



## VEHICLE TO VEHICLE COMMUNICATION FOR COLLISION AVOIDANCE: A REVIEW

**Neha Yadav\*, Maudhoo Jahnvi\*\*, Krishanu Griyagya\*\*\*,  
Mahendra Singh Meena\*\*\*\* & Ved Prakash\*\*\*\*\***

Department of Electronic and Communication, Amity University, Haryana

**Cite This Article:** Neha Yadav, Maudhoo Jahnvi, Krishanu Griyagya, Mahendra Singh Meena & Ved Prakash, "Vehicle to Vehicle Communication for Collision Avoidance: A Review", International Journal of Advanced Trends in Engineering and Technology, Volume 3, Issue 1, Page Number 156-158, 2018.

### Abstract:

This paper exhibits the particular use of remote correspondence, Automotive Wireless Communication additionally called as Vehicle-to-Vehicle Communication. The paper first gives a prologue to the Automotive Wireless Communication. It clarifies the innovation utilized for Automotive Wireless Communication alongside the different car applications depending on remote correspondence. Vehicle-to-Vehicle correspondence is the remote transmission of information between engine vehicles in a continuous. The fundamental point of V2V correspondence is to counteract mishaps by enabling vehicles in travel to send position and speed information to each other. The vehicle's driver may just get a notice ought to there be a danger of a mishap or the vehicle itself may take preemptive activities as braking to back off.

**Key Words:** Vehicle to Vehicle Communication, Zigbee, Collision Avoidance, Microcontroller 8051 & Wireless Communication

### 1. Introduction:

The goal of this work is to give brief survey on the innovations proposed to anticipate the impact between vehicles before the crash happens itself. The expeditious increase in the vehicle populace around the world, particularly in India has prompted inquire about in the specialty of Intelligent Transportation System (ITS). Vehicle-To-Vehicle (V2V) communication is a framework intended to transmit data amongst vehicles and different objects on the road in real time.

### 2. Problem Definition:

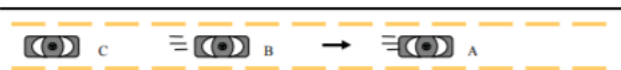
Auto collisions have been taking a large number of lives every year dwarfing any savage infections or cataclysmic events. Studies shows that around 60% roadway crashes could be maintained if the administrator of the vehicle was given cautioning no less than one-half second before an impact. Human drivers experience the ill effects of recognition restrictions on roadway crisis occasions, bringing about extensive postponement in engendering crisis notices, as the accompanying streamlined case outlines. In Figure 1, three vehicles, to be specific A, B and C, go in a similar path. At the purpose once vehicle A all of a sudden brakes unexpectedly, the two vehicles B and vehicle C measure imperiled, and being more faraway from vehicle A doesn't create vehicle C to any extent further secure than B because of below mentioned two reasons:

#### Line-of-Sight Limitation of Brake Light:

A driver will simply observe the stoplight from the vehicle specifically ahead. Consequently, possible vehicle C will not grasp the crisis at the purpose once B brakes.

#### Large Processing / Forwarding Delay for Emergency Events:

Driver latent period, that is from seeing the visual signal of vehicle A to venturing on the brake for the motive force of auto vehicle B, unremarkably extends from 0.7 to 0.5 seconds that brings concerning huge deferral in spreading the crisis cautioning.



**Figure 1: V2V helps to improve road safety**

Developing remote correspondence innovations are promising to fundamentally decrease the deferral in proliferating crisis notices. The Dedicated Short-Range Communications consortium is characterizing short to medium range correspondence benefits that help open security in vehicle-to-vehicle communication condition.

Utilizing V2V correspondence, in our past case, vehicle A can send cautioning messages once a crisis occasion happens. On the off chance that vehicles B and C can get these messages with little deferral, the drivers can be cautioned promptly. In such cases, C has a decent possibility of keeping away from the mishap through incite responses, and B profits by such notices when perceivability is poor or when the driver isn't giving careful consideration to the environment. Along these lines, the vehicle-to-vehicle correspondence empowers the agreeable impact cautioning among vehicles A, B and C. Despite the fact that V2V communication might be helpful, remote communication is normally inconsistent. Numerous elements, for instance, channel blurring, bundle crashes, and correspondence snags, can keep messages from being accurately conveyed in time.

Moreover, systems framed by adjacent vehicles are very not the same as conventional specially appointed systems because of high versatility of vehicles.

### **3. Literature Review:**

In order to select the technology best suitable to meet our requirements, we have reviewed some the existing technologies that might pose to be suitable to meet the expected results, that too in an efficient manner. Some of them are listed below.

#### **3.1 Wireless Communication:**

Wireless communication, or once in a while essentially remote is the exchange of data or power between at least two focuses that are not associated by an electrical transmitter. The most well-known remote advances utilize radio waves. With radio waves separations can be short, for example, a couple of meters for Bluetooth or to the extent a great many kilometers for profound space radio communications.

#### **3.2 Vehicle to Vehicle Communication (V2V):**

Vehicle-to-vehicle communication (V2V communication) is the remote transmission of information between engine vehicles. The objective of V2V correspondence is to forestall mishaps by enabling vehicles in travel to send position and speed information to each other over an impromptu work organize. Contingent on how the innovation is actualized, the vehicle's driver may basically get a notice ought to there be a danger of a mishap or the vehicle itself may take preemptive activities, for example, braking to back off.

#### **3.3 ZigBee:**

ZigBee is an IEEE 802.15.4-based specification for a suite of abnormal state correspondence conventions used to make individual region systems with little, low-control computerized radios, for example, for home computerization, therapeutic gadget information accumulation, and other low-control low-data transfer capacity needs, intended for little scale ventures which require remote association. Henceforth, ZigBee is a low-control, low information rate, and closeness remote system.

#### **3.4 WAVE (Wireless Access in Vehicular Environment):**

Remote Access in conveyance Environments (WAVE) Networking Services provides administrations to WAVE gadgets and frameworks. IEEE 802.11p is associate degree Affirmed correction to the IEEE 802.11 commonplace to incorporate remote access in conveyance conditions, a conveyance correspondence framework. It characterizes enhancements to 802.11 (the premise of things publicized as Wi-Fi) needed to assist Intelligent Transportation Systems (ITS) applications. This incorporates info trade between quick vehicles and between the vehicles and therefore the margin foundation, supposed V2V communication.

#### **3.5 GPS:**

The Global Positioning System is a satellite based navigation system made up of atleast 24 satellites. It gives geolocation and time data to a GPS receiver located at anyplace on or close to the world wherever there is an unimpeded line of sight to four or a lot of GPS satellite and can work in any weather conditions, anywhere in the world.

#### **3.6 Wi-Fi:**

Wi-Fi or Wireless Fidelity (WiFi) may be a technology used for wireless local area networking with devices that support the IEEE 802.11 standards. Wi-Fi most ordinarily uses the 2.4 GHz UHF and 5.8 GHz super high frequency school of thought radio bands. It is a wireless networking protocol that permits devices to speak while not net corded. Wi-Fi is that transfers data wirelessly at intervals to a set location. It is a trademark of the Wi-Fi Alliance, a world association of corporation attached wireless computer network technologies and merchandise.

#### **3.7 Infrared:**

IR or Infrared, communication could be a common, cheap and straight forward to use wireless communication technology. IR is light-weight and is incredibly almost like light except that is has longer wavelength. This implies IR is undetectable to the human eye which is excellent for wireless communication, as an example, after you hit a button on your TV remote, associate IR light-emitting diode repeatedly activates and off, 38000 time a second, to transmit info (like volume or channel control) to associate IR photography device on TV.

### **4. Comparison of Existing Technologies:**

The distinction between wireless technologies is admittedly the advancement in technology by passage of it slow. Earlier once infrared devices used, there was a limitation of wireless data transfer between utterly totally different devices and it won't be used for quite two devices. Whereas with the help of victimization Bluetooth we can connect with and it is safer and faster than infrared. Distance sweetening is yet another difference between infrared and Bluetooth. ZigBee Technology is in addition foe temporary vary data transfer but difference is that it is low-cost and low rate wireless technology. It is in addition acceptable prime level application, the excellence between Wi-Fi and different wireless technologies is it connect with internet access purpose or hotspot. As compared to infrared, Bluetooth and ZigBee, it is the fastest wireless technology. The foremost distinction of Wi-Fi is that we will increase the gap by overlapping multiple access points that produces it plenty of economical and fast than recent wireless technologies.

| Technology | Purpose                                                                                                                                                                                                                                                                                                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UWB        | It is used for the transmission of very short pulses with relatively low energy. It occupies a high bandwidth of 50MHz and point to point system with a frequency band of 3.1-10.6 GHz. It uses Orthogonal Frequency division Multiplexing or Direct Sequence UWB and having a network speed of 50-100 Mbps used in multimedia and healthcare applications. |
| Infrared   | It is a media transmission system which transmits data signals through Lasers or LEDs. It is a point-to-point system having a signal frequency ranging from 100 GHz to 1000THz and the speed ranges from 100Kbps to 16 Mbps.                                                                                                                                |
| ZigBee     | It handles many devices at low data rate having a frequency band of 2.5GHz and maximum network speed is 250 Kbps. It is a low-cost and low-powered mesh network used for controlling and monitoring application within range 10-100meters. It use Direct Sequence Spread Spectrum modulation technique.                                                     |
| Bluetooth  | It uses radio waves to communicate between devices have a range of 15-50 feet. It is a point to point system that use Frequency Hopping Spread Spectrum and have a network speed of 1 Mbps, 3Mbps and 12Mbps. It is mainly used for voice application by eliminating short distance cabling.                                                                |
| Wi-Fi      | It is the newest wireless technology used for point to point system having a frequency band of 2.4 GHz(b/g) and 5GHz(a) and maximum network speed of 54 Mbps(802.11a), 11Mbps and 54Mbps. These are extremely limited in range that is upto 100m and effective till 50m. It uses OFDA or DSSS modulation technique with complementary code keying.          |

#### 5. Conclusion:

After a long review of possible technologies that can be used for the communication purpose, we have concluded that ZigBee suits to be the best choice amongst that. Following are the reasons for same:

- ✓ Main advantage of ZigBee is that it can be organized in questionable mesh networks that are capable of multi-year battery lives with wireless nodes.
- ✓ It consumes low power and hence increases the battery life.
- ✓ When we want billions of devices to communicate together, cost is a very essential factor. Since the battery life is more, hence it is also the cost-effective method.
- ✓ The ZigBee has flexible network structure and is pretty easy to install and setup.
- ✓ Since it is a low power device, it also produces less radiations as compared to the Wi-Fi. Thus, it is also environment efficient.

Therefore, due to all the above factors, ZigBee is chosen to be the most appropriate technology to be used for the project chosen.

#### 7. References:

1. "Development of Alert Security Home System Using ZigBee Technology"-University Technology Malaysia, 2013.
2. "The role of ZigBee technology in future data communication system" - Dr. S. S. Riaz Ahamed.
3. "V2V Communication Survey"- ISSN: 2229-6093.
4. "Research on Vehicular Ad Hoc Networks" - G Yuen Liu, Jun Bi, Ju Yang.
5. "How Long Does It Take to Stop?" Methodological Analysis of Driver Perception Brake Times"-Marc green, Transportation Human Factors, vol. 2, no. 3, pp. 195-216, 2000.
6. "A Joint Vehicle-Vehicle or Vehicle Roadside Communication for Highway Traffic Safety"-Bin Hu and Hamid Gharavi, Hindwai Publishing Corporation, International Journal of Vehicular Technology.
7. "Vehicle-to-vehicle wireless communication protocols for enhancing highway traffic safety"- Biswas, S. and Tatchikou, R. and Dion, F Communications Magazine, 2006.
8. Maudhoo Jahnvi, Neha Yadav, Krishanu Griyagya, Mahendra Singh Meena, Ved Prakash, "Vehicle to Vehicle Communication for Collision Avoidance", International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 6 Issue V, May 2018
9. G.J.Deepika, Gurpreet Kaur, Neha Kumari, Suruchi Rathod, Sonal Dahiya, Mahendra Singh Meena, "Railway Accident Monitoring", International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 5 Issue: 5, 704 – 706, ISSN: 2321-8169
10. Athul P Anand, Deepesh Srivastava, Dushyant Sharma, Jyoti Rekha Dhal, Arun Kumar Singh, Mahendra Singh Meena, "Smart School Bag", International Journal of Engineering Science and Computing, Volume 6, Issue 5, 6057-6060, ISSN 2321 3361