Review on Detecting and Handling Traffic Violation

M. Yogavalli, E. Arulmozhi, M. Rajeswari and Mr. V. VijayaKumar,
Department of Electronics and Communication Engineering,
Sathyabama University, Solinganallur, Chennai, India.

Abstract—Safety and comfort of road users is becoming a matter of big concern. It is essential to build a safer and much more reliable system for traffic control and management. The main objective of this project is to introduce a system which detects stop line violation during red light running and to capture the invalid license, Road Tax, FC, insurance & chassis of a vehicle by using Active Radio-Frequency Identification (RFID), Global System for Mobile communication (GSM) and Programmable Interface Controller (PIC). This project consists of vehicle unit, traffic junction and Road Traffic Officer (RTO) unit. If the vehicle crosses the red signal first time then message will be sent to user of the vehicle and RTO with penalty and vehicle details exist in the RFID available in the vehicle unit. If the penalty is not paid within the timeline or the same vehicle crosses the red signal second time then vehicle will be slow down and stopped via GSM by the RTO unit. LCD's placed in the vehicle are used to display the RC number and to show the message for slow down and stop the vehicle. When the driver cut the connection and try to drive then the RC number will not be displayed on the vehicle which will help to capture the violated vehicle easily. A speed sensor is affixed to the vehicle, to control the speed of the vehicle when it violates the specified speed.

Keywords—Real Active Radio-Frequency Identification (RFID) Tag, Global System for Mobile communication (GSM), Programmable Interface Controller (PIC), Speed sensor, traffic light driver and Liquid Crystal Display (LCD)

I. INTRODUCTION

Advanced transportation systems (ATS) are built from technologies such as sensing, controlling, engineering, and computing to solve transportation-related problems. Automobiles were at the core of transforming lives of individuals and nations during the 20th century. The century started with production of a few hundred automobiles per year and ended with over 50 million units produced for global consumption annually. Unfortunately, along with the growth of the automobile usage, the numbers of accidents leading to mortality and serious injuries have seen dramatic increases. Traffic-related accidents are become as a serious and growing problem with global dimensions. A recent study by World Health Organization mentions that annually, over 1.2 million mortality and over 20 million serious injuries occur worldwide. Enhancement of traffic safety is pursued as a high-priority item not only by various government agencies such as National Transportation Safety Administration but also by most major automobile manufactures. University-based researchers are also contributing to this important mission. Such systems have evolved from primarily addressing traffic-control problems to current applications that involve better lane design is used to reduce congestion, developing systems that help to reduce traffic-related mortality, and better vehicle- and pedestrian monitoring systems to study flow patterns in various traffic scenarios. Such systems perform well in steady-state traffic situations like those on a freeway, but perform badly when applied to the highly unsteady flow of a busy traffic intersection.

In this paper, it consists of three units; 1. Vehicle unit, 2. Traffic junction unit, 3. RTO unit. Active Radio-Frequency Identification (RFID) tag is used in vehicle unit to store the information related to the vehicle. Information stored in RFID tag will be detected by the RFID reader in the traffic junction unit while crossing the red signal and the signal is preceded accordingly and message is sent via GSM. RTO unit receives the message whenever vehicle violates the traffic rules and message sent from the RTO unit to control the motor of the vehicle. If the vehicle crosses the red signal first time then message will be sent to user of the vehicle and RTO with penalty and vehicle details. The penalty should be paid within the timeline or else the vehicle will be blocked by the RTO unit. When the same vehicle crosses the red signal second time then message send to RTO unit and RTO will send a message to the appropriate vehicle to slow down and stop the vehicle via GSM. Two LCD’s are placed in the vehicle. One is to show the message for slow down and stop the vehicle while crossing the red signal second time and for speed violation to avoid the accident. Second one is placed in place of number plate available in front side of the vehicle to display the RC number and there is a connection between LCD and Motor driver. When the driver cut the connection and try to drive means then the RC number will not be displayed on the vehicle which will help to capture the violated vehicle easily. A speed sensor is affixed to the vehicle, to control the speed of the vehicle when it violates the specified speed. Hence, the vehicle is caught then and there when it violates the traffic and regulation and concern person driving license will be cancelled.

II. LITERATURE SURVEY

A. Vision-based real-time traffic accident detection, Zuhui (2014)
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 red signal by tracking method. Traffic police has contact 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)

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 embedded board, wireless module and RFID tags. 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 the information of the vehicle, location and number of passengers with report. 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 accident. There is no control on traffic rule and traffic signals.

C. A System for Traffic Violation Detection, Nourdine Aliane, Javier Fernandez, Mario Mata (2014)

This paper is to report the driver about some specific traffic violations like a 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 by two parts. Traffic sign detection and recognition is observed by computer vision subsystem in both day and night time. The above mentioned traffic Violations is recorded by Event data recorder (EDR). In manual controlling system we need more manpower to control traffic violation. In manual controlling system we need more manpower to control traffic violation. Vehicle detectors were using 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 lane.


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.


In this paper by using RFID technology, vehicles are connected to computerized systems, intelligent light poles and other available hardware along the way. Intelligent control system is capable of tracking all vehicles, crisis management & control, traffic guidance and also recording driving offences along the highway. Each and every vehicle is equipped with RFID to hold the data like Car ID, position, etc. Along the highway, intelligent light poles are equipped with RFID reader, solar cells, etc. to cover both sides of the highway and to carry the data such as traffic conditions, accidents, the weather, etc. Vehicle and intelligent poles are communicating with the help of Short Range Communications protocol. When the vehicle crosses the highway, record the information on RFID tag. Information will be exchanged between vehicle and intelligent light pole. If the vehicle went into any one of the dangerous driving violation, information about the vehicle will send to the police station or else information on tag will be transferred to driver’s license while leaving the highway. Provide the right exist before issue the license.

F. Development of an automated Red Light Violation Detection System (RLVDS) for Indian vehicles, Satadal Saha, Subhadip Basu, Mita Nasipuri (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 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.

G. A video-based traffic violation detection system, Xiaolong Wang (2013)

This paper is to detect traffic violations, such as running red lights, speeding, and vehicle retrogress in real time. In the proposed system is having an improved background-updating algorithm by using wavelet transform on dynamic background, and then track moving vehicles by using feature-based tracking method. This system consists of three modules namely video loading, detection of violating vehicles and capturing violation evidence. These three modules are implemented by using C++ by visual studio 2010 and open CV 2.3.1. Detection of violation vehicles can be done by image processing, filtering violation detection and background update. This project used to detect the vehicles information using vision based method. The recorded data only used to find out vehicle details after accident. There is no automatic way to control traffic violation and to warn the traffic violators.


This proposed system used to control the traffic violations such as lane violation, stop line violation during red signal and speed violation. In this system two IR transmitter fixed in the traffic signal, one is used to turn on the alarm circuit which is fixed in the vehicle when the driver cross the stop line during the red signal at first time. The alarm starts to ring continually until the driver stops the vehicle. When the driver cross the second stop line the alarm will start ringing, if the driver stops the vehicle then the engine has to start by the reset circuit which is controlled by the RTO office. The second IR transmitter is used to transmit the information to RTO office. And the RF transmitter fixed in the vehicle unit and RF receiver fixed in the RTO office for information transmission. Only the vehicles information was transferred to RTO after the traffic violation. Traffic police should take action after getting the information from RTO office about traffic violator.


This author proposed the system to avoid huge traffic in highways. To achieve this goal they were used image processing technique and MATLAB software. In this system, the video camera fixed in highways to record the traffic status. The recorded video is converted into continues pictures and then RGB to gray scale conversion is applied to the picture. This video to picture conversion and RGB to gray scale conversion is done by MATLAB software. After that the image processing technique such as 1) Image enhancement 2) Morphological operation is applied on the gray scale picture. Finally the gamma correction is applied to the picture for background elimination and lane masking to track the vehicles. End of the process the pictures were compared with the first picture to identify the number of vehicles in the highway. If the number of vehicles more than the threshold level the information sent to the traffic controller. Based on this information, the traffic is controlled by the traffic controller.

J. Design concepts of an application platform for traffic law enforcement and vehicles registration comprising RFID technology,Vladimir M. Vishnevsky, Andrey Larionov (2012)

The proposed system is to track the vehicle information by using RFID readers, video cameras & speed radars and send data to traffic police stations about the traffic rules violators. Data transmission can be done by both wired and wireless interfaces. The data sent to the traffic police station will have up to date data. In this, the platform consists of three different servers. Access server will act as an interface to the outside world. App server is used to hold several applications to perform different tasks. Adapter server is to hold several adapters connected to identification devices such as video camera, radar and photo based violations registration system and two readers. Components used in the paper are Interfaces to provide interface between platform (xIDCP/xIDDP) & clients (rIDCP/rIDDP), applications collect the data from different sources send it to sink to initiate the queries, buses, adapters and protocols. It is only sending the information of traffic violators to traffic policy station. Manual work to the traffic police would not be reduced by using this system.

K. Interactive RFID Based Driver Assistance and Safety Warning System, Fei YIN, Zhenhong LI, Haifeng WANG (2012)

In the proposed system, a RFID-based driver assistance and safety warning system is used to automatically detect various traffic violations and warn the drivers to prevent the accidents. Indication flags are written in the RFID tag to indicate the various events. On each lane, the roadside RFID readers are mounted on the crossbeam over the lane and the roadside RFID tags are mounted on the lane markings, both are deployed every certain distance along the lane. The roadside RFID readers towards to the lane surface and keep directional interrogating the passing vehicle RFID tags if any. Each roadside RFID reader is assigned with unique ID. The vehicles running on the lane are equipped RFID readers and RFID tags. The vehicle RFID readers are mounted in the both sides of the chassis of the
vehicles and towards the lane surface to directionally interrogate the passing roadside RFID tags if any. The vehicle RFID tag scan be attached on the vehicles’ windshield, and should be writable so that the event information can be written. The roadside RFID readers connect to a service server via cellular network to download real-time updating traffic information, rules, speed limit and other policies. The interaction between roadside and vehicle RFID systems are used to initialize and to release the indication flags which helps to detect and notify the driver about traffic violations. It is used only for notification to the driver. There is no action taken for traffic violators. Traffic violator’s details are not captured.

L. High-level traffic-violation detection for embedded traffic analysis, Julian A. Vijverberg, Nick A.H.M. de koning, Jangong Han, Peter H.N.de with, Dion cornelissen (2007)

This paper consists of robust and real-time traffic-violation detection system for cameras on intersections. This system uses background segmentation and a novel road-model to obtain the candidate traffic participants. A computationally efficient camera model is defined which requires three input parameters and enables the extraction of key object parameters like vehicle type and speed. It captures only the vehicle type. There is no action taken for traffic violators. Traffic violator’s details are not captured.

CONCLUSION

In this work, embedded system for automatic traffic violation monitoring, the traffic frequency is measured as a function of number of vehicles which comes under the contact of sensing unit. We have implemented a microcontroller-based system that automatically performs the functions of monitoring traffic violation using PIC. This paper presents an approach to detect the traffic violations and controls the system to introduce an embedded monitoring. Our proposal can reduce an accident and traffic in real time system. It also reduces the invalid document users. In this paper an experimental platform for recording traffic violations has been presented.

REFERENCES


