A Survey on Car Collision Avoidance System

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**Abstract** - Factually the Human life is most important things. The vehicles becomes in the second stags after the plans in terms of security. The accidence occurs mainly divided in to three parts as for the first part due to driver itself in terms of high speed, carelessness, drunk, health conditions, inattentive, distracted tired, Fall unconscious or bad estimate the distance on the road. In conjunction with the second part return to the bad weather statues in connection to the third part is to the road infrastructure itself.

In this paper is a survey paper discussed a substantial number of deferent principle to avoid accidence.

Indeed car collision avoidance system (CCAS) considered as indispensable system to alert the driver and take decision to make the action in the pre matureness time to avoid the accidence.

I. INTRODUCTION

As a matter of fact with the emerging of new technologies in different field of science the human life has become more comfortable and effortless. Advancement of embedded technologies in automotive industries makes the human life safer and convenient for living [2]

In the last two decades years the numbers of vehicles is increased by bewilderingly. Although the embedded system technology is developing and the numbers of vehicles is increasing therewith the accidence play a big role in the fall back this development.

Indeed the road accidents now days is reflect a negative image physically and financially. And the one of the major challenges in recently days is to save the human’s and animal’s lives.

Well the main cause of the collations is return to three factors the vehicle, the driver or environmental conditions. But, 77 percent of all traffic collisions are caused by driver error leaving 23 percent for vehicle malfunction or environmental conditions, such as light, weather, road or traffic. The most common errors committed by drivers are excessive speed, failure to yield the right of way, following too closely, improper turns, improper passing and improper backing [10].

The question that poses itself how can we avoid perilous consequence from the accidence. the assure of this question there was born the car collision avoidance system (CCAS).the main goal of this system to avoid loss of life and this system play a big role in safety technology for the vehicle. This system provided by substantial number of sensors. These sensors have many aims like detect the objects and check the driver health conditions such as (heard rate, drunk, and illness) in addition to that the system were provide by camera, Radar and laser additionally by the (GPS) and (GSM)

All these technologies are work together as one system to avoid the accidence as much as possible and send the useful report for his driver family or the police if any thinks happen.

II. LITERATURE SURVEY

In February 28, 2015 study by Smart Computing Review presented the Driver Authentication and Accident Avoidance System for Vehicles. The method it was build
the system to avoid the accident and save the human life and the system was provided by substantial numbers of sensors all these sensors work as a subsystem such as Alcohol Detection System. This system mainly is designed to know the driver conditions if he is drunk or not. And if the driver is drunk the system will automatically define that and turn off the engine and the car can’t work until the driver is outreaches from the drunk and alerts the driver by tune. The methodology of his work is to measure the breath to determine alcohol consumption.

In connection to the second method that he was used is heat rate sensor and this method basically measure the heart beat signal in beats per mints. If the driver heart rate is normal that is ok otherwise send the alarm message to hospital that’s means the driver in the critical position or has heart attacks.

With regard to that there are another method named human identification method. The principle of this method is to tell the driver by the number of human inside the car because if any one existed inside the car by default the car’s window is closed and this issue make asphyxia by time. And this system automatically open the windows if there is someone inside the car without the driver knowing and send a warning to the driver. [1]

In MAY 8, 2015 project by ARPN Journal of Engineering and Applied Sciences
Presented predictive vehicle collision avoidance system using raspberry-bi it seemed like to avoid accidence in the blind spot area using ultrasonic sensor using raspberry-bi module. The ultrasonic sensor work like radar system to detect the obstacles in the blind spot that can Couse the accidence but it is cheaper than it. In addition to that the ultrasonic sensor is used to measure the distance between the vehicle and the obstacles and saved the distance safe before fatalities happened and alerting the driver before the accidence using two ways visualization using light emitting diode (LED) and make a sound using buzzer and the driver alone apply the brake or steering to controlling on the speed.

The main advantage of ultrasonic sensor is that it provides highest reliability in getting proximity and has less absorption than RF and IR frequencies. [2]

In DEC 2, 2013 study by International Journal of Computer Trends and Technology
Presented Advanced Accident Avoidance System for Automobiles. This paper discussed the most important factors of accident due to the intersection accidence and the bad weather and this whether to some extent either the heavy rain, huge ice or high darkness. Indeed this bad weather conditions the driver feel very harsh to drive the vehicle and can’t controlling the car. In this paper there are for types of sensors such as lmn35 temperature sensor and humidity sensor and those sensors are used to check the weather states and alert the driver if any thinks happen in the weather. And there are a substation number of ultrasonic sensors to detect the near car and infrared sensors used to detect the forward cars by using burst of light to measure the cars speed, distance and position those sensors were fixed in the both car sides and in the forward of the vehicle to avoid all the cars and any barrier and alert the driver. This system were provided by Global System for Mobile communications (GSM) and Global Positioning System (GPS) module. If the accidence were happened then the system automatically take apposition of the car and send it to the police office and the driver family to save the driver and passengers health. [3]

In November 5, 2012 study by International Journal of Soft Computing and Engineering
Presented Vehicle Collision Avoidance System Using Wireless Sensor Networks. This paper presented the make use of the wireless sensor network (WSN) to transmit the measured data in avoidance system and the using the controller area network protocol (CAN) bus to revive the data and connect the data with the controller to controlling on the actuators. Actually this system mainly consist of laser transmitter and receiver. And the laser transmit a burst of electromagnetic radiation and when this radiation reflect by the barrier then this reflect light transmitting via Zig Bee module to the controller using 2.4 GHz in this step the data that received by Zig Bee receiver then the controller decide about the barrier and send the
In Jan 1, 2015 project by American Society for Engineering Education presented Vehicle Collision Avoidance System. This paper presented and discussed the vehicle collision avoidance system and alert the driver by every things surrounding the vehicle audible and visualize this is to decrease the number of accident and reduce the human and economic losses. Although they are used the ultrasonic sensor to cover all the blind spot area and then they used radar system and video. It is one of the most popular method in long rang detection for frontal collision avoidance system but it is an active type of detection, as for the Video on the other hand is passive, meaning that it simply receives light from its surroundings. Active detection systems are often more expensive because they require more equipment. On the other hand, they are typically more reliable than passive systems. In connection to there are additional method for car avoidance detection system and this system were provided by vibration sensor. When the accident were happened then the vibration sensor can know the accident and the system provided by GSM and GPS module. The GPS module determine the car location and send this data via GSM to his/her driver family and the police to save the driver and passenger lives. And the system were provided by camera used in avoidance system by using image processing and this method is very accurate and long range detection but the camera technology is expensive and it difficult to implement with the complex recognition algorithms needed. This system provided by Graphic LCD to view the map and the car tracking system.

In 2015 project by American Society for Engineering Education presented Vehicle Collision Avoidance Application. The application presented in this paper is intended to prevent accidents by notifying the driver of immediate obstacles and dangers found on the road. The application is based on broadcasting packets on a local network to communicate between vehicle to vehicle communications. The vehicle has a network of sensors from proximity, laser scanners, and global position system (GPS). The data is collected and computed by the on board computer that broadcasts the data to local area vehicles. And vehicle to vehicle communication area and this work done by two groups as for the first group is research and development (R&D) in connection to the second group is simulation and implementation design. And the main aim of this project is to alert driver before accident happened to reduce the lost human lives. Here the driver dealing to the graphic user interface (GUI) and this GUI was developed to alert the driver by the bearable vehicles. There for the system was implemented in the high traffic conditions. And the distractions play a big role in the accident occurs and one of the most distraction reasons talking on the cellphone during driving and the second reason driving the car when you are drowsy.

In July 7, 2015 project by International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering presented PCS Based Vehicle Collision Avoidance and Communication System. This paper discussed car avoidance system from rear using pre-collision system technologies (PCS), and forward collision warning (FCW), and the pre-crash break assist (PCA). All this technologies work together as one system and the FCW is used for alerting driver, moreover PBA used for amplifier the alert sound of break effect, and autonomous pre-crash braking (PB) systems are called Pre-collision system (PCS) components and are currently implemented separately in the newly manufactured vehicles and this systems are collecting his data for behind and both side of the vehicle and transmit the data using vehicle to vehicle communication (V2V). This system were used if the roar has a substantial number of vehicle or above and avoid accidence if the forward car has been stopped. This system consist of radar system, speed sensors, steering angle sensor and airbag control system. These sensors work to together to avoid accidence. The FCW is the system designed that to warn the driver through visual, audio or tactile, the
PBA is triggered when the driver is applied the break and the vehicle enter in the emergency region PB is intended to autonomously add to the vehicle’s braking deceleration. The vehicle collision avoidance system (VCAS) is a device that consists of a microcontroller, vibration sensor, ultrasonic sensor, RF transceiver, GSM and a GPS. There is also other or near vehicle section. This system consists of a microcontroller decoder unit, alarm unit and a reader device. The Vehicle Collision Avoidance System (VCAS) provides the vehicle navigation solution for the striking vehicle and the other vehicle section provides vehicle navigation solution for the struck vehicle that is the behind and side vehicles. This VCAS is used only for the rear –end vehicle collision mode. [7]

In 2013 project by American Journal of Engineering Research (AJER) presented Internet of Car: Accident Sensing, Indication and Safety with Alert system. In this paper we are discussed the how to use ultrasonic sensor and radar system and laser to detect the obstacles such as humans, animals or vehicles and send the car and driver information to the police and their siblings and controlling of the brake system, the steering system and doors. And determine the accident coordinates and send the data via GSM module in addition to that the data can send the data via Wi-Fi to the twitter.

Actually the main technology used is Obstacle detection & indication sensor in this method we use the photoelectric sensor it is mainly consist of transmitter and receiver the distance can be measured by visible light interference and the distance required can be adjusted as you want. In the two side of cars there are two sensors to detect the obstacles the indicator used the red light emitting diode (LED) wen it found obstacles.

Subsequently the second method is used is passive infrared (PIR) sensor or we can said human detection sensors. The importance of this sensor to detect the human near the car and give the car order to avoid this human. The principle of this sensor is transmit infrared radiation exist in the electromagnetic spectrum. These spectrum cannot visible but can detect the human.

To detect the accident here they used complex three axis accelerometer. This sensor mainly detect the accident when the car deviate by angle from the road in addition to that the system were provided by relay circuit to protect the car from battery ignition when the accident occurs and this system used GUS designed by android platform to monitor and tracking the vehicle. [8]

In 2013 project by Mobile Eye Vision Technologies presented Forward Collision Warning with a Single Camera. This project touch a very significant point that is why one of the most challenges now days how to avoid accident before happened. And safety the driver, passengers and pedestrian lives. And Lack of attention by the driver is identified as the cause for 91% of driver related accidents. As a matter of fact MobilEye’s vision based FCW system including experimental results. The algorithm described in this paper computes the Time-to-Contact (TTC) and possible collision course directly from the size and position of the vehicle in the image - which are the natural measurements for a vision based system - without having to compute a 3D representation of the scene.

Well there are camera and it is fixed rear and front the view mirror. The main aims of this this mirror is tracked the vehicle and determine the coordinate.

By using this camera we can determine the road ends and stick to the lane marking. Thus it combines together on the same platform Forward Collision Warning, Lane Departure Warning and Headway Monitoring. It can also be connected to active safety systems. And one method for FCW analyzed in uses time to contact (TTC) to trigger the warning. A Forward Collision Warning (FCW) is issued when the time-to-contact (TTC) is lower than a certain threshold. After computing the TTC and determining that we are rapidly closing the distance to the target the second half of the FCW system goal is to determine if we are in fact on a possible collision course. [9]
In 2014 project by European Journal of Engineering and Technology presented a vehicle accident and avoidance system for protecting passengers and vehicles. This paper discussed the accident in the last years becomes premonition dreadful cyclonically and financially and yearly there are a lot of person lost his lives from the road accident. The main reason of those accident due to the driver itself as take the wrong decision and this decision cause a lot of harm on human level and vehicle itself. Wherefore orphan laser radar, microwave radar and camera for blind spot area monitoring to detect obstacles on the head road. Beyond all questions the laser radar is used for distance sensor and make a vehicle in the safe distance and if there is no target the system is provides speed controller but when the obstacles is detected then the system were automatically turn on the (AICC) technologies and it is automatically controlling of the distance by keeps the same speed as the target vehicle at a safe distance.

The system has to a large extent performed according to design expectations and specifications. The obstacle’s distance to the transmitter is predicted by the time of arrival of the reflected signal, while the approaching angle is also determined by the angle of arrival method so employed in the design which was helpful in determining the appropriate positioning of the receivers for optimal system performance. Furthermore, the use of double receivers enabled the prediction of direction of obstacle. [10]

III. CONCLUSIONS AND FUTURE SCOPE

The system has to a large extent performed according to design expectations and specifications in this paper there are a lot of principle are illusive like Dhivya M and Kathiravan S discussed different method such as Alcohol Detection System, heat rate sensor and human identification methods. And Sumit Garethiya et al, S.Ramesh, et al, DR.Nesreen Alsbou, et al, S.Sivajothi Kavitha, et al, and AIUB, Bangladesh, et al handle on his principles the ultrasonic sensor, leaser and radar system and relay method. But S.Ramesh has used zig bee as transmitter module and LCD for display the result. But DR.Nesreen Alsbou, et al adding GPS and GSM technologies in addition to that in differ project they added a proximity sensor and laser scanner. But S.Sivajothi Kavitha, et al adding new technologies such as vibration sensor and RF transceiver. But AIUB, Bangladesh, et al adding on his principle Wi-Fi technologies and PIR sensor and GUI used with twitter. And T.U.Anand Santhosh Kumar et al discussed how to make use of the temperature sensor, humidity sensor, ultrasonic sensors and infrared sensors and GSM, GPS technologies. And Erez Dagan, et al and Mbachu, C, et al discussed differ technologies such as Mobile Eye Vision Technologies using camera. But Mbachu, C, et al used additionally technologies such as orphan laser radar, microwave radar

As for me personally I suggest to build a system involve ultrasonic sensor and leaser sensor in addition to that camera and radar system to avoid the accident as much as possible because the weather conditions in Sudan in change diametrically by week. Thus the different technologies on the vehicles reduce the accident too much in addition to that the camera image processing help a lot to avoid the accident that the road play a big role on it due to split road.

REFERENCES


