

Real-time Collision Avoidance and Accident Prevention - A Survey

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Abstract: *With the increasing population in the country, the number of vehicles on road is also increasing. Every household has at least 2 or 3 vehicles, because of which the number of on-road accidents is also on the rise, in spite of government laws being enforced for the safety of the riders. This is due to the fact that rules are not being followed properly and many a times accidents occur with no fault of one of the driver, because most accidents tend to happen when there is collision at the rear end. Hence there is a need of technology in vehicles which detects probable accidents by taking into account various factors around the vehicle and sending appropriate alerts. This paper presents a literature review of various proposed technologies implemented in the previous years and their benefits and drawbacks are listed. A system is proposed which concentrates on the accidents occurring on the rear end, is able to predict them and send suitable alerts to the driver. The system proposed is portable and can be attached to any vehicle. Artificial intelligence in the form of video processing is used which can detect vehicles moving at dangerous speeds, and function in all conditions like day/night time, urban/suburban roads.*

Keywords: *Collision avoidance, Video processing, Rear End collision detection, Artificial intelligence.*

I. INTRODUCTION

Statistics show that the leading cause of death by injury is road traffic accidents. There are number of causes for which an accident can occur, some of them are; lack of training institutes, use of mobile phone while driving, unskilled drivers, driving while intoxicated, bad road condition, overloading, and poor traffic management. In this survey paper, we briefly review selected road accident detection techniques and propose a solution. Rear end crashes occur mainly due to the driver being distracted and fails to keep a safe distance from the leading vehicles. According to recent statistics, a major percentage of all traffic accidents involves rear end crashes. Although rear end collisions show a moderate rate of 5.6% fatalities compared to all other types of crashes, it represents the highest rate of injuries that is 31% and also the highest percentage of property loss,

being 33%. There have been enormous efforts to develop an algorithm in the field of Intelligent Transportation Systems (ITS). An intelligent transportation system (ITS) is an advanced application, which aims to provide services relating to different modes of transport and traffic management. It enables various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

Nevertheless, the existing algorithms preventing accidents are lacking of consideration in different perception-reaction time under facing with risky situations. To decrease the present high statistics of accidents caused by collisions, many ideas have been proposed for essential advancement in developing system meant for collision warning. A system based on vision and video processing has been proposed that could employ a camera to take video images and extract features from behavior of vehicles around and draw conclusion to avoid accidents. Artificial intelligence utilizes software program that analyze the images from the video to recognize vehicles and sends an alert if it detects a vehicle breaking a "rule" set by the programmer depending on his needs. This type of AI is known as rule-based because a human programmer must set parameters/rules for all the things that he must be alerted for.

With this background the main objective of this study is to provide frameworks on the development of methodology that can mitigate collision risk without being influenced by different human PRT. In this paper the basic idea behind many technologies implemented for this purpose has been analyzed and a system is proposed which is effectively able to detect rear end approaching vehicles, detect their relative distance and speed and therefore inform the driver about a probable accident.

II. EXISTING WORKS

A.T Suge and H.Takigawa and H.Osuga and H.Soma and K.Morisaki, propose installing four television cameras at a curved area on an expressway where motor vehicle accidents frequently occur, to experiment and verify whether accidents can be detected by processing images taken by these cameras. It was found to be an effective method for detecting accidents or stopped vehicles. Therefore, if accidents or stopped vehicles can be detected, an alarm can quickly be sent to the following

cars and urgent cars, thereby preventing secondary accidents, responding to accidents quickly, and reducing jammed time. They were also able to define an image processing algorithm that is robust with respect to changes in outdoor environmental factors such as sunlight, rain, shadows, etc. Also if the optimum camera installation height can be ascertained by measuring certain traffic volume parameters, the traffic count and speed can both be measured with at least 90% accuracy [1]. But the proposed method is applicable only to curved areas in an expressway.

Jung Lee considers video image detector systems using tracking techniques overcoming shadows, occlusions and no lighting at night [2]. They have derived the traffic information, volume count, speeds and occupancy time under kaleidoscopic environments, and propose an accident detection system using vehicle tracing stream. In future works, applications of the tracking system developed in this study should be tested based on various environmental conditions for any other sites. They have developed the accident detection system using tracking trace image. Real world problems such as shadows, occlusions and vehicle detection by nighttime can be handled by the system. However, the system does not work in all environmental conditions and land sites.

The traditional method of moving vehicles detection from video is: image subtraction which is apt to be affected by brightness changing, Wei Zhana and Xiaolong Ji propose a kind of moving vehicles detection algorithm based on optical flow: they estimate optical flow through two consecutive frames' image pyramids and compute every optical flow image's threshold with which images are to be segmented into binarization images, after that, through morphological transformation operator and rectangular splitting algorithm on images, moving vehicles' images will be extracted from background. Light change effect can be avoided [3]. The detection accuracy of optical flow is higher than that of temporal difference and image subtraction with background, so optical flow algorithm is more suitable for multiobjective moving. However the proposed system is easily affected by light change of surroundings.

Detection of accident through three parameters: acceleration/deceleration, tilt of the vehicle and the pressure change on the body of the vehicle is attempted by Fahim Bin Basheer, Jinu J Alias, Mohammed Favas C, Navas V, Naveed K Farhan and Raghu C V [4]. Using these minute data values and an apt algorithm, the accident can be detected with a reasonable success rate. And the coordinates of the vehicle found using GPS technology is send to the emergency services for help. This system has a lot of potential to improve the accident rescue operations but, a successful implementation of such a system needs more resources. There should be a well-structured system in place, to support this endeavor. The success rate of accident detection is reasonable in this proposed method. However the system has a lot of potential to improvement such as the accident rescue operations. More resources are require to implement the system.

The main objective of Hossam M. Sherif, M. Amer Shedid and Samah A. Senbel is to create a Real Time Traffic Accident Detection System (RTTADS) using

Wireless Sensor Network (WSN) and Radio-Frequency Identification (RFID) Technologies. Sensors installed in a vehicle detect the accident's location, the vehicle's speed just before the accident and the number of passengers in the vehicle. The sensors then send an alert signal to a monitoring station. The monitoring station, in turn, tracks the location where the accident has occurred and directs casualty alert to the authorities concerned [5]. Accidents can be detected by the proposed system in real time and by using built in sensors inform the supervisory program. But the disadvantage is that the system is not cost effective.

The work proposed by Pradhan Suwendu Kedaeswa and Venkatasubramanian Krishnamoorthy, proposes a mechanism that not only computes the deceleration of vehicles due to breaking and displays the breaking intensities through an array of LEDs but also involves monitoring the breaking intensity levels and communicate it to the vehicles that are following it in lambertian range of IR transmitter modules to avoid any collision pre-hand, due to any situation that may arise and cause immediate deceleration of the vehicle ahead. The system does not intend to notify other running vehicles except the ones that are following it or is in the lambertian line of sight of the array of IR transmitter lined in the rear bumper. These following vehicles are the most probable cause of rear end collision [6]. The system is quick in response in terms of response time. Increased efficiency as it is independent of any external infrastructure and is lower in cost . But the system does not intend to notify other running vehicles except the ones that are following it or is in the Lambertian line of sight of the array of IR transmitter lined in the rear bumper.

A real-time monocular-vision-based techniques for simultaneous vehicle detection and inter-vehicle distance estimation in proposed by Mahdi Rezaei, Mutsuhiro Terauchi, and Reinhard Klette [7]. The performance and robustness of the system remain efficient, even for highly challenging datasets. In the paper, a collision warning system which detects vehicles ahead and assists a distracted driver, prior to occurrence of an imminent crash, is developed. The system can also detect safe distances from the user vehicle to other vehicles. Adaptive global Haar-like features for tail-light segmentation, vehicle detection, inter vehicle distance estimation, virtual symmetry detection as well as an efficient single-sensor multi-feature fusion technique which enhances the robustness and accuracy of the algorithm. The proposed algorithm is able to detect vehicles ahead at both day and night and also for short-and long-range distances. Experimental results under various weather and lighting conditions (including sunny, rainy, foggy, or snowy) show that the proposed algorithm outperforms state-of-the-art algorithms. The system uses a mounted camera for real time data streams. The said virtual-symmetry detection is necessary for sensing vehicles at very close distances in addition to medium or far distances that can also be covered by the AGHaar approach. However the proposed system makes distance estimations, using only monocular vision which is inefficient.

A rear-end Collision Warning System (CWS) is applied for mitigating collision risk to the frontal motor vehicle under the traffic conditions D. Lee and H. Yeo [8].

Previous studies have been performed to address the braking behaviour related problems based on the deterministic or stochastic parametric methods. Multi-layer perceptron neural network based rear-end collision warning algorithm (MCWA) has been developed and evaluated through a comparison between the conventional algorithms such as Time To Collision (TTC) and Stopping Distance Algorithm (SDA). However, these algorithms are of doubtful validity in the context of individual driving characteristics such as Perception-Reaction Time (PRT). In the paper a framework on Rear-end CWS to take into consideration of PRT effects based on the Artificial Neural Network (ANN) has been proposed. The proposed algorithm could be used for rear-end collision warning in car-following case without the influence of different human PRT. The comparison study demonstrates that the MCWA outperforms other traditional algorithms. In particular, the rate of false warning is significantly reduced. The MCWA shows noticeable performance improvements for predicting the potential rear-end collision by detecting the critical deceleration rate in advance, however, it requires a considerable learning time depending on the characteristics of input data. In order to reduce the learning time, there are several variations of the MCWA that may be further considered in future study.

An Android based application that detects an accidental situation and sends emergency alert message to the nearest police station and health care center is developed by Adnan Bin Faiz, Ahmed Imteaj and Mahfuzulhoq Chowdhury [9]. This application is integrated with an external pressure sensor to extract the outward force of the vehicle body. It measures speed and change of tilt angle with GPS and accelerometer sensors respectively on Android phone. By checking conditions, this application is also capable of reducing the rate of false alarm. The approach is capable of deciding whether a situation is an accident and if so, then immediately traces nearest police station as well as hospital and sends emergency alert for help. Though the system requires a continuous Internet connection, but this it is very much cost effective and can be applied significantly in the practical world.

A surrogate safety measure which can be used for preventing dangerous roadway events by calculating the potential safety risk by using information on the driving environment obtained from vehicles [10]. A safety measure known as DSSM (Deceleration-based Surrogate Safety Measure) is used as a safety indicator for rear-end collision risk calculation based on the safety conditions and the decision-making process during human driving. How drivers deal with the risk of collision in acceleration and deceleration phases is shown by the DSSM. The said surrogate safety model has been verified for severe deceleration behaviour, which is critical for driver behaviour in high-risk situations of collision based on microscopic vehicle trajectory data. The measure could be used for collision warning and collision avoidance systems. It has a merit in that it reflects the characteristics of both vehicle (e.g., mechanical braking capability) and driver (e.g., preference for certain acceleration rates). DSSM, which reflects both mechanical performances of individual vehicles and the behaviours of individual drivers. Such measure is used for evaluating rear-end collision risks in 143 different cases involving

even car-following situations. DSSM can estimate collision risk with greater discriminating capability than other measures. Both mechanical performances of individual vehicles and the behaviours of individual drivers is taken into consideration. But any lane changing vehicles, cut-in vehicles, and other classes of vehicles are not considered by the system.

A comprehensive solution to both accident detection and ambulance management is proposed by Hari Sankar S, Jayadev K, Suraj B and Aparna P [11]. When the in-vehicle accident detection module reports an accident, the main server automatically dispatches the nearest ambulance to the accident spot. The android application used by the ambulance driver assists the driver to reach the location quickly and safely. Automation of accident detection and ambulance dispatch, along with providing guidance to the ambulance driver, is achieved here. The adoption of a comprehensive package for both road traffic accident detection and ambulance management helps save crucial time towards post traumatic medical care and reduce mortality rate. But information relay delays are not taken into consideration by the proposed system.

A smart and reliable IoT system solution which instantly notifies the PSO headquarter whenever an accident takes place and pinpoints its geographic coordinates on the map is conveyed by Elie Nasr, Elie Kfoury and David Khoury [12]. When an accident takes place, a shock sensor detects it. Then, an algorithm is applied to process the sensor signal and send the geographic location along with some ancillary information to the PSO headquarter, indicating accident occurrence. This is a promising system, expected to aid in the tedious rescuing process by reporting in a matter of seconds the location of an accident, the passengers injured, blood types, thus lowering death's rates. The geographical data collected from this system could be relied upon as admissible evidence or indicator of the road state and conditions. Results showed that this solution provided many advantages compared to traditional systems, namely, minimizing injured passengers interaction, providing basic medical information to rescue teams, recognizing exact and accurate accidents locations, and facilitating the routing process. Reliability test showed that the system is robust, that is, available and serviceable. But the load on the server is not considered.

Pedestrian detection is an important and challenging area in computer vision with the potential to save lives. In this context, paper [13] proposes a camera setup, which consists of two stereo cameras with different focal lengths and baselines, allowing having higher pedestrian resolutions on images for a larger range of distances in front of the vehicle. Experimental results reveal a considerable enhancement on the detection performance, overcoming the difficulty caused by the reduced scale that pedestrians have on images. The main difficulty of the current state-of-art approaches on pedestrian detection is to detect pedestrians far from the vehicle due to their reduced scales, which is undesirable for situations with fast moving traffic. To overcome this problem and make existing algorithms more applicable to autonomous vehicles, this paper proposed a camera setup formed by two stereo camera systems with different focal lengths and baselines, allowing to have pedestrians in higher

resolution for a larger range of distances in front of the vehicle.

Dr.D.Selvathi, P.Pavithra and T.Preethi, provide an intelligent system for two wheeler's accident prevention and detection for human life safety [14]. The prevention part involves, Smart Helmet, which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving. The relay does not ON the engine if these two conditions are not satisfied. The microcontroller controls the function of relay and thus the ignition. The system also enables detection of an accident at any place and reports about the accident to predefined numbers with GSM module. The Microcontroller continuously records all the parameters of automobile for prevention and detection of accident. But this system can be used only in highways.

To lower the traffic accidents in highway systems, it is important to assure the highway can be used only by vehicles. If someone accidentally enters the highway without noticing the potential danger, some traffic management system may give out an alarm to the pedestrian using modern technology [15]. A pedestrian detection algorithm with optimized detection method of region-convolution neural network is proposed and implemented in to a real time monitoring system. Convolution neural network avoids the complicated and tedious steps of image pre-processing and can input the original image directly. R-CNN is proposed on the basis of CNN, in advance to extract a series of possible candidates for the object area, then to extract features and to judge only in these candidate areas. In this paper, with convolution neural networks, we build an end-to-end deep learning framework to implement pedestrian saliency detection and warning systems at entrances, exits and important places of highway. Most of the progress of pedestrian detection on the decade before 2014 can be attributed to the improvement of individual features. But after 2014, the method of deep characteristics become more and more predominant and gradually replaced the original hand-craft features. However, there are also some people in the study of how to combine the hand-craft features and deep features, so that both can learn from each other to cut back learning time, reduce memory consumption and improving accuracy in the same time. But the said system is applicable only in highways.-

A system that sends information messages to nearby emergency services about the accident location for timely response is absolutely in need. In research literature, a number of automatic accident detection systems are proposed by numerous researchers. These include accident detection using smartphones, GSM and GPS technologies, vehicular ad-hoc networks and mobile applications. The implementation of an automatic road accident detection and information communication system in every vehicle is very crucial. [16], presents a brief review on automatic road accident detection techniques used to save affected persons and proposes a different approach to find solution to the problem. An automatic road accident detection technique based on low cost ultrasonic sensors is also presented. These techniques include smart- phones, GSM and GPS technologies, vehicular ad-hoc networks, and mobile applications. These systems aim to timely inform emergency services about the location of accident, in the

process of saving precious lives. Among these four accident detection methods, accident detection using VANET is the best method because it not only detects an accident but also provides optimum route to the ambulance to reach the accident spot as soon as possible. However, the challenge to immediately detect the accident with the appropriate technology still needs extensive research and development efforts. Although the presented solution is well suited to detect an accident, however there are limitations. The ultrasonic sensor module that we have chosen has a maximum range of 4 meters, hence the range is very less. Also position of the sensor module is an critical consideration as the example ultrasonic sensor detects the reflected waves up to 15 degree. Therefore, an inappropriate sensor placement may cause the false alarm.

In order to avoid the accident where a vehicle collides with the one ahead, a novel vehicle brake behaviour detection method is proposed by using a camera or mobile device fixed on the windshield of the test car which is utilized to capture the front vehicle information [17]. The brake behaviour detection in includes two procedures, brake lights region detection and brake behaviour decision. For the first procedure, threshold segmentation and proposed horizontal- vertical peak intersection strategy is used to filter and generate the credible rear-light regions of the front vehicle in the YCrCb colour space converted from the original RGB colour space. For the second procedure, the sophisticated SVM classifier is trained to detect the brake behaviour of the front vehicle. The vehicle detection engine which is developed by Nokia detects the front vehicle, and then the proposed brake-light regions detection and brake behaviour decision method are used to detect the brake behaviour of these vehicles. At the end, results of the brake behaviour, whether the vehicle has brake behaviour or non-brake behaviour is found. Less threshold for brake-light regions localization improves the robustness in different traffic environments. But the precision and efficiency of red colour vehicle detection is not addressed in this system.

A vehicle detection and inter-vehicle distance estimation using a single-lens video camera for driver assistance on urban/suburban roads is proposed [18]. In this work, the still area of frame inside the host vehicle is first removed using temporal differencing, followed by detecting vanishing point. Segmentation of road regions is then conducted using vanishing point and road's edge lines. Shadow regions at the bottoms of vehicles verified using the HOG feature and an SVM classifier are utilized to detect vehicle positions. The distances between the host and its front vehicles are estimated based on the locations of detected vehicles and vanishing point. Experimental results show varied performance of vehicle detection with different scenes of urban/suburb roads and the detection rate can achieve up to 94.08%, indicating the feasibility of the proposed method. This paper proposed a simple yet efficient inter-vehicle distance estimation method using a single-lens video camera on urban/suburb roads. To verify the performance of the proposed method, five image sequences of Urban/suburb roads with various weather situations were used. The results show average DR and FAR values of 82.21% and 16.16%, respectively, indicating the feasibility of the proposed method. Besides, the proposed approach is computationally efficient since it is based on edge detection, line searching, and shadow

extraction from image sequences. The disadvantage of this system is that only detection of vehicles and inter vehicular distance is performed, whereas collisions on vehicles is failed to be detected.

A real-time vehicle detection system of two steps: hypothesis generation and hypothesis verification is proposed by Gang Yan, Ming Yu and Yang Yu [19]. In the first step, potential vehicles are detected using shadows under vehicles. In the second step, hypotheses generated in the first step are classified as vehicles and non-vehicles. The research is focused on constructing two types of histogram orientation gradients descriptors to extract vehicle features, and then combining them to obtain the final features of the system. The AdaBoost classifier is trained by the combined histogram orientation gradients features. The Treatment Group of images vehicle dataset is adopted for the classifier training. The experiment results show that the proposed system performs well in accuracy and robustness and can meet real-time requirements. This study proposes a real-time vehicle detection system using a monocular camera. The experimental system included two steps: the HG and HV steps. In the first step, the shadow was taken as the only information for generating hypotheses which only cost 0.01s run time per frame and also guaranteed the precision ratio because each vehicle on the road cast a shadow. In the HV step, a series of HOG feature vectors were extracted. Both SVM and AdaBoost classifiers were trained using these features. Based on a comparison of the results of these two classifiers, it was concluded that the AdaBoost classifier performed better in terms of accuracy and run time. Such a system cannot run in real traffic scenes. Considering the drawbacks of the HOG features, they constructed two HOG descriptors that can generate features with lower dimensions and contain more vertical and horizontal gradient features, to fit the vehicle structure. However when vehicles occlude with each other, shadows under vehicles may join together which can affect The detection accuracy.

A vehicle overtaking detection method using RGB-D data captured by the Kinect device in simulated traffic scenes is given by Yingjie Xia, Chunhui Wang, Xingmin Shi and Luming Zhang [20]. Vehicles are detected and tracked with a robust traffic scene understanding on RGB-D data. The depth data is utilized to recognize vehicles overtaking by analyzing the posture change of vehicles in different scenes. The principle of vehicles overtaking detection is to fit the line of vehicle side in the coordinate system and calculate the angle between the vehicle side and the road orientation. Therefore, the posture change of the vehicle can be recognized. The proposed method is evaluated using simulation experiments which show that their work has good performance in vehicles overtaking detection and tracking. The two steps of the proposed method have been tested in different simulation scenes and different lighting conditions. The experimental results show the effectiveness of 3D vehicle tracking and overtaking detection algorithm. The primary contribution of our method is the utilization of depth data which is a feasible supplementary to 2D vehicle detection and tracking. By rectifying the incorrect depth data and filling in the missing data, the algorithm can track the vehicles more accurately and give more reliable judgment about overtaking. In addition, the method to detect other steps of

vehicle overtaking such as changing lane and accelerating will be developed. However if there is an incorrect depth of data or missing data by any chance, it may lead to errors.

A video image processing algorithm is proposed: which detects, tracks and finds the number of vehicles on road by Mallikarjun Anandhalli and Vishwanath P Baligar [21]. Vehicle tracking is done using Kalman filter with the data association. They propose a novel idea to detect, track and count vehicles on road and it has been implemented using Raspberry Pi 3 using open CV and C++. A system with Raspberry Pi and USB camera is being used for real time vehicle detection, tracking and counting. Density of vehicles running in the particular road is determined in real time. The results of the proposed method in terms of its accuracy and time taken are better compared to rear view vehicle detection, tracking method and morphological operation method. Detection of the vehicle and tracking made by the system is reliable. But only vehicle detection and tracking is performed. Collision detection if any is disregarded.

The system proposed by Manuel Fogue, Piedad Garrido, Francisco J. Martinez, Juan-Carlos Cano, Carlos T. Calafate, and Pietro Manzoni, consists of several components with different functions. First, the vehicles should incorporate an OBU responsible for detecting accidents and communicating information about dangerous situations. Next, the notification of the detected accidents is made through a combination of both V2V and V2I communications. Finally, the destination of the information is the CU that will handle the warning notification, estimating the severity of the accident and communicating the incident to the appropriate emergency services. The first goal of the OBU consists of determining when a dangerous accident occurs. In the traffic accidents domain, there are two main events that could cause severe damage to the passengers in a vehicle: rollovers (overturns) and strong impacts. Currently work with the Applus+ IDIADA Automobile Research Corporation is being carried out to develop a realistic accident detection algorithm based on information that characterizes different types of accidents. The system requires OBU's to be installed in vehicles, which is responsible for detection of accidents and notifying them to an external CU, which will estimate the severity of the accident and inform the appropriate emergency services about the incident. The mechanism of the system is efficient for replacing the identification and notification of accidents based on witnesses, who may provide incomplete or incorrect information [22]. The development of a low-cost prototype shows that it is feasible to massively incorporate this system in existing vehicles. However, incomplete or incorrect information is provided after a long time.

Zi Yung and Lilian S.C. Pun-Cheng, give a literature review on vehicle detection under varying environments. Vehicle detection may face different problems and challenges due to the variability of on-road driving environments. Therefore, various approaches have been proposed, and can be classified as motion-based methods and appearance-based methods.. In the future, efforts should be focused on robust vehicle detection approaches for various on-road conditions. A comprehensive review of vehicle detection approaches and its applications in

intelligent transportation systems has been presented, with a specific focus on varying environments. Then, traffic surveillance subjects are discussed that can be achieved using vision-based vehicle detection approaches, such as vehicle counting, detection of traffic incidents. There are many environmental factors in outdoor videos that control the image background, and vehicle detection under varying environments are summarized in terms of illumination and weather condition.

III. PROBLEMS TO BE ADDRESSED

In the literature survey, it has been inferred that, all the previous works on this topic either involves a system in which, the mechanism used to collect real time data such as camera, sensors etc. are all placed external to the vehicle, such as in a curved area on an express way, lanes and roads or are placed in front of the automobiles to help in driver assistance, vehicle tracking and detection. Systems proposed, developed and implemented so far, hardly enable us to detect collisions and have no protocols in place if in case an unavoidable collision happens, beside most of the systems concentrate on front end collisions. Rear end collision detection systems are very few, and use methods such as detection of breaking intensity and communicating to other vehicles, use of neural networks etc. Also existing rear end collision detection systems have not considered the challenging problems of lane shifting, collisions while turning, detection under different lighting conditions and night time detection, problems of shadows, occlusions, pedestrians, animals and other objects while detection, problem of constant and distracting notification alerts, and the problem of working under damaged conditions when an actual collision happens. The existing systems also do not contain an interface, so that the user is able to personalize the system.

IV. PROPOSED FRAMEWORK

To address the above stated problems, we propose a portable system, attachable to any vehicle. The said system is an improved rear end collision system that is based on image and video processing. The features of the novel approach are as specified: The system can detect whether the vehicles approaching from the rear end are moving at dangerous speeds or not using image and video processing and send audio alerts. The system is adaptable to the users speed at all time, that is if the speed of the user is less than a certain threshold value; the system should not send any alerts or should be switched off. It should turn on again only if the speed of the user rises above the threshold value. The system proposed is able to work in all conditions which include: urban/suburban roads, highways and city traffic. The system can function in all lighting conditions such as daytime, dawn/dusk and night-time. The system should detect change of lanes and turning of user and focus on the side of change in such situations. The system distinguishes between pedestrians, animals and shadows from vehicles and actual threats of collision. The system should also be able to work in damaged conditions, when an actual collision occurs, to be able to send emergency alerts to the nearest health centre and guardians of the user. The system should have an easy to use interface, to allow the user to personalize the device for a particular vehicle and liking.

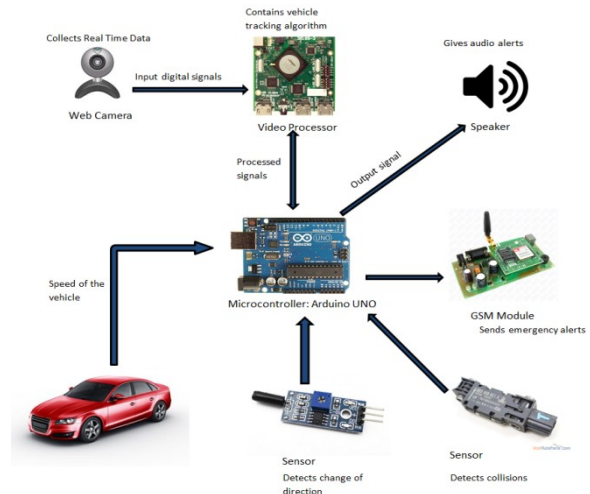


Fig 1. Architectural Diagram for Accident detection

The web camera sends the line feed to video processor, which houses algorithm to detect traffic. Based on the traffic detected, instructions are given to speakers, to speak out alert messages. Also based on the indicator, a particular section of the road is diagnosed on traffic, to help the driver take turns. Based on the wheel speed, the algorithm gets activated/deactivated to avoid continuous alarms during traffic signals. Also in case of accidents, which are sensed by crash sensors, a message can be sent to a predefined location/device.

V. CONCLUSION

The study conducted in this paper presents a comprehensive review of vehicle detection approaches and its applications in intelligent transportation systems, with a specific focus on varying environments has been proposed. Vehicle detection based on imaging technologies has attracted much attention in past decades, and will remain an active research area in the coming years. From different vehicle detection approaches summarized above, we get the conclusion that each method is suitable to one or two specific conditions, and there is a lack of universal method to automatically detect vehicles under varying environments. A system has been proposed which considers all the above factors and is also attachable to any automobile and can become a universal method to effectively avoid accidents on roads.

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