system. This system was developed using a Raspberry Pi 2 microcontroller.

PROPOSED SYSTEM:

The proposed system provides a base for implementing automatic number plate detection using image processing for toll collection at toll checkpoints. This system will help in saving time as well as help in reducing 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 capture an image placed at the toll checkpoint and will perform certain processes to detect the number plate of a vehicle. Following are the steps that needs to followed to detect a number plate.

- A. Image Acquisition
- B. Image Pre-processing
- C. Licence Plate Localization
- D. Character Segmentation
- E. Character Recognition

WORKING METHODOLOGY

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.

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 recognition 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: $m \text{ pixel} \times n \text{ pixel}$ 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).



Fig.1. Output results.



Fig.2. Input vehicle.



Fig.3. Admin page.

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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