

COLLISION AVOIDANCE TECHNIQUES IN WIRELESS SENSOR NETWORKS: A REVIEW REPORT

Ms. Mohini Thakur¹, Dr. Amit Bindal²

*¹M. Tech Research Scholar, ²Assoc. Professor, Department of Computer Science,
Maharishi Markandeshwar University, Mullana (India)*

ABSTRACT

The basic idea of Vehicular Collision Avoidance system is to improve the safety measurements of vehicle by using Wireless Sensor Networks. According to the latest National Crime Record Bureau(NCRB) report revealed that every year more than 135000 traffic collision related deaths occur in India, if these collision are not controlled at early stages they might cause huge economic problems. There are Electronic controlled unit (ECU) which are programmed to handled specific type of collision avoidance like Head on collision of the vehicle on to an obstacle in its line to site, Collision avoidance at blind curves and cross roads or Locating the vehicles status and to be raise alarms in case of breakdown.

Keywords: Collision, Optical Sensor, LCD, GPS

I. INTRODUCTION

Previous researches signifies that 94% of all accidents are in cities concern with police, previous accidents, passing the vehicles that aren't understanding about right or left side movement and not understanding constitute 85% of each cases are harmful[1]. A previous mishappenings with vehicle is hit by a trailing vehicle, as a result of forward change in vehicles speed, emergency and hard brake which are associated in previous accident. STRADA (Swedish Traffic Accident Data Acquisition) conduct an examination that's shows 90% of posterior effects and overpower crash with trucks[4]. The most widely perceived rear message and effects are passing to the principle vehicle is accident where a vehicle back is crushed by staggering truck. Basically every year 1.54 million peoples are passed near around the overall output about mischance is Approx. 30 to 60 million peoples having the nonlethal wounds in street mishappenings. In this case that this street mishappenings sequence proceeds with then and street lose the chance and will be exhaust by close around 70% and that's a actual reason for death .The street lose the chance term in financial concern, the street misshapen wounds add up to US dollar and these assessed at \$520 billion, which is

near about 1% gross of the item of national which districts having the low pay, 1.5% gross which having nations normal or center type of salary and near about around 2% gross which having nations high pay[2].

The driver is completely concentrate towards to the driving and tiredness towards to the driving or weakness or lost in music or driver sleeping [3]. So that diversion workout perhaps things are drinking or eating, or chatting on mobile phone,listening and use external luxury devices in vehicle innovations as like music radio framework,visual diversion mean looking outside the way or bio-mechanical diversion means playing with the radio framework .sound-related diversion mean listening or chatting on wireless[7].

Tiredness or weariness is reason for street to lose chances that's the reason to nearly 20 to 30% of street mishappenings or accidents happen because of the driver tiredness. So in that case and presence of mind are most influenced when driving the vehicle. Essentially four lack of weariness are generally implies substantial physical work, sluggishness, neighbourhood means muscle issues .mental weakness means aren't having vitality to do [5]. As the drivers have ability to keep moving through has a key part in the play in suspicion of such effects, a mechanized figures that helps the driver [6].

The late development structure in the auto business are unify in order to get vehicle motorization techniques like to avoid accident (which uses lasers to find out the things near around the vehicle and if when the vehicle go nearer to any obstacle, brakes will be associated), delight devices pushed wellbeing highlights, and part more [5]. The use of (ECU) electronic control units in vehicles is increasing rapidly, making the communication between them by especially mind boggling. Multiplexed communication was at last made to the interconnections (joins) to decrease between the ECUs.

II. EVOLUTION OF TECHNOLOGIES

2.1 Cooperative based

In this proposed model, the useful way of do doing work on radar depends on coordination, label on the vehicles and other ways, are potential thruway are risky .This model is having consonant reflectors in shefer's radar which is label as the target work The view of double mode radar model is labeled and focus as same as consonant radar doing approx. 100m. The disadvantage of this model is not detecting the pathway abilities [8]. The useful control idea are combined to the vehicle or managed blow the evasion framework. The model (framework) of engineering and evasion framework or to give over free and full controlled vehicles [13].The model proposed a show based information sending system to Intra Company Dedicated Short Range Communication (DSRC) and Cooperative Collision Avoidance (CCA) utilise joins. ITS System which is introduced by Tarik Taleb. The proposed method firstly bunches vehicles as per the part of the development. The critical level reflects the risks of a vehicle to join the crisis circumstance in the company. The CCA framework is named as Cluster-based Risk-Aware [17].A Collision Avoidance Algorithm is Based on the imaginary Target Approach in to Cooperative Unmanaged Surface Vehicles the framework was introduced by Marco Bibuli. The introduced crash evasion method is not working properly with the dispersed direction subpart effectively created for agreeable and giving the route of USVs, specifically with Wingman-based coordination plan and Cooperative Path Following [24].

2.2 Radar Based

Autonomous Collision Avoidance system is Steering by the model (framework) introduced by Andreas Eidehall. They shows another security of car called (ELA) Emergency Lane Assist. ELA joins simple path direction model with a danger appraisal subpart that to enact the path direction that direct by the genuine risky modules of path flight. The ELA security depends on to measure the technique that assesses a rundown of the wellbeing ideas and attempted to boost the effect to lose the chance measurements while minimizing equipment segment costs. ELA keeps effectively mediates a middle that path changes that are prone to bring and it is ready to give control to the vehicle and return the vehicle to a protected place in the first path.

2.3 IR Laser beam

At Switzerland Mr. Tiedeke planned such a framework for impact shirking and to follow the IR sensor. In European, a car industry main test is to finished with laser range finders and to have demonstrate that the car system can't be utilized for separation of the sensors for vehicles from the framework its simple to find out of relative speed and separation between the vehicles is an efficiently addition of the elements that are already programmed and direction of the framework are depends on the a multi-portion infrared laser (recipient and emitter). Vehicles like car, truck, autos are not reflectors on the road or of a divider. From the optics view we can show vehicles more like an assumed mirror. This procedure, called as parallel gating, it is presently to calculate the separations up-to 1000 m on non-agreeable directions [9].

2.4 Sonar Based

Sonar based open air route and vehicle crash shirking model was introduced in the year 1992. Such a framework which are having a sonar and which are released for self-sufficient area's vehicle Navlab. Generally equipment's setup of the framework is taken after a nearby matrix and the guide of its surroundings. The data collected in the report can be utilized for the application like stopping and crash shirking, vehicle following. The straightforward calculation that are track by a static components. In this the framework is utilized at low vehicle speeds [44].

2.5 Stereo vision Based

Visual Navigation with the Reference Lines and the Collision Avoidance for the Autonomous Vehicles, that framework was introduced by Shin KATO. The parallel control compressions of ventures on the reference line location, different recognition, and the way era, and estimation of the horizontal control. That approximates the arrangement of the focuses will give the sidelong control. The primary truth is that the framework is working in under low speed of vehicle [10]. Vehicle-Following Systems Impact Avoidance which is introduced by Stefan K. Gehrig. In this framework utilizing an auto that are explore self rulingly through customary traffic that's longitudinally. This framework focus on and limits itself to control sidelong for impact evasion. This is self-governing driving [23]

2.6 FFT Based

Vehicle crash or evasion framework using FFT purposed by Paul G. Flikkema in U.S.A. (1996).This framework is knowing for arrangements in the both versatile and altered areas of applications, and joining the millimeter wave radar and innovation with minimum effort incorporated DSP. We utilize recurrence balance (FMCW) constant wave systems, with coming favorable circumstances in many force proficiency and expense. It can be seen by the genuine down-change approaches that noteworthy hindrance of the requiring

specific channels before to down-transformation. The determination between to the complex baseband and to the immediate inspecting the approaches at last on relies on upon whether the extra idleness brought in the immediate testing technique [11].

2.7 Cerebellar model Articulation Controller (CMAC) Based

The framework is an Intelligent Driver Warning System in Vehicle Collision Avoidance system that are introduced by P. Edgar AN in year 1996. In this work having active and alert, clever driver cautioning which self-report inventory with a versatile driver. In this framework, the driver demonstrating target which focus on longitudinal vehicle taking after and past of history of throttle plot for the model information and controlled vehicles speed, ranges rate to the front of the vehicle for the model that was flow throttle edge. In this work a simulated neural system is called as a Cerebellar Model Articulation Controller (CMAC) and or the traditional straight model (CLM) are freely connected on the genuine driver data, information that was taken from test track or motorways environment [12].

2.8 Radio Field Based

Different assurance with unmanaged vehicles the framework was introduced by Robert W. Houskamp in 1998. In this framework using such as radio field system. The guideline is the slow recurrence radio field, in which a steady radio field proliferated and recognize utilized to "see" the unsettling influences in that field. In inspecting the type of snags liable to countered, such as an individuals, work areas, window-washers' and buckets all have dielectric consistent and the most prominent air or having an electromagnetic property [14].

2.9 Fuzzy controller Based

Crash Avoidance System for Obstacles altered for Robot Driving Fuzzy Controller Network of an Autonomous Vehicle are purposed .this framework introduced by Ulrich lages in 2001. The framework having an expanded sensors with ACC auto for item recognition and the human driver were keep mind in the end of goal to find out the information. How the driver be safe from the Collision with the settled article on the driving path. A short time later, the information was utilized in a part of request for building up a Fuzzy Controller Network for full Collision Avoidance for altered items [19]. Fluffy Logic depends on Integrated Control of Anti-lock Brake System. The incorporated control of (ABS) Antilock Brake System and (CAS) Collision Avoidance System in electric vehicle. Fluffy rationale systems is connected for necessary control of the two subsystems. Control calculation is measured and tried in electric vehicle in lab environment by using a free scale HCS12 micro-controller. An abnormal state system CAN convention is connected to all sensors and coordinate, CAS and ABS. that handle control of ABS and CAS keeps the separation from hindrance without the execution of either framework [18].The purposed framework is made out of the vision-based preprocessing and fluffy choice making. The destination position of the vision-based preprocessing a part is the path following and or forward vehicle recognition, that gives the important information to fluffy choice making to the triggering the notice gadget. The fluffy choice making the unit to conform the fluffy choice helplines base taking after the driving and conduct to expand the notice for quality for path and/or forward crash [20].

2.10 Code-hopping spread spectrum

Vehicle-to-vehicle correspondence V2V and running framework using the code jumping spread range procedure or the framework introduced by Atsushi ueda. This proposed framework is for Ranging System and Vehicle-To-Vehicle Communication Using Code-Hopping Spread Spectrum method with Code Collision Avoidance Algorithm is known as Code-Hoping Transmission System which are also having with Code Collision Avoidance Algorithm. It goes for an issue of code crash by code impact evasion calculation about

code-bouncing spread range strategy. Therefore the introduced framework has no issues after the change in PN codes on the set [15].

2.11 Inter-Vehicle Communications (IVC) based

In this framework introduced such a systems which keep away from the danger, crashes under all circumstances, i.e. blind corners, crossing points, and expressways by utilizing IVC innovation. The targets the framework are to sum up with the Vehicular Collision (VCASS) Avoidance Support System, in this framework introduced PCs, GPS in two vehicles. Telecom types of gear, a vehicle trades to the area data or the speed vectors by using the UDP telecast with each other, and calculate the relative position speeds. Vehicles made the notice for drivers with likelihood of the impact. In present calculations, cautioning that is made and CRI in become more extensive worth in C intersection or S crossing without the peril. This framework are not having great reaction in vehicle cautioning reason [16].

2.12 Collision mitigation brake system Based

A number of Vehicle Longitudinal Collision Avoidance or Impact Mitigation by using (ABC) Active Brake Control and that framework is introduced by Xiao-Yun Lu. The framework is distributed as a coupled of vehicles. The associations with this further front and back of the vehicle without V2V has considered, the goal is to set the sought deceleration in every vehicle such as the aggregate effects of the framework is minimized. This effect is characterized as the relative dynamic vitality in between a couple of vehicles [21]. Mitigating the Probability of the Adjacent Vehicle Collision in the framework introduced by M. Adeel. This framework having as an impact shirking procedure for Vehicular Ad hoc Networks (VANETs) i.e. alert is produced as an a notice to the vehicle after both the contiguous of the vehicles hope to apply the brakes, while in fully throttle precisely the meantime.[22].

2.13 Dedicated Short-Range Communications (DSRC)

From the Driver Alerts to the Vehicle Control and the framework was introduced by M. Maile. Crossing point (ICA) Collision Avoidance taking into the account (DSRC) Dedicated Short Range Communications is more encouraging applications for the interchanges vehicle. Best in class Dedicated Short-Range Communications (DSRC)-based convergence dangerous evasion frameworks. This framework as an usage of the Intersection Collision Avoidance that enhance the IMA idea to cover-up a most extensive scope of the crossing point and many crash situations and presents robotized braking as an framework reaction. When a high crashes of an impact is distinguished or and the driver does not respond to the cautions [25].

III. COMPARISON OF TECHNOLOGIES AND THEIR LIMITATION

Type	Techniques	Pros	Cons
Motion Based	Optical flow	By calculating matching pixels and feature point between to frames and 60 to 90% is a detection rate, relative speed is 5km /h to 25km /h	Fails to detect less moving objects at low detection rate 60% at 5km/h speed and camera movement is sensitive at high computational load
	Shadow underneath vechile	Image thresholding approach which is easy detect by morphological operation. These operation are less computational	At Morning and evening the long shadows generate incorrect ROIs and shadows are affected near to bridge, buildings and tree.
	Symmetry	Better hypothesis and Vertical symmetry is detected by hypothesis ROIs.	Computational load is higher and having a rough idea of target location in image.
	Vertical and horizontal edges	Fixed ratio of vertical and horizontal edges and computation is easy.	Hard to select the optimum threshold and interference from edges.
Appearance Based	Corners	Corner types and location are based on clustering and finding the corner with enough edge pixels.	Fail in clutter and complex environment.
	Colour	Useful in simple calculation and night time detection.	Poor performance in color matching and illumination is dependent
	Vehicle lights	For bright object extraction and segmentation.	Light mix-up with street lights and vehicles can produce false alarm when headlight fault.
	Stereo Cameras	Re-projection methods and transformation catch moving objects.	Expensive as comparison to ordinary cameras .for real time operation high speed hardware is required.
	Multiple features	Precision rate is high, more reliable and increasing the system robustness.	Expensive computationally and time consuming.

IV. SUMMARY, FUTURE SCOPE AND CONCLUSION

4.1 Summary

In this paper we have reviewed and studied collision avoidance systems which is helpful for prevent and

take different action before the happening of any accident. The technologies are as like (CMAC), radar, cooperative based, Sonar Based, IR laser, FFT, Stereo vision, Fuzzy controller Based, Code-hopping spread spectrum Based, Radio Field Based, (IVC), (ACC), (DSRC), Collision mitigation brake system are reviewed in the paper having no. of pros and cons which are not totally prevented.

V. CONCLUSION

In the previous years, CAS is made as far as vehicle characterization, like acknowledgment calculation or the productive machine learning components. Challenge still same in view of the temperamental CAS and different on-street circumstances. In this path they concentrated on the frameworks aren't useful for compelling and controlling CAS framework .So in this paper we are assuming a part of basic and symmetrical street vehicle location which procedures form the impact evasion framework. In this paper we had reviewed numerous technologies which are useful for (CAS) collision avoidance system.

REFERENCES

- [1] "Global Status Report On Road Safety 2013: Supporting A Decade Of Action," World Health Organization (Who), Geneva, Switzerland, 2013.
- [2] "Global Status Report On Road Safety: Time For Action," World Health Organization (Who), Geneva, Switzerland, 2009.
- [3] M. Peden, "World Report On Road Traffic Injury Prevention: Summary," World Health Organization (Who), Geneva, Switzerland, 2004.
- [4] T. A. Ranney, E. Mazzae, R. Garrott, and M. J. Goodman, "Driver Distraction Research: Past, Present, And Future," Transp. Rese. Center Inc., East Liberty, Oh, USA, Jul. 2000.
- [5] J. C. Stutts, D. W. Reinfurt, L. Staplin, And E. A. Rodgman, "The Role Of Driver Distraction In Traffic Crashes," Aaa Found. Traffic Safety, Washington, Dc, Usa, 2001. [6] "Driver Fatigue And Road Accidents: A Literature Review And Position Paper," In R. Soc. Prevention Accidents, Birmingham, U.K., Feb. 2001, Pp. 1–24.
- [7] Ancap, "South-East Asian Crash Test Program Commences," Ed, 2012.
- [8] G.F. Ross, H.M. Cronson And B. Rama Raob "A New Collision Avoidance System Using Baseband Reflectometry," 1978
- [9] J. Tiedeke, P. Schabel, E. Rille "Vehicle Distance Sensor Using A Segmented IR Laser Beam," 1990.
- [10] Shin Kato, Kohji Tomita "Visual Navigation Along Reference Lines And Collision Avoidance For Autonomous Vehicles," 1996.
- [11] Paul G. Flikkema Sandra G. Johnson "Vehicle Collision Warning And Avoidance System Using Real-Time Fft," 1996.
- [12] P. Edgar An And Chris J. Harris "An Intelligent Driver Warning System For Vehicle Collision Avoidance," Ieee Transactions On Systems, Man, And Cybernetics-Part A: Systems And Humans, Vol. 26, No. 2, March 1996.
- [13] Wu Zhang "Cooperatively Controlled Collision Avoidance," 1998.
- [14] Robert W. Houskamp "Obstacle Protection With Unmanned Vehicles," 1998.

- [15] Atsushi Ueda, Kiyoshi Mizui “Vehicligto Vehiccloem Municatioannd Rangingsysiem Using Codehoppingsp Read Spectrum Technique With Code Collision Avoidance Algorithm,” 2002.
- [16] Junpei Ueki, Junichiro Mori “Development Of Vehicular-Collision Avoidance Support System By Inter-Vehicle Communications,” 2004.
- [17] TarikTaleb, Keisuke Ooi “An Efficient Collision Avoidance Strategy For Its Systems,” 2008.
- [18] Sudeendra Kumar K “Fuzzy Logic Based Integrated Control Of Anti-Lock Brake System And Collision Avoidance System Using Can For Electric Vehicles,” 2009.
- [19] Marcin Uradzinski, “Towards Precise Car Navigation: Detection Of Relative Vehicle Position On Highway For Collision Avoidance”, 2010.
- [20] Chih-Li Huo, Yu-Hsiang Yu, “Vehicle Warning System For Land Departure And Collision Avoidance: Using Fuzzy Decision Making,” 2011.
- [21] Xiao-Yun Lu “Multiple-Vehicle Longitudinal Collision Avoidance And Impact Mitigation By Active Brake Control,” 2012.
- [22] M. Adeel, S. A. Mahmud “Adjacent Vehicle Collision Avoidance Protocol In Mitigating The Probability Of Adjacent Vehicle Collision,” 2012.
- [23] Najmi G. Haider “Ram Based Neural-Network Controlled Vehicle: Path-Tracking & Collision Avoidance,” 2013.
- [24] Marco Bibuli, Gabriele Bruzzone “A Collision Avoidance Algorithm Based On The Virtual Target Approach For Cooperative Unmanned Surface Vehicles,” 2014.
- [25] M. Maile, Q. Chen “Intersection Collision Avoidance: From Driver Alerts To Vehicle Control,” 2015.