The frequency of traffic collisions in India is amongst the highest in the world. Driver and passengers involved in an accident often end up with minor or major injuries and in occasional cases sudden death. Road accidents have been and will continue to be one of the greatest health hazards. In spite of implementing strict measures like no alcohol consumption, no cell phone driving, good roadway design, slow driving at poor roads, safety signals, safety boards and so on, Statistically it has been shown that the no. of death and injuries are increasing due to road accidents every year in the whole world. This paper discusses on the idea of implementation of digital speedometer and Signal indicator at the front and back of the vehicle, which helps in reducing the road accidents to some extent.

*Keywords*: Innovative concept, Digital speedometer, Signal indicator, Road accidents

**INTRODUCTION**

Traffic fatalities per unit population has been taken as an indicator of the health burden of road traffic crashes on society at the city, regional, or national level. At the individual level, what is of consequence is the risk of injury per trip, and the total number of trips is proportionate to the population. Therefore, traffic fatalities per unit population can be taken as a rough indicator of risk faced by individuals. The risk of being involved in a fatal road traffic crash has obviously been increasing for Indian citizens over the past few years. While some of this increase can be attributed to increase in the number of motor vehicles per capita in India, however, increasing vehicle ownership need not result in increased fatality rates if adequate safety measures are implemented. [1]

The total number of road accidents increased by 2.5% from 4,89,400 in 2014 to 5,01,423 in 2015. The total number of persons killed increased by 4.6% from 1,39,671 in 2014 to 1,46,133 in 2015. Road accident injuries have

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also increased by 1.4% from 4,93,474 in 2014 to 5,00,279 in 2015. Accident severity (number of persons killed per 100 accidents) has gone up from 28.5 in 2014 to 29.1 in 2015. The analysis of road accident data 2015 reveals that about 1374 accidents and 400 deaths take place every day on Indian roads. It further reveals that 57 accidents take place and 17 lives are lost every hour on an average in road accidents in our country.

During 2015, a total of 5,01,423 road accidents were reported by all States/Union Territories. Of these 26.3% (1,31,726) were fatal accidents. The number of persons killed in road accidents were 1,46,133 i.e an average of one fatality per 3.4 accidents. The number of road accidents, road accident fatalities and persons injured in road accidents in India during 2005 to 2015 is shown in Table.

According to the Department for Transport study, Contributory Factors to Road Accidents, 2005, the main causes of accidents are as follows:

- Failure to look properly – 18%
- Failure to judge another person’s path/speed – 10%
- Being careless, reckless or in a hurry – 9%
- Poor turning/manoeuvring – 8%
- Loss of control – 8%
- Going too fast for conditions – 7%
- Slippery road – 6%
- Following too close – 4%
- Sudden braking – 4%

These figures are drawn from accidents where the police attended the scene and a contributory factor was reported. But just looking at the above, it’s clear to see that some actions can be taken to try and reduce the risk of having an accident.

**Over view of the Idea**

It is observed from the Department of Transport study due lack of Proper looking, it resulted in 18% of accidents in 2005 the value increased in subsequent years. The idea is to identify the speed of the moving vehicles. When the driver

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Accidents</th>
<th>Number of Persons</th>
<th>Accident Severity*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Fatal</td>
<td>Killed</td>
</tr>
<tr>
<td>2005</td>
<td>4,39,255</td>
<td>83,491 (19.0)</td>
<td>94,968</td>
</tr>
<tr>
<td>2006</td>
<td>4,60,920</td>
<td>93,917 (20.4)</td>
<td>105,749</td>
</tr>
<tr>
<td>2007</td>
<td>4,79,216</td>
<td>1,01,161 (21.1)</td>
<td>114,444</td>
</tr>
<tr>
<td>2008</td>
<td>4,84,704</td>
<td>1,06,591 (22.0)</td>
<td>119,860</td>
</tr>
<tr>
<td>2009</td>
<td>4,86,384</td>
<td>1,10,993 (22.8)</td>
<td>125,660</td>
</tr>
<tr>
<td>2010</td>
<td>4,99,628</td>
<td>1,19,558 (23.9)</td>
<td>134,513</td>
</tr>
<tr>
<td>2011</td>
<td>4,97,686</td>
<td>1,21,618 (24.4)</td>
<td>1,42,485</td>
</tr>
<tr>
<td>2012</td>
<td>4,90,383</td>
<td>1,23,093 (25.1)</td>
<td>1,38,258</td>
</tr>
<tr>
<td>2013</td>
<td>4,86,476</td>
<td>1,22,589(25.2)</td>
<td>1,37,572</td>
</tr>
<tr>
<td>2014</td>
<td>4,89,400</td>
<td>1,25,828(25.7)</td>
<td>1,39,671</td>
</tr>
<tr>
<td>2015</td>
<td>5,01,423</td>
<td>1,31,726(26.3)</td>
<td>1,46,133</td>
</tr>
</tbody>
</table>

Source: Information supplied by States/UT’s (Police Departments).
Figures within parentheses indicate share of fatal accidents to total accidents.
* Accident Severity : Number of persons killed per 100 accidents
of his vehicle identify the speed/velocity of the front, side and rear vehicles he can be in a safe zone. It means he can properly analyse the relative distances between his vehicle and other vehicles and see it clearly without any assumptions. This avoid accidents to some extent.

If the vehicles are equipped with Digital speedometer Indicator and Signal system at front and rear of the vehicle the below shown accidents can be avoided.

**Assume Two Vehicles A and Vehicle B are Moving Relative to Each Other:**

**Vehicle A and Vehicle B moving inline in single line road:**

Assumptions: Both vehicle A and vehicle B are moving in high speed
Both vehicles are moving in one line and one direction of the Road.

When vehicle A is coming from very far distance with a high speed say 100-150 km/h, as it approaches vehicle B which is moving at 80-120 km/h. The driver of the vehicle A may assume that the vehicle B is also moving at high speed, but as the driver of vehicle A does not know exactly with what speed the driver of vehicle B is moving there are possible chances of having a clash as shown in Figure.

**Vehicle A and Vehicle B moving in opposite direction in single line road:**

Assumptions: Both vehicle A and vehicle B are moving in High speed
Both vehicles are moving in single line and opposite direction of the road.

The same is the case with vehicles moving in opposite direction in single line road. When Vehicle
A is coming from very far distance with a high speed say 100-150 km/h, as it approaches vehicle B which is moving at 80 -120 km/h. The driver of the vehicle A may assume that the driver of vehicle B is moving at low speed and he can divert the way, but as the driver of vehicle A does not know exactly with what speed the driver of vehicle B is moving there are possible chances of having a clash as shown in Figure.

The clashes can be avoided as shown in fig. to a great extent if the drivers know the relative speed of other vehicles moving beside their vehicles.

**Advantages of the Idea:**

1. All the people (old, middle and teens) who are unable to see properly and who are still driving can easily identify the speeds of other vehicles and be in their safer zones.

2. Implementing this idea helps in judgment of identifying the accused and the victim in road accidents as the digital speeds can be noted down (At the time of accidents the Digital speedometer will be stopped with the values just before the accident has took place).

3. This idea is inexpensive which helps all the people, as this idea can be implemented in the vehicles at low cost. Comparatively Implementing auto pilot or obstacle detectors in the vehicle is very costly, which cannot be affordable by a normal person.

4. The pedestrians can move to their safe zone drastically when this idea is implemented.

5. There are possible chances of failure of obstacle detectors or auto pilot but there are less chances of failure of digital speedometer indicator at the front and rear of the vehicle, as the indicator starts as the vehicle starts.
6. The implementation of this idea is most useful for night time drivers.

IMPLEMENTATION OF THE IDEA
Digital speedometer at the front and rear of the vehicle.
Digital speedometer at the front and rear of the vehicle along with the indicator signal.

CASE STUDY
1. On 3rd Oct, 2016 in a place Pordenone, Italy the very frequent case of the so-called “pileup”, i.e one that involves clash of several cars one behind the other has occurred incurring heavy material loss as shown in the Case Study 1. In this case it has become difficult to identify the faulty.
2. Reported in the year March 16, 2016. Multiple car pile-up is one of the most frightening and destructive events that can occur on the road (Case Study 2). Unfortunately, these crashes are all too common, especially during the winter: a USA Today analysis last year found that 57 reported pile-up accidents occurred between November 2014 and March 2015 in the United States. [4]
Case Study 1

Case Study 2
3. 100-car pileup (Case Study 3) on South Korean bridge leaves 2 dead, 65 hurt on Feb 11, 2015. [5]

4. Four persons killed in a road accident on Nov 5th, 2016 in Rajkot India. [6]

Case Study 3

![Image of the 100-car pileup](image1.jpg)

Case Study 4

![Image of the road accident](image2.jpg)
5. India not only has the dubious distinction of having one of the worst road accident records in the world, but that these are taking more and more young lives, particularly of school children. Road accidents have left nearly 70 children dead and many injured since the start of 2013, a NGO has said. More than 60 students were also injured in 11 accidents spread over seven states since January 2013 till July this year. In all instances, the victims were travelling in school buses which were either hit by other vehicles or trains or rolled down mountain slopes. The accident shown in the (Case Study 5) 25th July, 2014 occurred in New Delhi, India. [7]
Scope of Future Study

- Implementation of the idea on the vehicles in practical scenario
- Electrical design which immediately stops the digital speedometer at the same value while driving just before accident Occurs. This helps to know the speed at which the vehicles have moved at the time of accident.
- Aesthetic design of the speedometer and signal system.
- Design of the magnifying glass cover on the Digital speedometer and signal system which helps drivers to easily read the values even at a distance of 100m to 200m and more.

CONCLUSION

This paper concludes the idea of implementation of digital speedometer indicator at the front and back of the vehicles along with the signal system, which identifies relative speed of the other vehicles and help the drivers to operate the vehicles in Safe zone.

REFERENCES

1. Dinesh Mohan Volvo Chair Professor, IIT Delhi (2009), “Road Accidents In India” IATSS Vol.33, No.1.