

# Traffic Rule Violation Monitoring System Using GSM and Computer Vision Technique

Vismaya , Mphil Scholar, Nanjil Catholic College of Arts and Science, Kaliakkavilai, Manonmaniam Sundaranar University, Tirunelveli 627 012.

Dr.R.Kavitha Jaba Malar, Assistant Professor, Department of Computer Science, Nanjil Catholic College of Arts and Science, Kaliakkavilai.

**Abstract**— One of the prime concern in all developing countries is traffic rule violation. The rapid increase of vehicle increase with the exponential increase in number of traffic rule violation. In spite it leads to the increase rate of accidents on road caused due to the rule violation such as breaking traffic, over speeding, driving on wrong sides etc. It is a tedious compromising task to manage and control such violation. Although all this system have been automated, in this paper We implement a real-time vehicular traffic violation detection system. Indeed the proposed system comprises of a detection algorithm which identify various violation on road as well as on parking lots. The real-time analysis is achieved by implementing a parallel computing techniques. It holds an optimization scheme as well as an excel design data structure which improve the performance of the parallel implementation. In this experiment both real and synthetic data is applied, also the experimental results demonstrate the performance of the proposed system with high efficiency in detection of violation on real -time with traffic monitoring stream.

**Keywords**—MATLAB, Image Processing, Traffic Rule Violation.

## I. INTRODUCTION

In the 20th century, Automobiles is an evolution which indeed created a drastic transformation to every life in and around the globe. Initially, it started with the production of a few hundred automobiles per year but then it got extended over 50 million units which is consumed annually. In spite of this rapid increase of automobiles leads to increases in the rate of an accident with mortality and serious injuries. It has become a prime concern of priority to the government of India to enhance transport policy in order to achieve road safety. According to the survey, the accidents happening on the road is estimated around 3,00,000 every year. Also, these accident create a huge cost of living and an impact on our economy. Based on the survey, it has been stated that over 80,000 people are killed on Indian roads while the economic loss owing to road accident estimated is over Rs 3,600 crores.

Traffic-related problems have been exploded in global dimension creating a vital impact on the surroundings. The tremendous increase in the number of vehicles subject to traffic problems. Also monitoring, controlling and managing is not viable in practice yet it can be stabilized with a technology based intelligent system which can detect the vehicle on road, count, and since their presence in the restricted area. Eventually, It manages the traffic event and seeks the attention of the authorities in need.

It is an essential need to detect and monitor traffic events to prevent traffic violation. Indeed, this can be achieved through a well-automated traffic detection system, which helps in maintenance of record as the main objective to record, build, train and test the traffic working with real-time videos. The automated traffic monitoring system comprises of various monitoring stages such as foreground estimation, object detection, object tracking and object recognition. In this, no system currently in practice include all the above-mentioned functionalities within one system nor functional. These systems are generally based on commercial and proprietary. Also, there is various literature which indeed proves the above stated.

The remainder of this paper is organized as follows. The next section presents the Literature Review. Section III illustrates the proposed Novel Traffic Rule Violation Monitoring System Using GSM and Computer Vision Technique. Present the experimental results conducted against the proposed algorithm in Section IV. Finally, the paper is concluded in Section.

## II. LITERATURE REVIEW

A. Vision-based real-time traffic accident detection, Zuhui (2014) [1].

The author presents a vision-based real-time traffic accident detection method. The author intends to extract foreground and background from video shots using the Gaussian Mixture Model (GMM) to detect vehicles; afterwards, the detected vehicles are tracked based on the mean shift algorithm. Then the three traffic accident parameters including the changes of the vehicles position, acceleration, and the direction of the moving vehicles are gathered to make the final accident decision. This project detects the traffic violation such as speed, crossing the red signal by tracking method. Traffic police have contacted the traffic violator. There is no option used to control the violator vehicle automatically.

B. Real time traffic accident detection system using wireless sensor network, Sherif, H.M. (2014) [2].

The objective of this paper is to create a Real Time Traffic Accident Detection System using Wireless Sensor Network and RFID Technologies. Sensors installed in a vehicle are used to detect the accident's location, vehicle's speed and the

number of passengers in the vehicle. Sensors in the vehicle send an alert signal to a monitoring station. Based on the alert signal, the monitoring station tracks the location where the accident has occurred and directs alert to the authorities concerned. This can be done by using the embedded board, wireless module and RFID tags. An alert message might three different values „help“, „I“m here“ and „scan order“. There is no action required for "I“m here" and "scan order" message. For "help" message, the system will route information of the vehicle, location and number of passengers with the report. The sensor is installed to detect the vehicle details if it failed there is no to get the accident vehicle details. This project mainly to track the vehicle details after the accident. There is no control on traffic rule and traffic signals.

C. A System for Traffic Violation Detection, NourdineAliane, Javier Fernandez, Mario Mata (2014) [3].

This paper is to report the driver about some specific traffic violations like no parking, no entry, speed limit, red signal and lane change. These Violations will be recorded in the local database and allow to visualization of the spatial and temporal information of the traffic violations in a geographical map using the standard Google Earth tool. The test-bed is composed of two parts. Traffic sign detection and recognition is observed by the computer vision subsystem in both day and night time. The above-mentioned traffic Violations is recorded by Event data recorder (EDR). In the manual controlling system, we need more manpower to control traffic violation. In the manual controlling system, we need more manpower to control traffic violation. Vehicle detectors were used to collect the data to find the actual flow and to get signal timing according to the present rules and regulation of Traffic Control. These vehicle detectors detect the vehicle on the basis of the lane.

D. Traffic Violation Detection Using Multiple Trajectories Evaluation of Vehicles, Klubuwan, K (2013) [4].

This paper presents a novel method for the red-light violation detection using vehicles moving in the region of interest and combining with the evaluation of the direction behavior of multiple vehicles using mean square displacement (MSD) to detect the violation. We are using image processing technique, only to detected traffic signal without help of another other system. This system detects lane-change violation by determining the vehicles movement in the region of interesting and using mean square displacement for evaluates the multiple vehicles trajectories in the video sequence. This project mainly used to track the line change and red light violations. There is no option to track the license and RC details of the vehicle.

E. Traffic Violation Detection System based on RFID, S.Hajeb, M.Javadi, S.M.Hashemi, and P. Parvizi (2013)

In this paper, the author designed and developed a complete system for generating the list of all stop-line violating vehicle images from video snapshots captured by road-side surveillance cameras. The system first generates adaptive background images for each camera view and subtracts captured images from the corresponding background images and analyzes potential occlusions over the stop-line when a traffic signal turned to red. The camera starts to capture the videos snapshots when the traffic signal turned to red. Images will be sent to the system at a regular interval of 3

seconds. Images will be stored in the hard disk and dynamic list also prepared and stored in the disk.

F. Development of an automated Red Light Violation Detection System (RLVDS) for Indian vehicles, SatadalSaha, SubhadipBasu, MitaNasipuri (2013) [5].

In this paper, the author designed and developed a complete system for generating the list of all stop-line violating vehicle images from video snapshots captured by road-side surveillance cameras. The system first generates adaptive background images for each camera view and subtracts captured images from the corresponding background images and analyzes potential occlusions over the stop-line when a traffic signal turned to red. The camera starts to capture the videos snapshots when traffic signal turned to red. Images will be sent to the system at a regular interval of 3 seconds. Images will be stored in the hard disk and dynamic list also prepared and stored in the disk. A process is written to read the list of images in a file in the sequence manner. A new image will be subtracted from the background image to find whether it is a background image or it is non-background image. If it is a background image then it will be subtracted from actual image. Stop lines also will become black. To identify the occlusion, five lines drawn manually for stop line to decide whether the vehicle is along with the stop line or not. Adaptive technique is used in this system to gradual modification of timings. Capturing images will consume high amount of space. Violator's information alone captured and there is no action taken on the violators.

### III. PROPOSED METHODOLOGY

In this proposed work. The block diagram displays the process of the complete system, which includes the extraction of the vehicle number from the number plate and identifying its owner to alert him/her about their penalty by sending an SMS with the help of GSM module. Global System for Mobile Communication is a facility through which SMS (Short Message Service) can be sent. GSM modems are easily available in the market and can be operated with the use of AT commands. With the help of Attention commands, SMS can be sent to the concerned authority. A computer is used for programming for the computation of arithmetic and logical operations and run many applications compatible with the application platform of MATLAB. Fig 1 shows the proposed architecture.

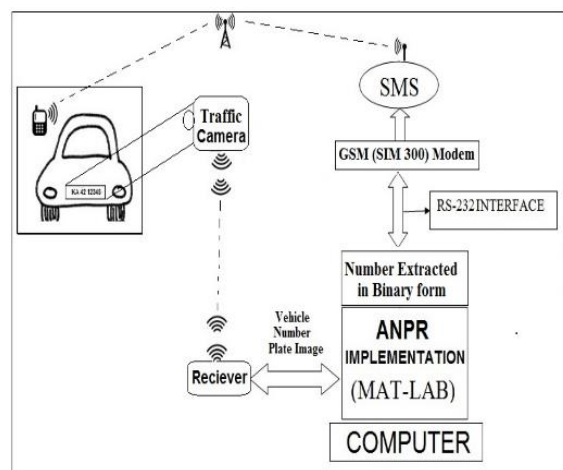


Fig.1.Proposed Block diagram

**A.IMPLEMENTATION**

- 1)Input image from webcam.
- 2)Convert image into binary.
- 3)Detect number plate area.
- 4)Segmentation.
- 5)Number identification.
- 6)Save to file in given format.

**1) Input Image from file.**

- Capture image from different traffic location.
- Store the captured image as a jpg format for further processing.

**2) Convert image into binary.**

- Identify the image intensity. If the intensity = high Reduce intensity Else if intensity = low Increase intensity Else, No change.
- Convert traffic image into gray scale.
- Measure the appropriate threshold value for the image.
- Convert the image into binary image using the calculated threshold.

**3) Detecting Number plate area**

- Fill small holes including numbers of Number plate.
- Determine height and width of the image.
- Scan each pixel of line counting number of white pixels in the following system, If number of 'white' pixels < x; pixels become 'black' Else; no change If number of 'white' pixels > y; pixels become 'black' Else; no change the value of x and y may be changed according the image intensity and plate area.
- Use the step no. 3 for both horizontal and vertical direction.
- Check number of possible areas. If number of areas > 1 Select suitable area
- Logically AND with binary image obtained at "Convert image into binary" algorithm.
- Crop the required area.

**4) Segmentation**

- Filter the noise level present in the image.
- Clip the plate area in such a way that only numbers of plate area extracted.
- Separate each character from the plate.

**5) Number identification**

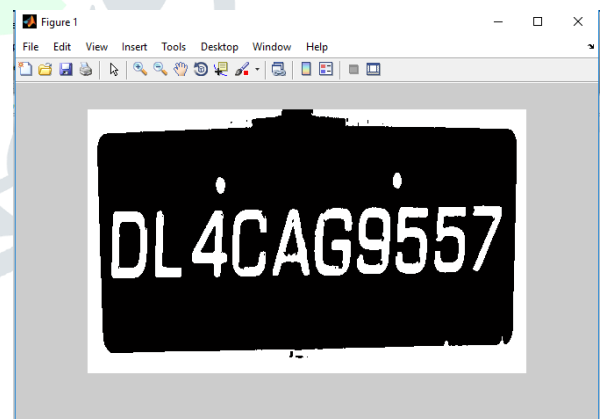
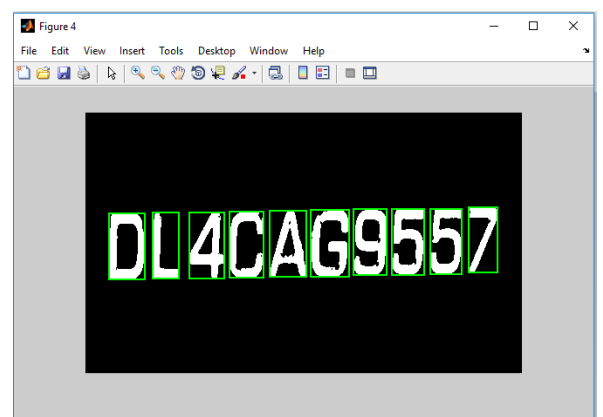
- Create the template file from the stored template images.
- Resize image obtained from segmentation to the size of template. Compare each character with the templates.
- Store the best matched character.

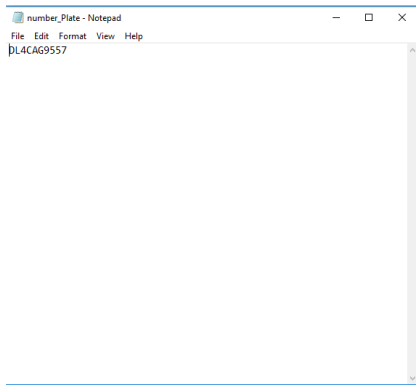
**6) Save to file in given format**

- Open a text file in write mode.
- Store the character obtained from the number identification process to text file in given format.
- Close the file.

**IV.RESULTS AND DISCUSSIONS**

The images which are in RGB format with the resolution of the image is 800 x 600 pixels. Once the vehicle number is extracted from the plate and then it is converted to the binary text form. The system is programmed using Matlab 2015 and is tested on real-time images. From the results, it is observed that the vehicle number plate on the real-time images. Next, we the warning SMS to the automobile owner and the RTO office using GSM modem which is serial communication from MATLAB. This system also developed with Graphical User Interface for which the captured vehicle images are processed and will display the result on the desktop GUI screen. Fig 2 shows the input image. Fig3 shows the binarized image. Fig4 shows the segmented image. Fig 5 shows the obtained number.

**Fig 2 Input RGB image.****Fig3 Binarization.****Fig4 Segmentation.**



Mechanical and Mechatronics Engineering Vol:7,  
No:2, 2013.

**Fig 5 Final output.**

#### IV. CONCLUSION

As we have discussed about various problems faced by traffic police to maintain the all the vehicles traffic rules, easier solution for the same. The module what we have developed is able to justify 80% of the purpose. There are still some imperfections in the code that we are still working on. Only in the case of 10 get the accuracy of all the characters getting decoded. We are able to the car number vehicles number. Identified owner will be sent an SMS with the use of a GSM module. This SMS will contain the details of get his fine record cleared.

#### References

- [1] Zu hui , Xie yaohua , Ma lu and Fu Jiansheng, "Vision-based real-time traffic accident detection", Vision-based real-time traffic accident detection
- [2] Hossam M. Sherif ; M. Amer Shedid ; Samah A. Senbel, "Real time traffic accident detection system using wireless sensor network", 2014 6th International Conference of Soft Computing and Pattern Recognition (SoCPaR).
- [3] Nourdine Aliane and Javier Fernandez, "A System for Traffic Violation Detection", Universidad Europea de Madrid, C/Tajo S/N, Urb el Bosque, Villaviciosa de Odón, Madrid 28670.
- [4] Katanyoo Klubsuwan, Wittaya Koodtalang and Surasak Mungsing, "Traffic Violation Detection Using Multiple Trajectories Evaluation of Vehicles". 2013 4th International Conference on Intelligent Systems, Modelling and Simulation.
- [5] S. Hajeb, and M. Javadi, "Traffic Violation Detection System based onRFID", World Academy of Science, Engineering and Technology International Journal of