

# A Review on Vehicle to Vehicle Communication for Collision Avoidance Using for Rural Areas

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**Abstract-** The development of Advanced Driver Assistance Systems to prevent accidents due to driver inattention has become important given the rising road accident fatalities. These systems are particularly important in countries such as India where the total number of road accidents was reported to be 5,01,423 in the year 2015 that resulted in 1,46,133 fatalities. This result shows the idea to avoid collision among vehicles in rural zones with the help of Internet. The security of driver is turning into a critical issue in the present time. The task is to diminish number of injuries on our roadways by collision. For this, it presents a controlling element utilizing approach of fuzzy logic for controlling the development of vehicles that keeps up a separation between vehicles. The fundamental piece of the work is to complete a practicality consider on vehicle crash evasion framework utilizing remote correspondence. Their speed of propagation, separation from sides and angle of introduction will be estimated and assessed.

**Keywords-** VANET, Internet of Things, Vehicle Collision Avoidance, Fuzzy Controller etc.

## I. INTRODUCTION

Remote interchanges is the quickest developing fragment of the correspondences business. In that capacity, it has caught the consideration of the media and the creative energy of the general population. Cell frameworks have encountered exponential development in the course of the most recent decade and there are as of now around two billion clients around the world. Furthermore, remote neighbourhood presently supplement or supplant wired systems in numerous homes, organizations, and grounds. Numerous new applications, including remote sensor systems, mechanized expressways and production lines, shrewd homes and apparatuses, and remote telemedicine, are rising up out of research thoughts to solid frameworks. The unstable development of remote frameworks combined with the expansion of PC and palmtop PCs demonstrate a brilliant future for remote systems, both as remain solitary frameworks and as a feature of the bigger systems administration foundation.

Nonetheless, numerous specialized difficulties stay in planning vigorous remote systems that convey the execution important to help rising applications. For a very long while, scientists and designers from everywhere throughout the world have been pulled in and interested by the possibility of vehicles being "between associated" through remote correspondences. Their exploration was at first inspired by the possibility of an expanded wellbeing level on the streets. Through an intermittent trade of status (or mindfulness) messages vehicles are imagined to set up a common mindfulness, which can be utilized to dodge risky

circumstances or to facilitate different vehicles amid complex driving moves, for example, a path change or a surpass procedure [1].

A key part of a brilliant city is cutting edge vehicles that join new detecting, correspondence and social capacities as a major aspect of the more extensive Internet of Things idea. By giving versatile remote detecting and correspondences, vehicles can encourage information get to, which is key to make savvy urban areas a reality. The principle vision of the Internet of Things (IOT) is to prepare genuine physical articles with processing and correspondence capacities so they can connect with each other for the social great. The close ongoing applications offer sheltered and productive travel of the vehicle clients, and the disconnected information guarantees shrewd conduct of the vehicles and information examination for the vehicle specialists.



Fig 1: Intelligent Transport System [1]

A VANET is a network that contains large number of vehicles that act as a node in the system. In this case, each vehicle provides interface to each other within the range of 100-300 m. It is a part of MANET system but main difference is the presence of vehicles in this network. It provides safety on the roads by reducing number of collisions. The main scenarios in VANET are vehicle to vehicle, vehicle to infrastructure or roadside etc. In V2V, the measurements are provided w.r.t other vehicles present. In other case, it calculates the criteria w.r.t roadside or other infrastructure present.

In this work, it thinks about the idea of automobile impact shirking framework with Internet of things. Further, in segment II, it gives the data identified with vehicle to web availability. In Section III, It characterizes proposed

execution of framework. Results are clarified in segment IV. At long last, conclusion is clarified in Section V.

## II. LITERATURE SURVEY

Ø. Grefstad et al. [2018] proposed a strategy for identifying deterrents is proposed, utilizing a solitary shaft precisely checking sonar, including arranging of an ideal way around the obstructions. Obstruction identification is accomplished with an opposite sonar model refreshing a vehicle-fixed inhabitation lattice. Another and impediment free way is arranged utilizing Voronoi outlines and Dijkstras calculation. The way is smoothed utilizing Fermats winding and a viewable pathway direction framework with a period fluctuating look forward separation as direction [1].

M. Yousef et. al. [2018] proposed a Vehicle-to-Vehicle (V2V) correspondence based forward impact evasion calculation by disturbing the driver for the typical driver mode and controlling the driving wheel for oneself represented (self-sufficient) driving mode. The proposed calculation profits by the data trade between the host vehicle and the main vehicle to compute the sheltered separation between have vehicle and driving vehicle to ensure the evasion of the impact. The proposed framework gives warning and fast approaching alerts as indicated by the anticipated mishap levels, utilizing a three unique degrees of impact evasion for the driver mode. [2]

V. Ramani et al. [2018] researched the impact of idleness in V2V correspondence on a crash shirking calculation produced for overwhelming street vehicles. Examinations performed on a Hardware-in-Loop arrangement were utilized to assess the impact of dormancy for different situations. It was discovered that dormancy had a counterbalancing impact on vehicle dispersing and relative longitudinal speed that prompted inconsequential changes in the last dividing [3].

J. Ji et. al. [2016] constructed a 3D virtual hazardous potential field as a superposition of trigonometric components of the road and the exponential limit of obstructions, which made a pinned for heading for crash avoidance when a vehicle sway with preventions is likely going to occur. Next, remembering the ultimate objective to follow the organized bearing for sway avoidance moves, the manner in which following controller characterizes the accompanying task as a Multi-obliged Model Predictive Control (MMPC) issue, and calculated the front directing point to shield the vehicle from hammering into a moving obstacle vehicle. The reenactment comes about exhibited that the proposed way organizing methodology was reasonable for some driving circumstances [4].

H. Salmane et. al. [2015] depicted the system with a shrewd video security structure. It was tuned for perceiving unpredictable conditions under level convergences. This cunning security structure started by recognizing, segregating, and following moving things shot in the LC. By then, a covered Markov show was made to evaluate impeccable headings, empowering the perceived concentrations to discard hazardous conditions. Starting there forward, the degree of peril of every goal was immediately assessed by using the Dempster-Shafer data mix system. Four chance circumstances were attempted and surveyed with different

certified video picture progressions: proximity of the hindrance in the LC, closeness of the stopped vehicles line, vehicle befuddling between two shut half checks, etc [5].

M. Rezaei et. al. [2015] proposed a persistent vision based vehicle acknowledgment and detachment estimation between vehicles in which the execution and healthiness of the system remain forceful, despite for significantly troublesome benchmark datasets. They displayed flexible overall Haar-like features for vehicle area, tail-light division, virtual evenness acknowledgment, between vehicle separate estimation, and furthermore a compelling single-sensor multi-incorporate mix technique to improve the precision and intensity of our figuring. The proposed count could perceive vehicles ahead at both day and night and besides for short- and long-go partitions. Test comes to fruition under various atmosphere and lighting conditions (checking brilliant, stormy, foggy, or covered) showed that the proposed figuring beats bleeding edge estimations [6].

A. Abadi et. al. [2015] showed first use a powerful development test framework to make streams in all associations using open action information, assessed demand, and evident development data available from gets furnished together with sensors. They completed an improvement methodology to change the reason to-objective systems driving the test framework. It by then used the consistent and evaluated development data to predict the action streams on every association up to 30 min ahead. It used Monte Carlo entertainments to survey our technique. The propagations displayed the precision of the proposed methodology. The development stream conjecture botches move from a typical of 2% for 5-min desire windows to 12% for 30-min windows even inside seeing surprising events [7].

X. Na et. al. [2015] gave a discourse on the models that may be used for exhibiting a driver's controlling association with vehicle sway evading control in way following circumstances. These two were figured considering the models of equalization in non-pleasing preoccupation speculation. The pleasant Pareto perspective was gotten from supportive delight theory to exhibit a driver's collaboration with the effect avoidance systems that think about the driver's goal way. The driver and the effect avoidance controllers' progression issues and their ensuing directing systems develop in each perspective are depicted [8].

H. Zhou et. al. [2014] proposed profitable road recognizable proof and following structure in UAV chronicles. The high efficiency of our framework was credited to two points of view: the road ID is performed exactly when it is essential and most work in finding the road is immediately done through speedy homography-based after. Preliminaries were driven on UAV accounts of certifiable road scenes it got and downloaded from the Internet. The promising results demonstrated the sufficiency of our proposed structure, with the exactness of 98.4% and dealing with 34 layouts for consistently [9].

S. Appeal et. al. [2014] exhibited that a long-broaden remote attack was physically possible using a certifiable vehicle and pernicious propelled cell application in a related auto condition. They in like manner proposed a security show for CAN as a countermeasure made according to current CAN judgments. It evaluated the reachability of the proposed

security show using programming and a DSP-F28335 microcontroller. The results exhibited that the proposed security show is more profitable than existing security shows with respect to check deferral and correspondence stack [10].

### III. VEHICLE TO INTERNET CONNECTIVITY

Web network is turning into a fundamental and must have highlight of current vehicles. Remote access advancements to web assume a noteworthy part in giving web administrations to vehicle clients. The two promising arrangements are Cellular and Wi-Fi. The cell systems, for example, 3G and 4G-LTE, can give dependable and inescapable access administrations. The roadside Wi-Fi passages can be utilized for open air Internet access at vehicular portability. The Existing answers for interface vehicles to the Internet through generally conveyed cell arrange foundation, and can be separated into two classes, i.e., got and worked in.

#### Brought-in Connectivity

The acquired choice takes into account 3G/4G versatile clients who incline toward tying their own particular PDA to the auto. The most prevalent tying innovation, to be specific Mirror Link is fuelled via auto network consortium (CCC). Utilizing Mirror Link, the driver/travellers in a vehicle can associate the telephone to the vehicle infotainment framework through wires (e.g., USB) or remotely (e.g., Wi-Fi or Bluetooth), with the goal that the vehicle increases prompt access to the Internet and some copy elements of advanced mobile phones. Mirror Link-empowered vehicle infotainment frameworks are as of now in the market, for example, Toyota Touch 2. NFC can likewise be utilized to associate cell phone to the vehicle to get to web. In Hyundai i30, once inside the auto, the driver at that point puts their NFC telephone in the middle reassure, empowering the telephone to be connected to the i30's focal 7-inch contact screen. All the substance put away on the telephone, including music, telephone contacts, radio station inclinations, singular profile settings and web get to is given to the vehicle [12].

BMW Car Hotspot LTE gadget is a NFC adornment shoppers can use to get to quick web out and about. The gadget permits up to eight clients to consequently associate with the vehicle's Wi-Fi center point by tapping their NFC telephone onto the LTE logo of the hotspot [13]. For iPhone clients, particularly, Apple as of late discharged CarPlay [5] as a standard of associating iPhone to autos. Goodbye pizzazz utilizes Harman's Connect Next as infotainment framework which is stacked with highlights like touch screen control for music, temperature and voice controlled activity.

#### Built-in Connectivity

Worked in choice coordinates cell benefit in the on-board infotainment framework. The Internet association depends on the implicit cell module, as opposed to advanced mobile phones of driver/travellers. Through implicit cell interchanges, BMW Connected Drive joins different online applications, driver help, call focus administrations, and answers for give Internet association with cell phone inside the vehicle. Audi interface [7] is another case of inherent

arrangement. Chevrolet additionally built up the inherent answer for their autos which is the first and final auto organization to have worked in 4G LTE Wi-Fi to their autos. Worked in choices could give driver/travellers with more grounded associations and redid administrations contrasted with got choices.

The constraint is that the cell network can't develop once it is inserted. The fundamental preferred standpoint of inherent frameworks is that they don't depend on outer gadgets, dispensing with similarity or interoperability issues that can frequently be risky when carrying gadgets into the auto.

#### Drive-Thru Internet

The Drive-through Internet venture explores the ease of use of IEEE 802.11 innovation for giving system access to versatile clients in moving vehicles. Drive-through Internet is to give problem areas along the street - inside a city, on an expressway, or even on rapid turnpikes, for example, autobahns. With a large number of hotspots sent everywhere throughout the world, Wi-Fi can be a reciprocal answer for vehicular Internet access with ease. Ongoing exploration has exhibited the plausibility of Wi-Fi for open air Internet access at vehicular portability. The implicit Wi-Fi radio or Wi-Fi empowered cell phones in the vehicle can get to the Internet when the vehicle is moving in the scope of Wi-Fi hotspots, which is frequently alluded to as the drive-through Internet, This sort of Wi-Fi get to is deployable to offer an ease information pipe for vehicle clients, and ongoing advances in Pass point/Hotspot 2.0 make Wi-Fi more aggressive to give anchor network and consistent wandering [8].

### IV. PROBLEM FORMULATION

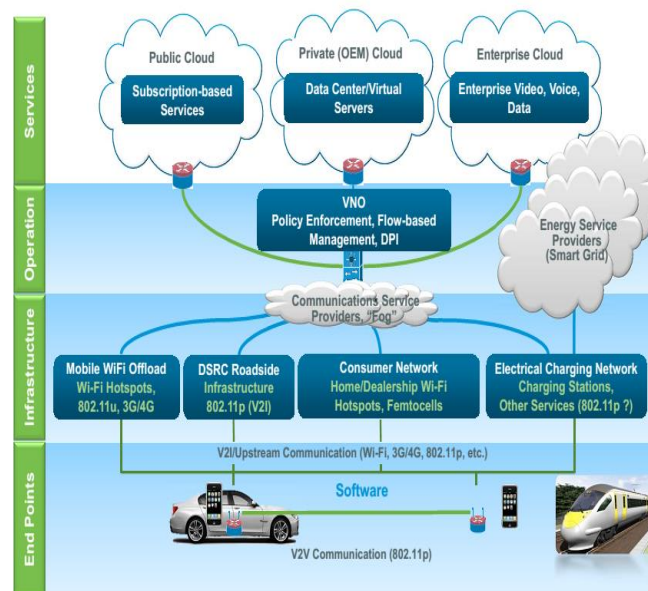


Fig 2: Connected Vehicle & Transportation

Communication between different vehicles provides a better driving situation on the roads. It provides a better security for drivers to move on without tension or mis-happening. Safety of driver is crucial in today's technology era. Life is going



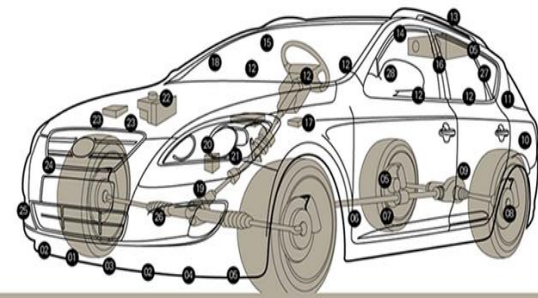
very fast and all are quite busy in their life. No one has a time to wait for some time. Due to this, technology becomes so much advanced that helps to provide relaxation to drivers. There is development of Vehicular Ad-Hoc Networks technology that provides security to the drivers. Due to this, this work proposes a vehicle collision handling system in rural areas. It provides the controlling of vehicle movement by the use of internet.

While the imagined situation of vehicles that trade data utilizing remote correspondence innovation to expand wellbeing on the streets is naturally persuading to numerous individuals, the specialized usage of simply that isn't as straight forward as one may think. These networks are faced by different type of issues or challenges. The figure shows the connected vehicle and transportation system. In this, vehicle is connected to communication service providers that helps to maintain movement on the roads.

Avoiding a collision in systems administration predominantly shows up in systems with bearer sense numerous gets to. This depends on the rule that hubs that will transmit information need to tune in to the channel for quite a while to decide if different hubs are likewise transmitting on the remote channel. A hub can begin transmission just if a channel gives off an impression of being inactive, something else, transmissions are conceded. Crash evasion partitions the remote channels similarly among transmitting hubs inside the impact area. It's supplemented by trading solicitations to send a parcel. Hubs inside senders and collectors are cautioned not to transmit for the span of fundamental transmissions.

Safe driving is an essential issue. There are a few components like human blunder, mechanical disappointment of vehicle, severe climate conditions and roadway restrictions that present a genuine test to the security of the driver by causing street mischance's. There are in excess of 1,700 fatalities and 840,000 wounds yearly because of vehicle crashes off open roadways. Auto accidents are the main enemy of kids 1 to 12 years of age in the United States. Traveller vans handle uniquely in contrast to littler traveler vehicles since they are commonly more, higher, and more extensive. They have a higher danger of accidents and rollovers if not appropriately determined and kept up. For this, it considers the issue of crash evasion at vehicular crossing points for an arrangement of controlled and uncontrolled vehicles that are connected by remote correspondence.

This work proposes a vehicle collision handling system in rural areas. It provides the controlling of vehicle movement by the use of internet. Internet helps to control the velocity of vehicles by providing signals of close by vehicle and also maintains a distance between them. Different scenarios are studied and implemented. Its introduce isn't to create any extra dangers for other street clients. This choice module should consider the street attributes, the claim vehicle development, the obstructions and ought to create moves that are doable practically speaking as indicated by vehicle elements and ought not shock for the drivers. The vehicle internal sensors are shown in figure 3.



1. Road condition sensor	12. Airbag	22. Fire detection sensor
2. Magnetic sensor	13. Road-to-Vehicle / Vehicle-to-Vehicle communication system	23. Vehicle speed, acceleration sensor
3. Vehicle distance sensor	14. Rear view camera	24. Collision detection sensor
4. Forward obstacle sensor	15. Water repelling wind shield	25. Pedestrian collision injury reduction structure
5. Blind spot monitoring camera	16. Seatbelt pretensioner	26. Electronic control steering
6. Drive recorder	17. Driver monitoring sensor	27. Message display system
7. Side obstacle sensor	18. Headup display	28. Hands-free system
8. Air pressure sensor	19. Steering angle sensor	
9. Inside door lock/unlock	20. Electronic control throttle	
10. Rear obstacle sensor	21. Electronic control brake	
11. GPS sensor		

Fig 3: Vehicle Containing Internal Sensors

There is a increase in accident ratio day by day. Due to this, safety becomes a critical chapter in every one's life. There are large number of vehicles move on the roads daily. A lot of accident occurs due to different reasons. There is a road sign provided in every areas still these are unpredictable and cause dangerous situations sometimes. In our work, it helps to reduce vehicle collision on roadside with the help of internet. It provides the usage of latest technology for reducing such kind of things on roads. It provides the alert to driver so that it may help to control its speed or maintain a distance from other vehicles.

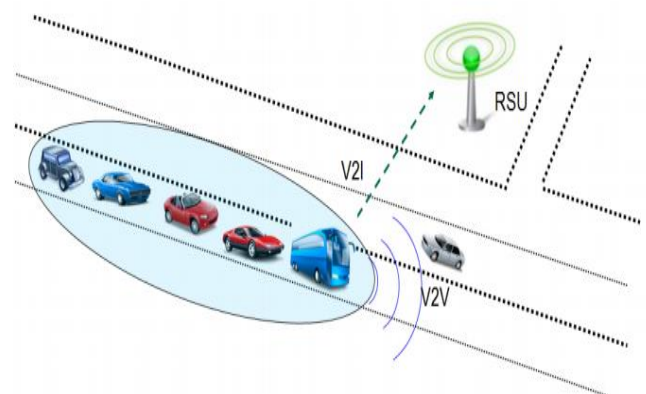


Fig 4: A Platoon of Vehicles

In first case, it considers the single lane to move the vehicles on both sides. Due to this, accident may happen in large numbers. But due to presence of smart technology in vehicles, it helps to reduce accidents. In this case, if distance between vehicles are less or they are just close to each other for creating an accident, the driver receives a alert message immediately to reconfigure its distance and also maintain its velocity that helps to avoid accident. In this work, it uses fuzzy controller to maintain its movement. The base station is provided in each corner of street or roadside to provide

signals to the drivers. It helps to control distance from both sides and also controls velocity of both vehicles. Each vehicle has inbuilt circuit or sensor elements that helps to reduce collision with other vehicles. One sensor is used to locate its current location, other sensor helps to identify Close by bodies, one is to increase or decrease its velocity etc.

## V. CONCLUSIONS

Safety of driver is crucial in today's technology era. Life is going very fast and all are quite busy in their life. No one has a time to wait for some time. Due to this, technology becomes so much advanced that helps to provide relaxation to drivers. There is development of Vehicular Ad-Hoc Networks technology that provides security to the drivers. Due to this, this work proposes a vehicle collision handling system in rural areas. It provides the controlling of vehicle movement by the use of internet. Internet helps to control the velocity of vehicles by providing signals of Close by vehicle and also maintains a distance between them. Different scenarios will be studied and implemented.

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