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# IEEE Explore Digital Library

## Developing advanced traffic violation detection system with RFID technology for smart city (Late 2017 Conference)

* Computer Vision with RFID Technology
* Method of background subtraction on motion objects detection:
  + By taking samples from the objects, background models are being set and extracting foreground areas from background subtraction and reducing the shadow in the foreground. The experiment results indicate that the performance of the background subtraction method is more stable on dynamic objects detection.
* A threshold method is presented to divide standard to the image and improve the detection effect.

Link: <https://ieeexplore.ieee.org/abstract/document/8289907>

## Traffic Violation Detection Using Multiple Trajectories Evaluation of Vehicles

* novel method for the red-light violation detection using vehicles moving in the region of interest
* combining with the evaluation of the trajectories behavior of multiple vehicles using **mean square displacement (MSD)** to detected both of violation

Link: https://ieeexplore.ieee.org/abstract/document/6498268

# ACM Digital Library

## Real-Time Vehicular Traffic Violation Detection in Traffic Monitoring Stream

Our system proposes a detection algorithm which can discover various types of violations taking place on the roadways as well as in the parking lots. In order to achieve real-time analysis, parallel computing techniques are used in our implementation. An optimization scheme as well as a well-design data structure is proposed to improve the performance of the parallel implementation. Both real data and synthetic data are applied in our experiments. Experimental results demonstrate that our proposed system can discover all the violations from the high-throughput traffic monitoring stream in real-time. Good scalability on multiple threads is also shown in the experimental results.

Link: <https://dl.acm.org/doi/10.1109/WI-IAT.2012.91>

# Google Patents

## Traffic violation detection, recording and evidence processing system

a non-intrusive violation detection means for detecting vehicle presence and movement and for providing an indication of a violation; and processing means for identifying images stored in the storage means and which relate to a violation detected by the violation detection means so that images associated with a violation are identifiable and can be processed to provide evidence of the violation and also identify the vehicle associated with the violation.

### Background

Traffic camera law enforcement has traditionally used 35 mm film-based cameras for the detection of speed and red-light violations.

In the case of red light violations, the camera is used in conjunction with vehicle detection systems that are usually in-ground (in-road) sensors eg inductive loops, which detect the presence of a vehicle at a particular point on the roadway. The camera system is also connected to the traffic signal controller, generally the red feed for the purpose of co-coordinating to the red signal phase. In principle an image of an offending vehicle is taken when a vehicle is detected about to enter the intersection, and/or in the intersection during the red signal phase. A common practice is to take two (2) images of a vehicle as it progresses through the intersection in order to provide sufficient evidence for a prosecution.

With speed violations, similar film-based cameras are used with a speed-measuring device—either in-ground loops for fixed-speed traps, or radar commonly used by mobile speed enforcement units. For speed enforcement, a picture of the vehicle is captured when the speed measuring system detects a vehicle traveling at a speed in excess of a preset threshold speed.

The film-camera systems have required white light illumination generally in the form of flash units, to provide sufficient light to capture violation images in poor ambient light or at night.

With the advent of digital imaging traffic cameras the film-based cameras are being replaced by digital cameras however the violation detection and recording and illumination systems have remained fundamentally as for film-based operations.

Similarly while the advent of digital cameras is removing the need to digitise film images to allow automated processing and allows the option of centralised processing, processing software still has to be installed and maintained locally in each processing or user location. Additionally, users other than authorized processing officers must typically request issue of violation information according to standard formats or reports and are barred from interactivity with system data.

The fundamental disadvantages of these commonly applied systems are:

* The detection system is invariably unable to provide a trigger point that is sufficiently consistent to ensure that the positioning of vehicles at the time of imaging is identical. To compensate for this a wider angle lens is used with the consequence of reducing the available resolution for effective and efficient license plate recognition during subsequent evidence processing;
* Conventional system's typically capture a single image of the vehicle licence plate. If this image is obscured or poorly focussed, it may be impossible to identify the vehicle. Likewise, with only one image of the driver, it may be difficult or impossible to provide an identifiable driver image where this is required;
* High construction and maintenance costs (ie because of the costs of installing and maintaining in-ground sensors, underground cabling and connections to traffic signal controllers, flash units and in some instances where digital cameras are used, communications lines);
* The use of flash illumination may be detrimental at night to oncoming traffic and has the potential to cause temporary driver blindness and consequent safety risks as well as preventing authorities from deploying systems covertly;
* The requirement to install flash illumination units (often on a separate pole) also incurs additional supply, installation, maintenance and running costs and creates additional visual pollution;
* Where digital cameras are used, systems either require the availability of high-speed communications lines to meet the demands of communicating high-resolution images, or else images and data must be collected manually;
* Purpose built, high-resolution, digital traffic cameras are relatively expensive, adding to costs of traffic program installations and operation.
* Traffic violation evidence collected by conventional systems includes time and data information provided by the camera computer clock which can be subject to error and therefore can prejudice the validity of evidence.
* The requirement that violation processing software be installed and maintained in all computers in all processing offices and on all client computer systems in the various client locations incurs high program implementation and support costs.
* With the exception of authorised processing personnel, users of violation evidence such as courts or police departments have been denied interactive access to information held by the central processing system and have only been able to request and view standard reports prepared for them by the relevant processing office.

Furthermore, traffic violation systems often use cameras which are housed in dome enclosures. Using low-cost digital video cameras as capture devices places inherent limitations on the resolution of the video-footage. To counter this, a high powered lens is required. However, the size and weight of high powered lenses makes them impractical for dome enclosures, because much of the space in the enclosure needs to be taken up by a motor and moving mechanism for moving the camera. Thus, a reduced amount of room is provided for the lens. Furthermore, the size of the camera and lens is limited by the power of the motor controlling its movement.

### Summary

This is a detection system that can capture red light violations and record it in some form of database. Speeding is also engulfed. It catches a video based evidence of the driver as well as vehicle using modern digital cameras available in the market along with the use of laser ranging technology for night ease of capturing of driver as well as license plate images. There is no license plate detection system but, license plate and violation related are recorded carefully.

Link: <https://patents.google.com/patent/US8134693B2/en>

## Automatic traffic violation detection system and method of the same

### Abstract

Disclosed herein are a system and method for the automatic detection of traffic and parking violations. Camera input is digitally analyzed for vehicle type and location. This information is then processed against local traffic and parking regulations to detect violations. Detectable driving offenses include, but are not limited to: no scooters, buses only, and scooters only lane violations. Detectable parking offenses include, but are not limited to: parking or loitering in bus stops, parking next to fire hydrants, and parking in no-parking zones. Camera input, detected vehicle information, and violations can be stored for later search and retrieval. The system may be configured to signal the authorities or other automated analysis systems about specific violations. When coupled with automatic license plate recognition, vehicles may be automatically matched against a registration database and reported or ticketed.

### Components

1. Image input unit
2. Image analysis unit
   1. Vehicle position detection submit
   2. Vehicle type recognition submit
3. Offense determining unit
4. License plate recognition unit
5. Data output unit

### Background

Currently, taking pictures manually at a specific location is most general way to expose the offense of traffic regulation. However, this conventional way provides poor efficiency since it requires high cost of manpower and there is no automatic process to assist for all day long detection. For deterring the traffic violations effectively, the conventional way need to become efficiency. This automatic detection approach may recognize the vehicles against the traffic regulations, and store the images of violation events as the evidence for ticketing the traffic violations.

### Summary

This system is capable of detecting the driving on a wrong designated lane, including a specific vehicle prohibited lane, eg, scooter-prohibited lane, bus-only lane, etc. By means of digital image processing technology, the system analyzes the vehicle information in monitoring images. Through one or more cameras, a specific zone is monitored and photographed. The monitoring image related to the specific zone, such as a designated lane, can be acquired. The mentioned digital image processing technology is employed on the image taken by the camera(s), and the position and movement information of vehicles can be identified. By an image recognition technology, the types of the vehicles in the image can be identified, including large vehicles, cars and scooters. When any illegal driving event is detected, the traffic violation detection system outputs the related information identified by system to the designated device. No, information on implementation specific details were given.

* The mentioned location tag of the event is to locate the traffic violation, and the location indicates the site where the camera is mounted.

Link: <https://patents.google.com/patent/US20120148092A1/en>

## System for collision prediction and traffic violation detection

### Abstract

The invention refers to a system for monitoring, analyzing and reporting incidences of traffic violations at a predetermined area in real-time, prospectively or retrospectively. Specifically, the invention refers to a system and method of monitoring, analyzing, predicting and reporting or warning the incidence of a past or imminent traffic violation by acquiring a moving object within a predetermined boundary, assigning a path to the moving object and based on a plurality of thresholds, determining the likelihood of a traffic violation type and occurrence.

### Summary

This system proposes to use a motion detection, & offers motion tracking. Real Time Violation Detection & Post Time Path Analyzations (paths are once again analyzed to confirm violation). These both output violation video & puts into video database. There is also a collision detection but it doesn’t lie under our spectrum. It’s main working basis is path analyzation of moving vehicle.

# Keywords used for research at Google Scholar

* Traffic Violation Detection System (Pg. 1 & 2)

**Keywords planned to be used**

* Traffic Violation Detection System **genetic algorithm**
* System and method traffic enforcement camera
* Method and system traffic violation
* **Intelligent System Architecture** traffic violations
* Evidence Protection traffic violation detection
* Traffic Violation Detection System **machine vision**