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REVIEW OF RESEARCH

A STUDY OF CAR-2-CAR COMMUNICATION AND ITS FUTURE IN INDIA

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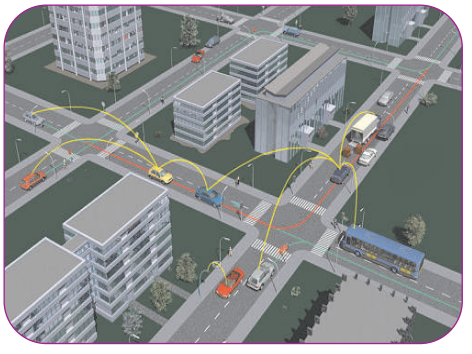
ABSTRACT :



Indian consumer is price sensitive, however, one cannot negate the idea that safety plays an important role while deciding to buy a new car. Many manufacturers in Indian market have technologies invested many years ago to safeguard the car as an option and not provided as a default feature due to the price factor. India stands second in the world in the list of deaths caused by road accidents. Reasons for this would be many but safety features in a car would reduce this number drastically. This paper attempts to identify the latest technology in the field of vehicular safety through car to car communication. Further is examines the possibilities of introducing car to car communication technology in car in the Indian market. A review of literature in the area of automotive innovations tell that there are many advantages of car to car communication and some concerns which experts have to address. Indian market is still in the pre-mature stage and experiments are underway to introduce advanced technology in Indian market.

KEYWORDS :*Automobile, innovation, car-2-car communication, safety, Indian market.*

INTRODUCTION

A car is indeed a product for an Indian consumer invests a large amount of time to decide upon. There could be many factors which would act as deciding factors, safety would be of highest priority if the passengers in the car are your family. When it comes to car safety, the consumer would ask certain questions to know the safety needs of the family, safest cars available in the market and the price to pay for the safe journey.The World Health Organization informed that there were roughly 1.24 million deaths due to road mishaps in 2010. Statistics related to India show that there's at least one death every 4 minutes on the roads of the country and in 2013 0.1 million people died and 0.5 million road accidents reported Wipro Insight. (2015, April 14).Globally the count of the deaths caused due to accidents stood at 1.25 million with millions mores sustaining serious injuries and living with long-term adverse health concerns. Globally, road traffic accidents are a leading root of death among young people, and the main cause of death among those aged 15–29 years. Presently the road traffic injuries are estimated to be ninth leading source for death across all age group globally, and are projected to be the seventh leading cause of death by 2030('WHO | Number of road traffic deaths', n.d.).

Report generated by World Health Organization shows the deaths and the mortality rate in various countries. Table 1 depicts the estimated number of road accidents in 2013 and mortality rate with respect to 100000 of the population.

Table 1

Country	Estimated road accident death rate in 2013 (Per 100000 population)	Estimated number of road accidents in 2013
UK	2.9	1827
Netherland	3.4	574
Spain	3.7	1730
Germany	4.3	3540
France	5.1	3268
New Zealand	6	272
Canada	6	2114
USA	10.6	34064
India	16.6	207 551
China	18.8	261 367
Russia	18.9	27025
Brazil	23	46935
South Africa	25.1	13 273

Source: ('GHO | WHO | Road traffic deaths - Data by country', 2015)

Table 1 shows that nations in BRICS have higher rate of mortality in comparison with other developed nations. China leads the list with 2,61,367 deaths followed by India where 2,07,551 people died due to the road accidents. South Africa had the highest rate of mortality of 25.1. This table shows that developed nations have lesser number of deaths and very low death rate. World class roads and the higher priority for safety lead to the reduction in the mortality rate. Drivers' fault has been revealed as the single most responsible factor for road accidents, accounted for 77.1 per cent of total road accidents during 2015 as against 78.8 per cent during 2014. Within the category of drivers' fault, road accidents caused and persons killed due to exceeding lawful speed/over speeding by drivers accounted for a share of 62.2 per cent (2,40,463 out of 3,86,481 accidents) and 61.0 per cent (64,633 out of 1,06,021 deaths) respectively (PIB, GoI, 2016).

In the report of Ministry of Transport and Highways following were the points added

- 146,133 people were killed in road accidents in India in 2015, up from 139,671 in 2014
- There were 501,423 road accidents in 2015 - or 1,374 accidents every day - up from 489,400 in 2014
- 500,279 people were injured in road accidents in 2015, up from 493,474 in 2014
- 400 road deaths take place every day on India's roads
- 13 states, including Tamil Nadu, Maharashtra, Madhya Pradesh, Karnataka, Kerala and Uttar Pradesh, accounted for more than 80% of all road accidents and fatalities
- Nearly eight in ten accidents were caused by drivers, with 62% of those blamed on speeding. (Ministry of Road Transport and Highways:Transport Research Wing, 2011)

Safety Innovation in automotive sector for of passengers

It takes thousands of bolts to bring together a vehicle, and only a single nut to scatter it all over the road. Since a decade, safety of an automobile has seen many key progresses in technology making a car safer and sophisticated. Advancement in electronics, miniaturization and software development has led to the evolution of automobile. Innovation has indeed a direct impact on case sales (Shaikh, Kinange, &Fernandes, 2016). In the last couple of years communication between vehicles has fascinated the curiosity of many intellectuals around the world. In the developed nations some studies look into the possible of decreasing road mortality under the road safety initiatives. Car-to-car communication (C2CC), often referred to as vehicular ad hoc networks (VANETs), enables many new services for vehicles and creates numerous opportunities for safety improvements. Advanced technology in car has taken a quantum leap over a period, mainly in the areas of safety, ecological performance and user ease, important development has been made thanks to innovations in vehicle-based electronic technologies, engine technologies and in the information and communication technologies that

emphasize ITS (Intelligent Transport Systems). Vehicle-based safety-technologies include (a) technologies for active safety to support avoid accidents and (b) technologies for passive safety to lessen injury when accidents do take place.Features such as adaptive cruise control, backup cameras, autonomous braking, and numerous sensors are usual on new vehicles in developed nations. Car to Car (C2C) communication offers the opportunity of cars and roads that are in "constant, harmonious communication" to alert drivers to a vehicle some cars ahead braking swiftly or to the presence of black ice on the roadway or to a car running a red light.

Car to Car (C2C) communication

In order to describe vehicle communications, it is important differentiate the different types of communication that may happen. Mainly, there are two types of car communication:

• Intra-car communication reference communications that occur within a vehicle.

• Inter-car communication represents communications between vehicles or vehicles and sensors placed in or on various places, such as roads, signs, parking areas, and even the home garage.

Connectivity leverages data collected both inside and outside of the car to provide a variety of new driving benefits, conveniences, and consumer applications. According to former Transportation Secretary Ray LaHood, connectivity offers tremendous promise for improving safety, reducing trafficcongestion, and increasing fuel efficiency ('New DOT Research Shows Drivers Support Connected Vehicle Technology, Appreciate Potential Safety Benefits | National Highway Traffic Safety Administration (NHTSA)', 2012). Over the past decade a considerable amount of research has occurred in the area of inter-vehicle communications oriented toward providing safety features and expanded capabilities to vehicles.

In the Table. 2, a list of new technologies related to car-to-infrastructure and car-to-car have enumerated.

Table 2

Car to Infrastructure Applications	Car to Car Applications
Curve speed warning	Emergency braking of forward vehicle
Optimal speed advisory	Pre-crash warning
Highway work zone warning	Driver advisories when making turns across traffic
Highway/rail crossing collision avoidance	Lane change warning
Traffic signal violation warning	Approaching emergency vehicle advisory
Low bridge warning	Stop sign movement assistance
Road condition warning	Road condition warning
Electronic toll collection	Cooperative adaptive cruise control
Wireless diagnostics	
Software "flashing"	
Commercial driver log information	
Vehicles acting as data probes for traffic and road information	
Real-time map/traffic updates	
Enhanced route planning and guidance	
Drive-through payment (gas, parking, fast food)	
Wireless transfer of digital entertainment (games, music, video)	
Data exchange for border clearance	

Source: (Roxin, 2014)

These technologies not just will reduce the mortality rate and the number of accidents recorded but also will generate a lot of data which will be helpful for the manufacturers, cities, agencies and other entities which would get affected by the data. In addition to safety benefits, connectivity will allow for continuous emissions testing of vehicles, which could reduce oil consumption by 4% nationwide, saving six billion gallons of

gasoline.16 Services like Automatic can monitor driver behavior, nudging drivers towards better and more fuel-efficient behaviors, and provide an interactive driving score (Brandom, 2013). The benefits of connected cars as well as communicating cars are umpteen. Other devices get connected with the central system and communicate with each other to alert the maintenance of the cars. Cellphones can have applications which can be used as a console to controlthe car. These applications allow drivers to remotely start their cars and beat the heat (or the cold) by setting the car's internal temperature without even going outside, and to find their vehicles via their mobile phone in a crowded mall parking lot ('BMW ConnectedDrive: Remote Services', n.d.).

However, these technologies do have some concerns to be addressed. As C2C communication develops and allows vehicles to communicate with one another, questions about privacy and scope inevitably arise.Cars will communicate with each other using wireless trasmitters and these trasmitters have the ability to transmit the vehicle's speed and location. The fear of data protection emerges when these data generated by transmitters are stored by the manufacturers. Will the data be manipulated or otherwise used outside of the safety functions of the C2C communication technology These transmitters have the ability to transmit a vehicle's location and other data which would raise serious concerns about the GPS tracking of the car. (Covington, 2014). The fact that these C2C transmitters have the ability to transmit a vehicle's location and other data raises serious concerns about GPS tracking of vehicles. Two computer-security researchers proved they could take control of a moving Jeep Cherokee using the vehicle's wireless communications system, raising new questions about the safety of Internet-connected cars (Yadron& Spector, 2015). This is indeed an alarm to the manufacturers to go back to the design rooms and work on making these technologies more robust and safe.

Another concern relates to the scope of C2C and similar technologies. How many other ways may this technology legally be used How integrated will this technology become, and at what cost to consumers' privacy and choices Can this technology be used in unintended ways that will invade a person's privacy (Covington, 2014). Potential downsides include the extra cost, software reliability and the cyber security that all networks are vulnerable to. Also, till cars become completely autonomous, all the data transmission in the world will not make any difference unless the driver is able to respond in time(Wipro Insight, 2015).

C2C communication technology and Indian market

The Government will take measures to guarantee that safety features are built in at the stage of design, manufacture, usage, operation and maintenance of both motorized and non-motorized vehicles in line with international standards and practices in order to minimize conflicting safety and environmental effects of car operation on road users (including pedestrians and bicyclists) and infrastructure. Government of India is working on the direction of tightening of safety standards for vehicles like Seat Belts, Power-steering, antilock braking system, airbags etc., (Ministry of Road Transport and Highways: Transport Research Wing, 2011).

Mike Bell, Global Connected Car Director, Jaguar Land Rover in an interview said "We don't have a specific date for India, though India is one of the countries on our list for connectivity services"(Ram, 2015). He further added that "This is part of the collaboration research we are doing – looking at the human interface in terms of technology and how you inform the driver".

Besides BMW and Mercedes, other automobile giants such as Fiat-Chrysler, Ford Motor, General Motors, Honda, Toyota and the VW Group, all of which sell their cars in India, are financing heavily in hardware and software to connect drivers to the mobile web. Indian carmakers, as you would expect, are still playing catch-up. The number of cars in India with even basic connectivity today is only 1.4 per cent of the total, according to automobile industry analysts. One key reason is the dilemma carmakers face in ramping up products because of the famed price consciousness of Indians. Tata Motors introduced ConnectNext as one of the core pillars of its way-forward strategy. The tool enables drivers to stay connected at all times, by integrating thecustomer's mobile device and the navigation system on their latest cars. RajanWadhera, president and chief executive< Mahindra and Mahindra says "With more connectivity, we can get deeper insights into the driving conditions and styles that will help us in bettering our vehicle design".

CONCLUSION

Though C2C communication technologies offer unbelievable benefits, including the potential to prevent half a million car crashes each year, there are significant concerns related to individual privacy and the scope of the technology that must be addressed in order for this technology to gain acceptance with consumers and the auto industry. C2C communication technologies must be implemented in a way that both protects privacy and ensures the technology is used primarily for accident prevention.

Indian consumer is though a price sensitive should understand that the safety and advanced technology to safeguard the car and the passengers travelling in it comes at a price. Indian consumer should give more priority to the safety features in the car along with the deciding factors. Indian manufactures should be ready to update their vehicles to take the next level to give safe cars. Indian government should come with policies to enforce some basic passive as well as active safety features in all the passenger cars running on Indian roads.

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