**Unmanned Vehicle Route Tracking Method Based on Video Image Processing**

**SUMMERY**

Vehicle detection and statistics in highway monitoring video scenes are of considerable significance to intelligent traffic management and control of the highway. With the popular installation of traffic surveillance cameras a vast database of traffic video footage has been obtained for analysis. Generally at a high viewing angle a more distant road surface can be considered. The object size of the vehicle changes greatly at this viewing angle and the detection accuracy of a small object far away from the road is low. In the face of complex camera scenes it is essential to effectively solve the above problems and further apply them.

Vision based vehicle object detection is divided into traditional machine vision methods and complex deep learning methods. Traditional machine vision methods use the motion of a vehicle to separate it from a fixed background image. This method can be divided into three categories the method of using background subtraction, the method of using continuous video frame difference and the method of using optical flow . Using the video frame difference method the variance is calculated according to the pixel values of two or three consecutive video frames. Moreover the moving foreground region is separated by the threshold . By using this method and suppressing noise the stopping of the vehicle can also be detected. When the background image in the video is fixed, the background information is used to establish the background model . Then each frame image is compared with the background model and the moving object can also be segmented. The method of using optical flow can detect the motion region in the video. The generated optical flow field represents each pixels direction of motion and pixel speed. Vehicle detection methods using vehicle features such as the Scale Invariant Feature Transform and Speeded Up Robust Features methods have been widely used. For example 3D models have been used to complete vehicle detection and classification tasks. Using the correlation curves of 3D ridges on the outer surface of the vehicle the vehicles are divided into three categories cars SUVs and minibuses.

Vehicle counting process provides appropriate information about traffic flow vehicle crash occurrences and traffic peak times in roadways. An acceptable technique to achieve these goals is using digital image processing methods on roadway camera video outputs. This paper presents a vehicle counter classifier based on a combination of different video image processing methods including object detection edge detection frame differentiation and the Kalman filter. An implementation of proposed technique has been performed using C++ programming language. The method performance for accuracy in vehicle counts and classify was evaluated which resulted in about 95 percent accuracy for classification and about 4 percent error in vehicle detection targets.

Unmanned vehicles are mainly used to improve road traffic safety reduce traffic congestion and to reduce vehicle fuel consumption and environmental pollution. Many countries in the world are supporting the research in the field of driverless vehicles and intelligent transportation technology mainly including the control research of driverless vehicle path tracking lane maintenance vehicle lane change and so on. The purpose of path tracking is to make the vehicle travel along the desired path while ensuring the lateral stability of the vehicle. Its control algorithm is the key of path tracking. The path tracking control algorithm is particularly important for the driverless vehicle. Therefore path tracking is a key technology in the research direction of the driverless vehicle. Early path tracking methods such as geometric path planning and rolling path method are more suitable for indoor robots. However because the driverless vehicle is a non holonomic constrained vehicle bodywhich is constrained by turning radius angular speed and so on the path tracking method mentioned above is not applicable to the driverless vehicle. Therefore unmanned vehicle path tracking method has become a hot research topic of relevant scholars. Jeon et al took the change rate of lateral deviation and lateral deviation as input of the fuzzy controller and the former wheel rotation angle as output of the controller to control the driverless vehicle running along the desired path. For example adopt adaptive sliding mode controller to realize path tracking of unmanned vehicle and eliminate control system jitter and external interference according to Lyapunov stability theory. Ojha et al used model predictive control and forward feedback control to achieve four-wheel steering driverless vehicle path tracking with the objective of minimizing lateral deviation. Depatla uses robust H output feedback control to track the driverless vehicle path without considering the driverless vehicle lateral speed. Simultaneously simulation experiments are carried out. However there is a big deviation between the theoretical results and the actual situation.

**VEHICLE DETECTION AND TRACKING TECHNIQUES: A CONCISE REVIEW**

**SUMMERY**

**INTRODUCTION:**

Tracking of moving vehicles in a roadway video can give us acceptable description of traffic flow and presence or absence of vehicles in the video sequence. Vehicle tracking is a process that detects the position of a vehicle in each frame of the video sequence.There are several techniques for the estimation of traffic flow, such as using manual counters, portable counters and observers. The observer records the classification of the vehicles and record count data by videotaping traffic. But none of these techniques are optimum and rational.

As an alternative method, image processing and machine vision algorithms have been applied to roads and highway traffic analysis in recent years. Trafﬁc ﬂow monitoring based on computer vision techniques and image/video processing algorithms are really efficient and inexpensive. For the software-based vehicle detectors, video cameras are placed alongside a roadway. The approach in this article focuses on a suitable technique using image processing and computer vision algorithms to be applied to vehicle detection in roadways. Note that in this method, motion scenes should be captured with a view from above to the roadway surface. Lots of algorithms in video processing allow users to perform editing functions by using various filters. Video processing includes pre-filters which can cause contrast changes and noise eliminations along with video-frame’s pixel size conversion . Highlighting particular areas of videos, eliminating camera motion, deleting unsuitable lighting effects, removing edge superimposition and so on can be done by video processing methods.

One of the best ways of reaching video analysis goals is to use image processing methods in each video frame systematically, so that we can realize motions by comparing two sequential video frames . which is very useful to achieve object tracking and motion detection targets. All videos which are used in this paper are recorded in Tehran

**GREYSCALE IMAGE GENERATTION:**

The vehicle detection technique should be performed in gray scale image domain. So each videoframe pixel should be transformed from RGB or CMYK model to a 0 to 255 gray level. While converting an RGB image to gray scale model, the RGB values for each pixel should be taken as input, and a single value reflecting the brightness of it should be made as output . RGB to gray scale conversion is done on the sequence of captured video frames. One of the best ways is to take a weighted average due to human-oriented basics. Our suggested approach is 0.3R + 0.59G + 0.11B, since the perceived brightness is often dominated by the green component. Then, a gamma correction function performs on the grayscale image to achieve suitable image quality. The main target here is to process the gray scale image so that result will be more acceptable than the original RGB image for background subtraction method After representing gamma corrected gray scale image, it’s time to clean static parts of two sequential video frames. Hereon, the main challenge is that performance of image analysis algorithms can suffer from darkness, glare, long shadows, or bad illumination at nights which may cause strong noises . So the grayscale image might be unspecified in these situations and make the detection task a bit more complex. In our technique, frame differentiation is applied to extract the moving parts from a static background in a video frame sequence . The static background is then deleted to locate the moving objects in each frame. The result zone leaves only vehicles and some details as moving objects in two sequential images, which are changing from frame to frame.

**Classification:**

Vehicle classification counts are used in computing capacity, establishing structural design criteria and computing expected roadway user revenue . Typically, vehicles are classified as four common types:

Type1: bicycles, motorcycles

Type2: motorcars

Type3: pickups, minibuses

Type4: buses, trucks, trailers

To diagnose each passing vehicle belongs to which type, it’s necessary to obtain width and length of each vehicle’s rectangle in pixels. So the area of each rectangle can show us which type to choose for the vehicle.

**CONCLUTION:**

We have developed and implemented a hard real-time vision system that recognizes road boundaries, and multiple vehicles in videos taken from a car driving on high ways .Our system is able to run in real time with simple, low-cost hardware. Under reduced visibility conditions, the system works well on snowy highways, at night when the background is uniformly dark, and in certain tunnels. However, at night on city express ways, when there are many city lights in the background, the system has problems ﬁnding vehicle outlines and distinguishing vehicles on the road from obstacles in the background. The vehicle tracking system can also extract vehicle signatures to match observations between detector stations and quantify conditions over extended links. This paper showed that using image processing techniques for vehicle counting purposes can be a brilliant way to lower the cost and save the quality and accuracy both together. So we introduce a powerful method to classify passing vehicles in roadways using a combination of frame differentiation and edge detection methods include both Sober and Kalman algorithms. Experimental results show the effectiveness of the system design and implementation. The computation is implemented in real time and is easy to embed into a hardware for real vehicle borne video. The test results indicate that the represented method worked effectively in hard test conditions and the error percentage is less than 5%, made it a useful technique for vehicle detection purposes. The limitations of this paper are as follows:

1) Although the method functions well in mild driving conditions, more complex pdfs for unsteady motion should be investigated under drastic driving conditions.

2) Distant vehicles are difﬁcult to detect because of their small sizes in the vertical proﬁling, although they have no inﬂuence on safety driving. The loss of target tracking due to a far distance can still be picked upif the target gets close again.

3) The necessity in collecting motion evidence for a period of time when the observer vehicle has a reasonably high speed.

# **Vehicle detection and tracking in roadway traffic analysis using kalman filter and features**

**SUMMERY**

**INTERODUCTION:**

The study is undertaken with the objective to detect road signs and to suggest automated driver guidance mechanism. Developing an automated driver guidance system is very important in the context of Indian road conditions. A driver finds it difficult to control the vehicle due to sudden pot holes or bumps or sudden turns where the road signs are not very prominent or missing most of the times.

Suppose if there is a system with integrated motion camera and an integrated onboard computer with the vehicle, a simple driver guidance system based on frame by frame analysis of the motion frames can be developed and there by generate the alarm signals accordingly. So that the driving can be made quite easier. Road Image analysis is very important aspect for automated driver support system. Real-time qualitative road data analysis is the corner stone for any modern transport system. So far, most of the analysis is done manually and the use of image processing techniques for qualitative analysis is still at its early stage .

Lane detection is one of the most challenging problems in machine vision and still has not been fully accomplished because of the highly sensitive nature of computer vision methods. Computer vision depends on various ambient factors. External illumination conditions, camera and captured image quality etc. effect machine vision performance. Lane detection faces all these challenges as well as those due to loss of visibility, types of roads, road structure, road texture and other obstacles like trees, passing vehicles and their shadows. Lane detection and its tracking is significant element for vision based driver assistance system. Main purpose of these systems is to prevent crashes due to unintended lane departure movements produced by tired drivers.

Driver assistance systems aim at increasing the comfort and safety of traffic participants by sensing the environment, analyzing the situation, and signal ling relevant information to the driver. In order to reliably accomplish this demanding task, the information of different sensors must be evaluated and fused to obtain a suitable representation of the traffic situation. The complexity of the whole data processing architecture is determined by the actual task to which the driver assistance system is devoted. Among others, these tasks include lane departure warning, lane keeping, collision warning or avoidance, adaptive cruise control, and low-speed automation in congested traffic.

Build a monocular vision autonomous car prototype using Raspberry Pi as a processing chip. An HD camera along with an ultrasonic sensor is used to provide necessary data from the real world to the car. The car is capable of reaching the given destination safely and intelligently thus avoiding the risk of human errors. Many existing algorithms like lane detection, obstacle detection are combined together to provide the necessary control to the car. In robotics, obstacle avoidance is the task of satisfying the control objective subject to non-intersection or non-collision position constraints. The different hardware components and their assembly are clearly described. A novel method to determine the uneven, marked or unmarked road edges is explained in details relying upon OpenCV. Using ultrasonic sensors, the collisions with obstacles is avoided.

Advanced Driving Assistant Systems, intelligent and autonomous vehicles are promising solutions to enhance road safety, traffic issues and passengers comfort. Such applications require advanced computer vision algorithms that demand powerful computers with high-speed processing capabilities. Keeping intelligent vehicles on the road until its destination, in some cases, remains a great challenge, particularly when driving at high speeds. The first principle task is robust navigation, which is often based on system vision to acquire RGB images of the road for more advanced processing. The second task is the vehicle's dynamic controller according to its position, speed and direction. This paper presents an accurate and efficient road boundaries and painted lines detection algorithm for intelligent and autonomous vehicle. It combines Hough Transform to initialize the algorithm at each time needed, and Canny edges detector, least-square method and Kalman filter to minimize the adaptive region of interest, predict the future road boundaries location and lines parameters[5].

Autonomous driving cars have become a trend in the vehicle industry. Numerous driver assistance systems (DAS) have been introduced to support these automatic cars. Among these DAS methods, traffic light detection (TLD) plays a significant role. This paper proposes a method to detect traffic lights (TLs) using color density identification(CD). The system receives an RGB image as an input and produces the traffic light state (red, yellow, green or no Signal) of the scene. The algorithm has three stages: clustering, filtering, and state identification.

HSV thresholding, geometrical information, and color density of an image are used to detect traffic lights. The color density method recognizes the color of an object by comparing the densities of each color belonging to the object. The method is robust, only requires RGB images and has a high detection rate.

**CONCLUSION:**

The image processing algorithms used here have found a lot of practical applications and it is still one of the most extensively researched areas. A step has been taken to improve the current road traffic management scheme and provide with much cheaper and efficient results than the existing know-how. These results or their underlying principles can be deployed in different purviews like disaster mitigation management, defense etc. This algorithm can be further improved by training our dataset using machine learning algorithms which can lead to much better results with better efficiency due to reduction in processing time and output deliverance and with an up to date technology.

**Automated Vehicle Driving using Image Processing**

**SUMMERY**

**INTERODUCTION:**

Data can be useful for the timely and efficient control and management of traffic, and may constitute a verifiable real-world platform for comparing traffic simulation outputs. The acquisition of vehicle tracking data is both expensive and technically complex, frequently requiring the deployment of costly traffic monitoring systems. Both “Infrastructure-based” and “Non infrastructure-based” techniques are currently used to obtain traffic data worldwide. Generally, data obtained by detector technologies are somewhat aggregate in nature and do not provide an effective record of individual vehicle tracks in the traffic stream. This limits the use of these data in analyzing individual driving behavior and calibrating and validating simulation models.

Recently, two others “Non infrastructure-based” techniques have been applied more and more frequently to observe traffic flow conditions: probe vehicle data acquirement and video image processing.

The first allows observing the trajectories of individual vehicles yielding Lagrangian measurements. These measurements can be obtained through on-board tracking devices that provide real-time information on individual vehicles. this technique does not allow macroscopic traffic data to be obtained, such as traffic volume and density if not coupled to stationary detectors to estimate traffic conditions.

On the other hand, video image processing provides a low cost nonintrusive procedure for capturing individual vehicle operations over time, and as such, provides a useful tool for obtaining observational data for traffic control, and calibration and validation of traffic simulation models.

This paper presents a methodology to extract traffic data by using Unmanned Aerial Vehicles. The proposed methodology implies the use of a combined technique involving an Unmanned Aerial Vehicles (UAV) image acquisition technology and a video [processing algorithm](https://www.sciencedirect.com/topics/engineering/processing-algorithm). Moreover, this paper intends to demonstrate the usefulness of Unmanned Aerial Vehicles to acquire reliable traffic data and to provide useful information on driving behavior parameters for individual drivers. Accuracy in the traffic data evaluation is assessed by comparing individual vehicle trajectories as extracted from the video with the corresponding profiles obtained from baseline GPS referenced values for the same trajectories. The study described in this paper has two specific objectives to introduce and describe a methodology for tracking vehicles based on Unmanned Aerial Vehicles (UAV) image acquisition technology to assess the accuracy of this methodology in evaluating individual vehicle paths.

**Fast and Improved Real-Time Vehicle Anti-Tracking System**

**SUMMERY**

**INTERODUCTION:**

As the number of vehicles increases, the demand for driver assistance systems also increases, ensuring safe and comfortable driving. Over the last decades, many criminals have been resorting to the method of stealing cars commonly referred to as carjacking. This most frequently happens while the owner is driving the vehicle and is temporarily stopped, e.g., at a traﬃc light, gas station, convenience store, ATM, hotel, etc. Carjacking can be prevented by equipping a vehicle with an anti-tracking system which alerts the victim vehicle to being tracked by suspicious criminals. From this perspective, the intelligent transportation industry has conducted various studies. Thisisachievedbyinstallinghigh-techequipmentandothercontrolsystemsonthevehicleratherthan on the road. In this case, many visual sensors are used [1]. The vision system installed in the transport vehicle can provide the location and size of other vehicles in the traﬃc environment, as well as provide information from roads, traffic lights, and other road users. All this information captured by the vision system is very useful in the event of traﬃc incidents (such as an accident or carjacking). The proposed system uses information from the visual system represented by one camera. This provides a picture and video of the scene behind the car. The purpose of the system is to identify vehicles located in this space and following the host vehicle. However, some factors are obstacles to the reliability and robustness of the tracking system.

Many researchers have tackled the se issues in their work to get better result. proposed a method based on there being motion in an image [6]. In such a case, the intensity value of a pixel will be diﬀerent from the corresponding pixel in the next frame or the reference frame. Generally, the subtraction of the background is achieved as follows: An initial model is created to model the background image. The diﬀerence between the current image and the background model is estimated to spot moving objects; and ﬁnally, the background template is updated. The regions thus detected form probable objects of interest. Ekta Saxena et al. proposed an object tracking algorithm that takes an image from a camera and convertsittoapre -processe dimageing rayscale[7]. Then the image goes through the process of canny-edge detection. If the number of vehicles is large enough after ﬁltration and expansion, that area is selected and vehicles are detected on the image in the form of a bounding box. Finally, the algorithm uses a blob analysis for the detection of a separate number of vehicles. to update the background model, based their approach on the texture of the image, using processing such as the texture-based moving object detection method (TBMOD), in which each distribution is adjusted by weight [8]. The TBMOD models each pixel by a binary pattern calculated by a comparison between a pixel and its neighborhood. More speciﬁcally, a histogram is associated with local patterns in a circular region. Then the decision is determined by comparing the various histograms. . have developed a technique to detect and recognize vehicles from RGB images using image morphology and target spectra [9]. The quality result of the detection process is 65% higher and false detection occurs when using a car with sunlight and spectral values. Engel and his team proposed a multi-object tracking approach which is based on a cascade ﬁlter of detector objects [10]. This ﬁlter is made up of the following constraints: the size of the objects, the weighting of the background, and the smoothness of the trajectories of the target objects.

**CONCLUTION:**

The experimental results obtained show that our system of tracking presents the best results by lusions The experimental results obtained show that our system of tracking presents the best results by using the Adaboost algorithm and SURF algorithm to detect a possible following vehicle. The proposed anti-tracking system has three mains parts: preprocessing, detection, and recognition. In the detection work, the proposed method was based on the AdaBoost algorithm with three cascades of classifiers (front view, left profile, and right profile) to detect vehicles in the video sequences. This algorithm, combined with good input image processing, is fast and robust in its ability to detect vehicles of different shapes and different brightnesses. The combination of three cascades allows us to obtain a higher rate of good detections. The SURF algorithm was used to detect previously detected vehicles in a new frame. An improvement can be made by enriching the base of images of different positions and rotations to cause several cascades of different poses—but that was not enough. We needed to find a system robust and accurate enough for our objective, so we improved the algorithm with a precise positive dataset, a feedback system, and a new segmentation method that gave us excellent results. Finally, the anti-tracking system determines which vehicle is a possible follower by running the recognition system.