

To,
All Superintending Engineer,
State/Panchayat/National Highway/Capital Project
World Bank/GSRDC/SHDP

Sub :- One-Day National workshop on Road Safety for Vulnerable Road Users.

With reference to above mentioned subject, a One-Day National workshop on Road Safety for Vulnerable Road Users was organized by Asian Institute of Transport Development, New Delhi in association with Ministry of Road Transport and Highways (MORT&H) at Pune on dated 31/05/2019.

Various presentation made by experts during workshop as well Study material regarding Vulnerable Road Users (VRUs) enclosed herewith for study and implement in current projects and in future projects as well as for further dissemination at sub-division level.


(N. S. Salavi)

Under Secretary (N.H.)
Roads & Buildings Department

Encl. : As above

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P.S. to CE (NH) & AS for information

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MINISTRY OF ROAD TRANSPORT AND HIGHWAYS
GOVERNMENT OF INDIA

Road Safety for Vulnerable Road Users

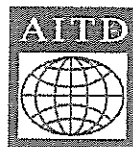
ONE-DAY NATIONAL WORKSHOP

AT HOTEL SHERATON GRAND, PUNE

Dated 31.05.2019

Sh. Nilesh bhai
P.L. or Lte Secy.
To Circulate to
on 31/5/19
Dy
12-16

Organised by



Asian Institute of Transport Development, New Delhi

1555 (2014)

World Bank Supported
National Highway Interconnectivity Improvement Project

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VRU Accidents and Road Safety

1. Who are VRUs?

VRUs or Vulnerable Road Users are the group of people who are susceptible to road crashes on a road network. Such group of people lack the "Protective Shield" of a Car user or of any 4-wheeler vehicle. Upon being involved in crashes, they suffer maximum causality. A group of road users can be defined as 'vulnerable' in a number of ways:

- The amount of protection in traffic (e.g. Pedestrians and Cyclists)
- The amount of task capability (e.g. Children & Elderly people)

Such vulnerable group includes Pedestrians, Cyclists, MTW (Motorized Two Wheelers), children, People with Disability (PWD) and elderly people.

Vulnerable road users include

- *A pedestrian.*
- *An individual on a bicycle or on a motor assisted bicycle.*
- *An individual in a wheelchair or other device driven by muscular or any other kind of power that is designed for and used by a person whose mobility is limited by one or more conditions or functional impairments.*
- *An individual who is on the highway because the individual is engaged in construction, maintenance, repair or a similar function while on that part of the highway.*
- *An individual who, is, a police officer, a firefighter, an individual who attends on a call for an ambulance, or an emergency response worker, and is acting in the course of their duties.*

Some are more vulnerable than others

Among vulnerable road users, some are more vulnerable than others, in particular the elderly, the disabled, and children.

Elderly people show a gradual decrease of their abilities to cope with difficult traffic situations and therefore sustain a greater risk of being involved in an accident. They are also becoming physically more fragile, which means that the

lesions sustained in a collision may have more severe consequences for them than for members of the younger age groups.

- As a consequence, most elderly people who are aware of their own difficulties tend to disengage from traffic, thus reducing their mobility and the scope of their social life.
- This form of compensation between mobility and safety usually shows in accident figures, which are lower than could be expected because of lower exposure to traffic, and may thus encourage the decision-makers to ignore the specific problem of the elderly as pedestrians and cyclists.

Disabled persons include any individuals with a physical, sensory or mental impairment affecting their movements. They are usually pedestrians, either walking, with or without artificial aids, or using a wheelchair; some may be cyclists.

- As the elderly, the disabled are more at risk of a collision in difficult traffic situations or on parts of the infrastructure that are not adapted to their abilities, and they may also in some cases present a lower faculty of recovery from injuries.
- If disabled people suffer from a handicap in traffic, this handicap results from the conjunction of their disability and of the kind of environment they have to move in.
- Creating a physical environment that reduces handicaps and thus enables the disabled to move about with a level of ease and protection similar to that of other road users is not only a safety measure, it is a basic action to treat the disabled with equity and fully integrate them in society.

Children are also particularly vulnerable road users as their abilities to cope with traffic evolve with age and remain severely limited in the first nine or ten years of their life.

- They are therefore highly at risk in any situation where motorised traffic is heavy or fast, visibility is limited, or the drivers focus their attention on other vehicles and tend to forget about pedestrians or cyclists.
- Protection of children cannot rely on better behaviour on their part: it is the responsibility of decision-makers to allow them freedom of movement in appropriate surroundings and to promote more careful behaviour of the drivers.

2. Why VRUs are killed on Roads?

VRUs are mostly killed on roads due to the speed of the vehicles hitting them. If we try and describe the phenomenon in terms of basic physics, it is the transfer of momentum that causes the maximum injury. Higher the weight of the vehicle and higher the speed, the more is the accident impact to a VRU in road crashes. In simple terms, speed is the major killer in case of accident of VRUs. Any speed higher than 40 kmph may be fatal for VRUs in an accident. Figure 1 illustrates the probability of a fatality of a pedestrian under different operating speeds.

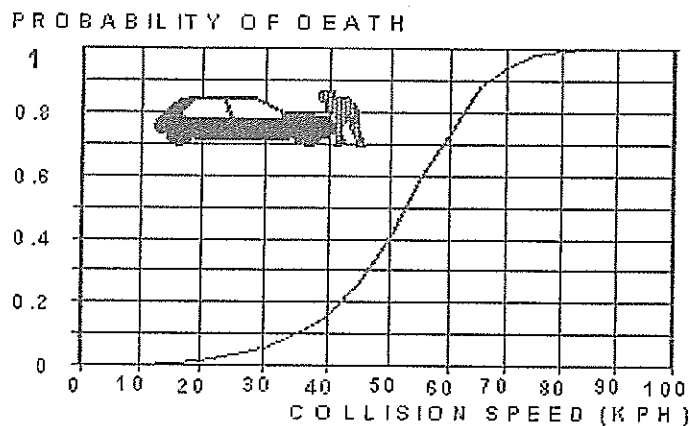


Figure 1: Vehicle Speed and Fatality Probability of a Pedestrian¹

It may be clearly seen that the graph is exponential in nature and the probability of fatality also changes drastically after 40 kmph speed. At 40 kmph, the probability is close to 20%, however at 80kmph, the probability of a pedestrian death is as high as 100%.

3. VRU Accidents in India

VRUs accidents in India are on a rise, the Ministry data shows that VRUs have been involved in 42% accidents in 2017. The number is largely occupied by 2-wheelers which comprise of 34% share, followed by Pedestrians and Non-Motorized vehicles at 7% and 1% share respectively. The details are shown in Figure 2.

¹https://ec.europa.eu/transport/road_safety/specialist/knowledge/speed/speed_is_a_central_issue_in_road_safety/speed_and_the_injury_risk_for_different_speed_levels_en

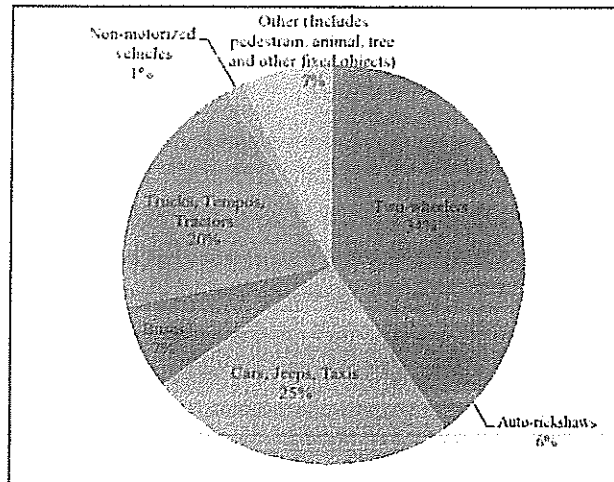


Figure 2: Total Road user wise Accidents in 2017, Source: MoRTH

4. VRU Deaths in India

VRUs accounted for 49.2 percent of the total fatalities on Indian roads. Two Wheelers accounted for the highest share of deaths, followed by Pedestrians and Bicyclists. Almost 50% of the fatalities in road are of the VRUs only, which is a matter of deep concern.

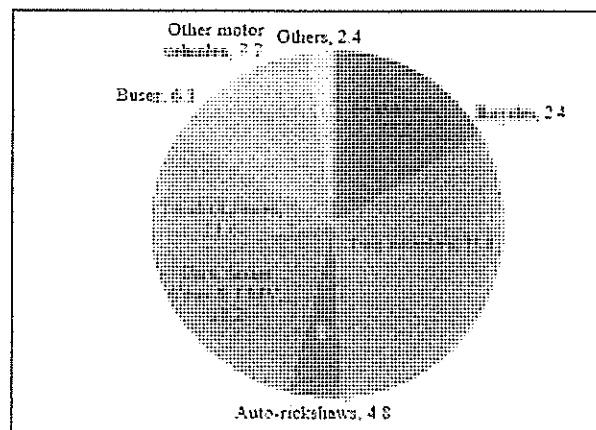


Figure 3: Total Road user wise Fatalities in 2017, Source: MoRTH

5. VRUs and Accidents

VRUs have been involved in more than 50% of the total accidents on the roads. A category wise analysis of why the VRUs are victims of highest number of Road Accidents.

5.1 Pedestrians

Pedestrians are the people who walk on the roads or on pedestrian facilities wherever they are provided. Figure 4 shows the pedestrians crossing an urban road on a footpath.



Figure 4: Pedestrians crossing an Urban Road using a Zebra Crossing

The pedestrians are often characterized by their platoon movements during crossing of roads. The pedestrians are very typical road users. The following attributes may be associated with the pedestrians:

- They look for ease of crossing- At grade Crossings
- They look for continuous footpaths, Sidewalks and Crossings
- They do not like to wait for crossing
- The pedestrians do not like to weave and would always take the shortest path
- The pedestrians prefer no conflicts while crossing the roads, however with no or little safe gap available, the pedestrians take undue risks and become victims to moving vehicular traffic.

With Zero or no facilities available for the pedestrians, they have been forced to tussle for the road space with vehicles and are hence subjected to friction and dangerous interactions with the moving traffic stream. In a moving traffic stream, the pedestrians are involved mostly in back-hits and side-hits by vehicles.

Figure 5 shows the typical accident patterns of involvement of Pedestrians and cyclists during a side-hit by a vehicle. As discussed earlier, any speed beyond 40kmph is fatal for the pedestrians and cyclists.

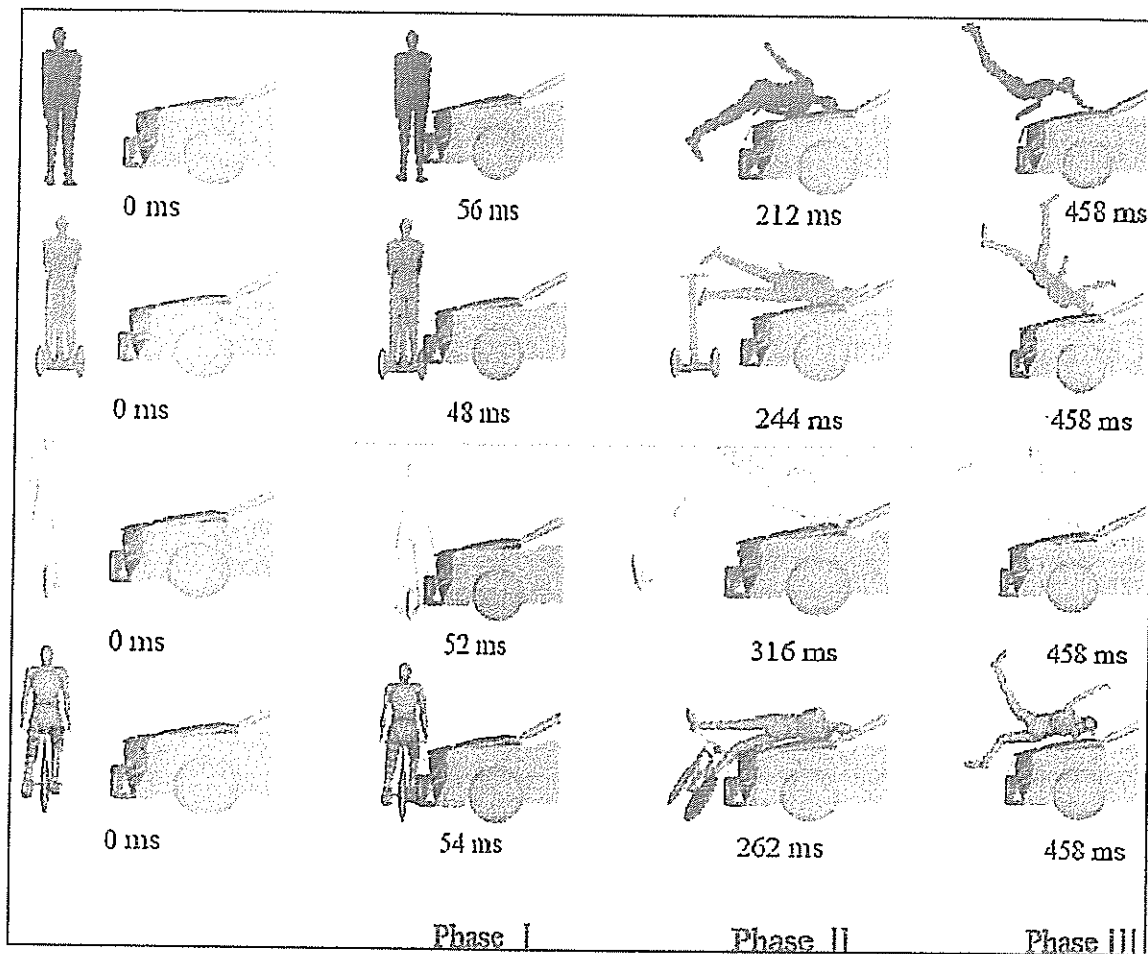


Figure 5: Accident modelling of a side-hit accident of Pedestrians & Cyclists

Pedestrians may be facilitated by providing the following safety features to ensure a safe movement while walking and crossing roads. These facilities include:

- Continuous Sidewalks
- Zebra Crossings
- Table Top Crossing
- Pedestrian Signals
- Adequately lit Subways
- FOBs with escalators/Lifts

Such facilities would ensure that the pedestrians do not have to mix with the fast moving vehicle traffic. The only way to save the pedestrians from accidents on roads is to segregate them from the fast moving traffic and provide them adequate facilities which may be availed by them for ensuring their own safety.

5.2 Cyclists

Cycles a mode of transport was predominant in the 1970. The cycle slowly got marginalized with the rise in income levels and the affordability of the people for Motorized Two Wheelers such as Motor-bikes and Scooters.

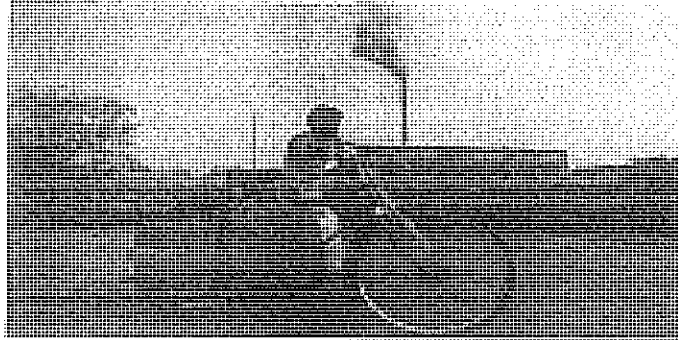


Figure 6: A Typical Captive Cycle User in India

In 1970s, the mode share of cycle was as high as 37% in the National Capital of Delhi; however the same is now reduced to only 3%. The cycle users can be categorized into 2 broad categories:

- Captive Users: Milkmen, Daily Labours, Washer-men etc.
- Occasional Users: Users for Joyrides on weekends, persons on exercise regime

The cyclists are one of the most neglected road users and they get marginalized in the fast moving traffic. One of the primary reasons why people do not use cycles for commuting may be summarized as follows:

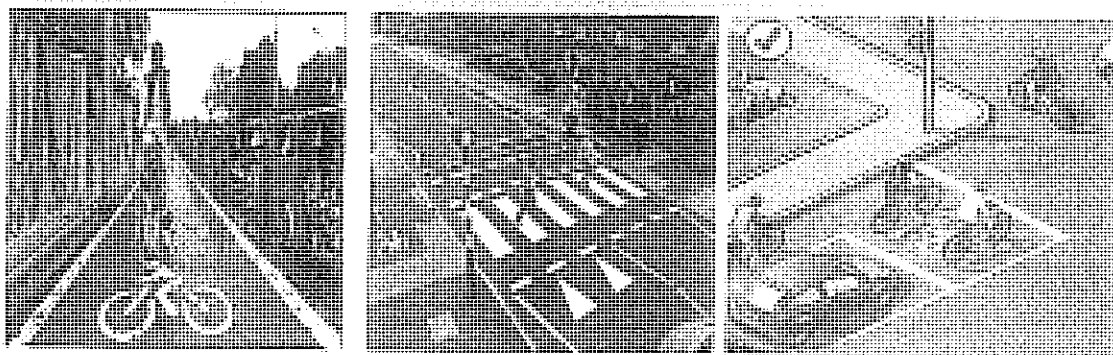
- Adverse Weather Conditions
- Lack of protection in fast moving traffic
- Lack of adequate design provisions for cyclists in Junctions
- Large distances between Work Centres, Commercial/Recreational Centres and Residences

The Government of India recognizes cycling as one of the most environment-friendly means of commute and has started many initiatives to promote the same under various schemes. In European Countries, Cycling is "Way of Life". People use cycles to commute to work and for all other occasions. However, the same hasn't been very popular with the residents may be attributed to the reasons mentioned above only. The use of cycles in India is now limited to only a few Educational Institutes, where the use of Motorized Two Wheelers has been banned.

In order to rejuvenate the cycling culture in the country, the following interventions may be suggested:

- Segregation of Cycles from fast moving traffic streams through creation of "Cycle Tracks/Lanes"
- Dedicated Crossing Facilities for Cycles with signals
- Creation of Box Junctions, where the cycles stay ahead of the traffic and are given preference for movement in signalized intersections.
- Speed calming measures at major cycle crossing points on the roads.

Figure 7 illustrates the desired treatments to be adopted for safety of Cycle



users.

Figure 7: Various Design Interventions for Safety of Cycle users

Planning of Cycle Networks

Many Schemes have failed to invoke the desired Cycle ridership by the various implementation agencies because for the schemes to be successful, a detailed cycle masterplan is necessary incorporating various surveys of baseline year and future growth. This will enable better planning of routes for the cycle users. The plans need to be re-visited every 5 years for evaluating success and shortcomings of the scheme.

5.3 Motorized- Two Wheelers

Motorized two wheelers also come under the category of Vulnerable Road users in terms of the "physical protection in traffic". The motorized two wheelers are generally associated with high risk taking behaviour while driving. They constitute 33% of the accidents and 34% of the total fatalities on Indian Roads. The Motorized 2-wheelers are susceptible to accidents due to the following reasons:

- The way-ward movements, cutting across lanes
- High manoeuvring speeds
- Interactions with 4-wheelers, busses and trucks
- Non-use of personal protection equipments such as helmets
- Exceeding number of legal occupants

Motorized Two Wheelers are a dominant mode of personal transport for the South-East Asian countries such as Vietnam, Lao PDR, Malaysia, China etc. These countries have taken various design interventions for the safety of 2-Wheelers which can be listed as follows:

- Dedicated Lanes separated by Road Markings
- Dedicated Lanes for 2-wheelers separated by Physical barriers
- Creation of Box Junctions, where the Motorized Two Wheelers stay ahead of the traffic and are given preference for movement in signalized intersections.

Figure 8 shows various interventions for segregation of 2-wheelers from mixed traffic stream

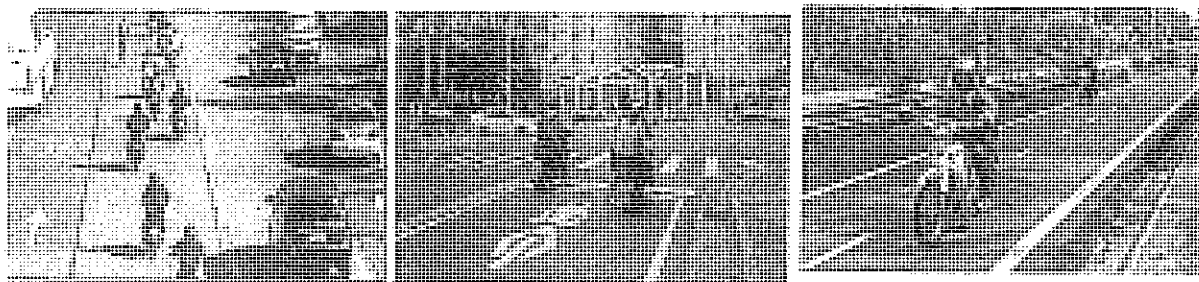


Figure 8: Various Engineering Interventions for the Safety of MTWs

6. Policies to Benefit VRUs

To date, vulnerable road users have been neglected in transport and planning policy. Vulnerable road users are legitimate road users in the safe system. Not only are they legitimate road users, they contribute to a healthier society and form a growing proportion of road users in cities and rural areas.

VRUs under National Road Safety Policy

National Road Safety Policy lays down one of the 11 statements especially for the safety of VRUs. It stresses that the design and construction of all road facilities (rural and urban) will take into account the needs of non-motorized transport and the vulnerable and physically challenged in an appropriate manner. The Government will seek to disseminate 'best practices' in this regard to town planners, architects, and highway and traffic engineers.

Vulnerable road users seek fair representation of their concerns in road safety discussion. Pedestrians and cyclists also seek leadership and support from road safety practitioners subscribing to the safe system in

public forums and the media when interventions in favour of vulnerable road users are proposed. The world must now increase its focus on making walking and cycling safer, and protecting these road users from high-speed traffic.'

6.1. General Traffic Policies that Would Benefit All VRUs

Ways to address VRU road safety concern all road users and are expected to lead to significant improvement in overall road safety, including VRUs. Three main areas have been extensively investigated with available evidence-based results: speed, alcohol, and visibility/conspicuity.

Speed plays a key role in road safety as it increases both crash risk and crash severity. Speed mitigation policies clearly benefit all VRUs.

- Efforts to reduce speeding include speed limit setting and enforcement and traffic-calming engineering measures (speed bumps, chicanes, roundabouts).
- Lowering the speed limit in dense areas is probably the most effective and affordable intervention to stem traffic crashes in both high- and low-income countries.
- Systematic review of controlled before/after studies showed that traffic-calming engineering measures may have the potential to reduce road traffic deaths and injuries.

Drinking and driving is the other main cause of traffic injuries, and setting and enforcing blood alcohol limits is therefore essential. According to a systematic review, alcohol ignition interlocks, which prevent drivers from starting the engine if their blood alcohol level is over the legal limit, appear to be effective when the device is installed in the vehicle of potential offenders.

Visibility (sufficient range of unobstructed vision) and **conspicuity** (being clearly discernible) are fundamental in preventing traffic crashes.

One of the basic driver errors responsible for collisions is the late detection of other road users.

Studies abroad indicate that pedestrian fatalities increase as illumination decreases even when other factors are held constant.

Evidence from systematic reviews indicates that street lighting may prevent road traffic crashes, injuries, and fatalities for all road users, especially VRUs.

List of Presentations to be made:

Technical Session - I

- 11:30-11:40 Chairman's Remarks and Introduction of Speakers
TBD
- 11:40-12:00 Safety Status of VRUs in India and Govt Initiatives for Improvement
Mr. Khushal Chand, Chief Engineer (EAP), Ministry of Road Transport and Highways
- 12:00-12:20 Case Studies of Road Accidents involving VRUs in Indian Cities
Mr. Bhuvanesh Bhasarth Aiyar, Road Safety Engineer, JP Research India
- 12:20-12:40 Provisions for VRUs under the Law and needed Reforms
Mr. Mukund Upadhyay, (Retd. Jt. Traffic Commissioner, Delhi Police)
- 12:40-13:00 A look at the Safety provisions for PwDs in Urban Space
Ms. Anjee Agarwal, (Samartham)
- 13:00-13:30 Discussions with Q & A
Chairman



13:30 - 14:30 Lunch Break

Technical Session - II

- 14:30-14:40 Chairman's Remarks and Introduction of Speakers
TBD
- 14:40-15:00 Engineering treatments on Road Junctions for VRU Safety
Prof. Sewa Ram, School of Planning and Architecture, New Delhi
- 15:00-15:15 "The Speeding Behaviour and its Correlates Aspects of Vulnerable Road Users for the understanding of Accident Causation in India"
Dr. Neelima Chakraborty, Sr. Principal Scientist, Central Road Research Institute, N. Delhi
- 15:15-15:30 Improving Safety Star Rating for VRUs on Indian Roads; Some Case Studies
Mr. Jigesh Bhaswar, IRAP India
- 15:30-15:45 ITS for VRU Road Safety
Prof. P.K. Sarker, Director (Transportation), Asian Institute of Transport Development
- 15:45-16:00 Discussions with Q & A
Chairman
- 16:00-17:00 Panel Discussion on Way Ahead for VRUs & Recommendations
Prof. Dinesh Monon with all speakers

Conspicuity Aids

Conspicuity aids (lamps, flashing lights, retro-reflective materials) also have the potential to improve detection and recognition and merit further development to gain public acceptance, especially from cyclists and pedestrians travelling in rural areas without road lights and in urban areas with poor lighting.

Conspicuity aids are of particular interest in developing countries where cyclists and pedestrians are often not properly visible.

6.2. Countermeasures that are Specific to Pedal Cyclists and Pedestrians

Modifications of the built environment can substantially reduce the risk of severe injuries among pedestrians and cyclists by separating them from motorized traffic.

- Sidewalks and refuge islands are of interest to protect pedestrians from collisions with motor vehicles, while bicycle facilities (e.g. on-road bike routes, off-road bike paths) are associated with the lowest risk for cyclists.
- When it comes to cyclists, a systematic review shows that helmet use results on average in a 70% reduction in the risk of head injuries, but its use is mandatory in a limited number of countries, and encouraged in some.
- The prevention of pedestrians' injuries is more complex, as walking in the street is often considered a common life activity carrying no particular hazard. Those with immature or impaired perception and cognitive skill (children, elderly, alcohol-intoxicated pedestrians) are particularly vulnerable
- New four-wheeler vehicles are increasingly designed to be less injurious to pedestrians and other VRUs. However, if designing safer car fronts is important, we will have to wait for several years to record a significant impact on morbidity and mortality statistics, especially in developing countries, where vehicles are older.
- Vehicle onboard advanced sensing systems are currently being developed to track road users and assist in preventing or reducing pedestrian injuries. However, while technology-based strategies (including the design of safer car fronts) might have a significant impact on VRU fatalities in industrialised countries, their costs will limit their use in developing and middle-income countries, where they are the most needed.

- Awareness prevention campaigns have remained relatively scarce among cyclists and pedestrians, who are consequently sometimes unaware of road hazards or consider that crash avoidance is up to motorists only.
- Public should be made fully aware that drinking is a risk, not only among users of motor vehicles but also among pedestrians and cyclists. Because they share the same pathways as motorists, cyclists and sometimes also pedestrians should be expected to obey the same restrictive rules concerning risky behaviours, including alcohol intoxication.
- Changing behaviours and attitudes might also be pivotal in reducing road casualties in developing and middle-income countries, where large populations of cyclists, pedestrians, and moped cyclists interact with motorised transport in unforgiving infrastructures.

6.3. Countermeasures That Are Specific to Motor and Moped Cyclists

As far as motorized two-wheelers are concerned, the most effective protection that can be offered is the helmet.

The rate of helmet use is high in developed countries but often very low elsewhere, due to inadequate awareness, regulation, and enforcement.

New protective devices such as jacket air-bags are being developed but are still subject to reliability issues. Anti-lock Braking Systems and Combined Braking Systems (front and rear brakes are applied by a single means of control) proved helpful in preventing a significant number of falls, but their generalization faces cost barriers.

Effective roadway improvements to decrease the risk to riders of motorized two-wheelers include skid-resistant road marking, road maintenance (minor defects can be a safety hazard for cyclists and motorcyclists), and efforts towards a more forgiving roadside, such as the replacement of safety barriers with motorcycle-friendly safety barriers.

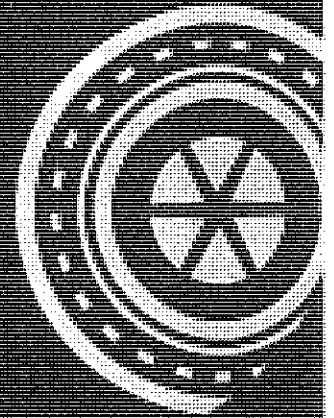
7. Way Forward

In India, a lot less has been done for the accident reduction and safety of VRUs. As the rates of fatalities of VRUs are increasing every year, some high level policy decisions are highly warranted to safeguard the VRUs on roads which need deliberations and strict implementation into policy guidelines. This will be the prime focus of this workshop.

PROVISIONS FOR VRUs UNDER THE LAW AND NEEDED REFORMS

Mukund Upadhye IPS (R)

Chief Security Commissioner
Delhi Metro Rail Corporation



VULNERABLE ROAD USER

A Group of Road users

- By the amount of protection in Traffic
 - Pedestrian
 - Cyclists
 - Manual /Animal driven vehicles
 - Two wheeler riders
- By the amount of task capabilities
 - Young & children (inexperienced)
 - Elderly (Declining Task capability)
 - Specially abled.
- Do not have a protective shell
- Difference in Mass compared with the colliding opponent

VULNERABLE ROAD USER

- Can be saved by
 - limiting the speed of motorised vehicle
 - Segregation of unequal road user types
 - Adapting motor vehicles
 - Side-under run – protection for trucks
 - Collision friendly car fronts.
 - Vulnerable should not be threat to others
- In crashes involving only VRUs, mainly infrastructure that is important for prevention & limitation of injury.

PERSONS KILLED IN ROAD ACCIDENTS IN TERMS OF ROAD USER CATEGORIES IN 2016 AND 2017

Road User Category	% killed in 2016	% killed in 2017
Two Wheelers	34.8	33.0
Cars, Taxis, Vans & LMVs	17.9	18.2
Pedestrian	10.5	13.8
Trucks/ Lorries	11.2	11.6
Buses	6.6	6.1
Other Motor vehicles (including e-rickshaws)	10.6	7.7
Auto-Rickshaws	4.7	4.8
Bi-cycles	1.7	2.4
Others (Animals drawn vehicle, cycle rickshaws, hand carts & other persons	2.0	2.4

LEGISLATION

- Comprehensive Road Safety Legislation which incorporates
 - Evidence based measures
 - Strict & appropriate penalties backed by
 - Sustained enforcement
 - Public Educationhas been proven to reduce
 - Road Traffic Fatalities
 - Road Traffic injuries
- Penalty under MV Acts.
 - 1914 Rs:500/- 1939 Rs:50/100/- 1988 Rs:100/-



LEGISLATION IN INDIA

MOTOR VEHICLES ACT ,1988.

- Central Motor Vehicles Rules, 1989.
- Motor Vehicles Driving Regulations 2017(Motor Vehicles)
- State Motor Vehicle Rule and State MACT Rules.
- 138(1A) The State Government may make rules for the purpose of regulating the activities in a public place of pedestrians and such means of transport as are propelled or powered by muscular power of either human beings or animals.

STATE POLICE ACT.

- Regulations made for control of traffic.
 - ODISHA Urban Police Act 2003.
 - DELHI POLICE Act.(DCVCRS 1980)

ORDERS OF THE SUPREME COURT/HIGH COURT.

NOTIFICATIONS AND STANDING ORDERS BY MoRTH

MOTOR TRANSPORT WORKERS ACT, 1961.



KEY FACTORS

- Speeding
- Drunken Driving
- Non use of helmets by two wheeler riders.
- Non use of seat belts
- Non use of child restraint.
- Only 28 countries (7% of world population have comprehensive laws on these five risk factors.
- Post crash management and compensation.
- Aggressive Traffic Enforcement Decreased
 - Motor Vehicle Crashes
 - Crash Fatalities
 - Fatalities related to speed
 - Severity of injuries



MVDR 2017

➤ G.S.R 634 E MoRTH dated, 23rd June 2017

- Issued in supersession of Rules of the Road Regulations 1989.
- Section 119 MV Act: Every driver of a motor vehicle shall drive the vehicle
 - In conformity with the driving regulations made by Central Government,
 - As per indication given by the mandatory traffic sign,
 - In compliance of the directions given to him by police officer engaged in the regulation of the traffic in public place.
 - Non compliance of MVDR 2017 punishable.

➤ Punishment under MV Act for violation of MVDR

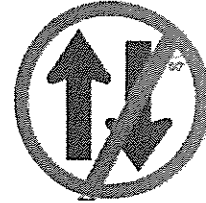
	177/1988	177A/1988 (Amendment bill) 2017
1. First offence	Rs. 100	Rs. 500-1000
2. Subsequent offence	Rs. 300	
3. Compoundable U/S 200 MVA 1988	YES	NO



MVDR 2017 RULE 4

❑ RULE 4. USE OF ROADS BY VEHICLES

- Every vehicle while moving on a road shall have a driver and shall be driven on a carriage way on the left side unless directed by Police/Road Signs (RRR 2)
- Driver shall keep to left while being **overtaken**, approaching the bend or a hill or when his view is obstructed.
- Heavy vehicle shall be driven in left lane/left side except while overtaking an obstruction or slow moving vehicle.
- Drive as directed by signage on roads declared one way and not to pull, push or drive a vehicle against flow of traffic (RRR 17)
- Maintain safe distance from the vehicle reversing and not to move towards it till completion of the reversal.



MVDR 2017 RULE 5

❑ RULE 5. DUTIES OF DRIVERS & RIDERS

“Rider” means a person travelling on a motor vehicle otherwise as driver of that vehicle whether for hire or reward or otherwise.

- Drive at all times with due care and caution ensuring full control of Physical and Mental abilities, maintaining good lookout and concentration on the road, avoiding any activity causing distraction like loud music, video e.t.c.
- Driver not to cause any hindrance or undue inconvenience to other road users and residents.
- Drivers & riders to take special care and precautions to ensure safety of vulnerable road users such as pedestrians, cyclists, children, the elderly and differently (specially) abled persons.
- Driver to ensure that his view is not obstructed and hearing not impaired.
 - 125MVA- Driver not to allow any person to stand or sit or to place anything in such manner which would hamper his control over vehicle.

MVDR 2017 RULE

- Driver and other occupants to wear seat belt and child up to 12 years of age be seated in appropriate child restraint system, wherever provided.

138(3) CMVR-

Driver, person seated in the front seat and the person facing the front seat to wear seat belt while the vehicle is in motion.

138(6) CMVR-

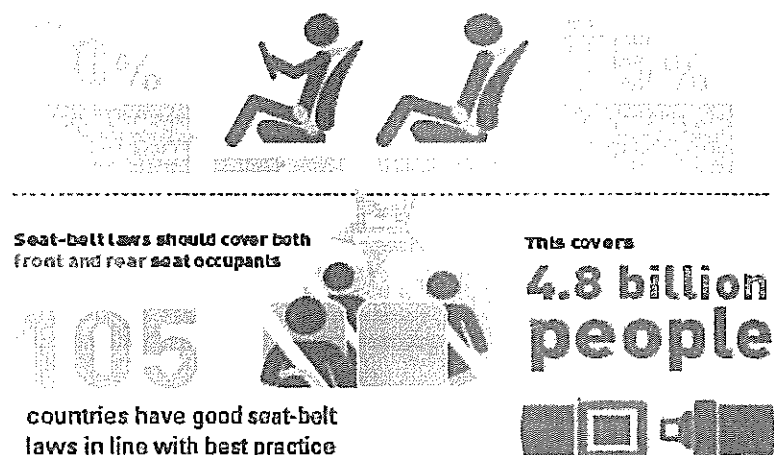
Child below age of 12 year carried in vehicle to be seated in child restraint system.

194B MVAB-

Fine Rs. 1000/-

SEAT-BELTS: THE FACTS

Wearing a seat-belt reduces the risk of a fatal injury by.



Drivers Killed (2017)

Used :- 5749

Not used :10020

Total 15679

36.5%

63.5%



MVDR 2017 RULE

- Rider/Pillion rider of two wheelers shall wear helmet.

129 MVA every person driving or riding otherwise than in a side car shall wear protective head gear confirming to standards of BIS.

Sikh person exempted . State govt. may provide such exception which could be for similar category of persons wearing turban where wearing helmet is not possible. S.R. Batt Vs State of Karnataka AIR 1998.

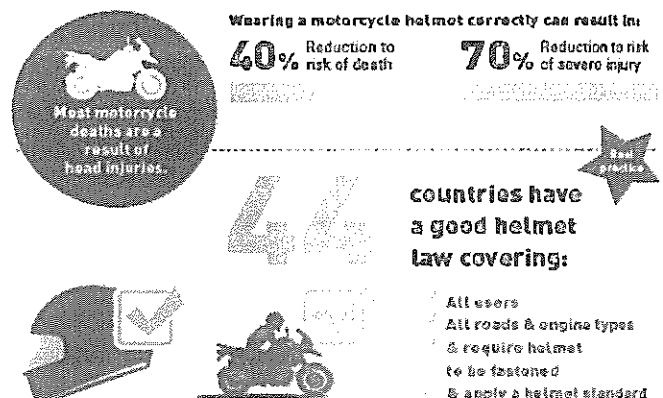
138 (4)(f) CMVR-

Manufacturer to supply protective head gear confirming to BIS specification at the time of purchase

194 D MVAB- Fine Rs.1000/-

Failure to wear helmet / standard helmet would result in suspension of Driving License for 3 months. Second offence revocation of DL.

MOTORCYCLE HELMETS: THE FACTS



Riders Killed (2017) Total 35975

Used :- 14880

41.3%

Not Used:-21095

58.6%



MVDR 2017 RULE 4

- Driver shall comply with the law relating to prohibition on consumption of alcohol, drugs and smoking and also ensure compliance by other occupants, if any

185 MVA – Who ever while driving or attempting to drive has in his blood more than 30mg Alcohol per 100ml of the blood or is under the influence of any drug rendering him incapable of exercising control over the vehicle shall be punished.

First offence –

Six month or Rs.2000 or both
Subsequent offence (with in 3 years)-
2 years or Rs.3000 or both.

Excise Law – Drinking in public place
206(4)MVA – Suspension/Revocation

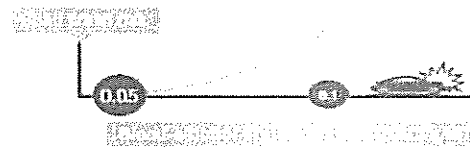
- Zero tolerance for commercial vehicle Drivers & 20mg/100ml BAC for young Drivers.

- Installation of Alco-lock.

DRINK-DRIVING: THE FACTS

Drinking alcohol and driving increases the risk of a road traffic crash

Above a blood-alcohol concentration (BAC) of 0.05 g/dl, the risk of road traffic crash increases dramatically.

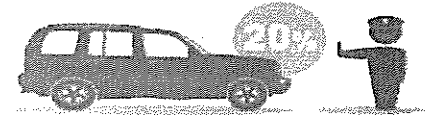


Drink-driving laws should be based on a blood alcohol concentration (BAC) limit of no more than:

- 0.05g/dl for the general population
- 0.02g/dl for young or novice drivers

34
countries have a drink-driving law in line with best practice.

Strictly enforcing a drink-driving law can reduce the number of road deaths by 20%.



MVDR 2017 RULE 5

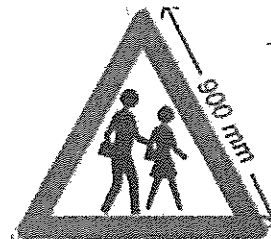
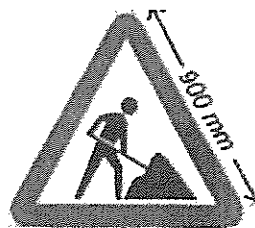
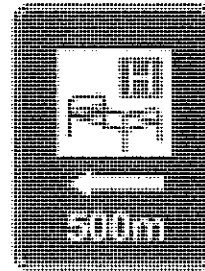
- Driver shall take care of himself and other occupants while getting in/ getting out (Boarding/Alighting) of a vehicle ensuring safety of self , passengers and other road users.
- Driver not to drive defective vehicle and on noticing defect while driving, shall take the vehicle off the road in the quickest possible manner. Pushing of two wheeler allowed on discovering the technical defect while driving.
- Driver/Rider not to hold on or push any other vehicle while driving.
- Driver of two/three wheeler to always hold hand bar while driving except while signaling.



MVDR 2017 RULE 16

□ Rule 16. SPEED.

- Driver not to drive vehicle at such a low speed to impede the normal traffic flow.
- Driver not to drive at speed exceeding 25KmPH or such lower speed as notified while passing by a construction site, school or hospital or on roads without footpath and soft shoulders generally used by the pedestrians to walk.



MVDR 2017 RULE 16

“Construction Zone” –means a section of the roadway where construction activity is in progress or declared to be undertaken and includes Work Space, Traffic Space or Buffer Space.

- 112 MVA – No person shall drive or cause or allow motor vehicle to be driven in public place exceeding the maximum speed or below minimum speed for that class fixed by act/law.

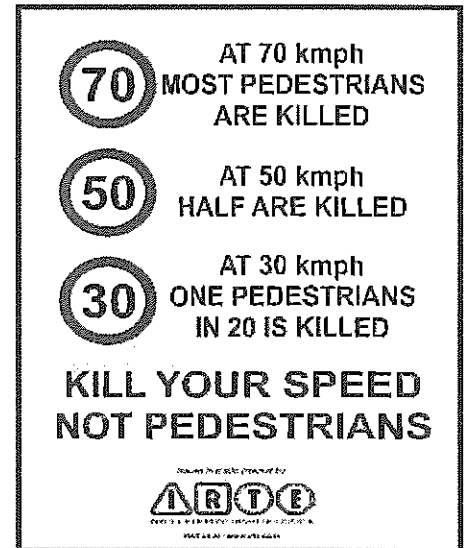
STANDING ORDER 1997 E w.e.f 05-08-2014

- | | |
|--|-----------|
| ▪ Passenger carrier (9 or more + driver) | 100 Km/Hr |
| ▪ Passenger carrier (8 or less + driver) | 120 Km/Hr |
| ▪ Goods carrier | 80 Km/Hr |
| ▪ 3 Wheeler (Passenger) | 60 Km/Hr |
| ▪ 2 Wheeler | 80 Km/Hr |
| ▪ Not applicable to defense service vehicles in execution of military maneuvers in notified area during notified period. | |

- 210 (4) MVAB Seizure of the driving license and suspension of License for 3 month / Revocation in case of second offence.

MVDR 2017 RULE 16

- 183 MVA punishment for driving in contravention of speed limits.
 - First offence. Rs.400, subsequent offence Rs.1000.
 - Person making a time table wherein it is not practicable to cover the journey in specified time without contravening speed limits
First offence Rs.300 subsequent offence Rs.500.
- 117 CMVR- Every motor vehicle to be fitted with an instrument (Speedo meter) to indicate the speed of the vehicle.
- 118 CMVR- All transport vehicle manufactured after 01-04-2014 to be fitted with speed governor (speed limiting device) with maximum preset speed of 80Km/hour
- INTELLIGENT SPEED ADAPTAION



MVDR 2017 RULE 31

❑ RULE 31. VEHICLE LIGHTING

- Use lights at nightfall/ night/ dawn and during poor visibility conditions.
- Lighting devices to be in working order & not to be obstructed (RRR 16)
- *Two wheelers shall be driven with dipped head lights on during the day time.*
- Not to drive with only parking light on unless directed.
- Not to use high beam on well lit roads.
- Dip high beam well in time for vehicle approaching in opposite directions & while driving close behind another vehicle.
- Switch on fog lamps only during adverse weather conditions not otherwise.
- CMVR 105 Every motor vehicle being driven in a public place during the period half an hour after sunset and when there is no sufficient natural light shall be lit with lamp ensuring visibility of 150 meters and red light in the rear to be visible from a distance of 150 Meters. [75 Meters for 2 wheelers]

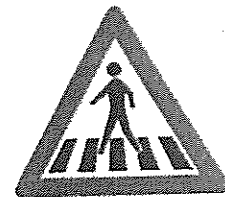
MVDR 2017 RULE 33 & 39

❑ RULE 33. LANE SPITTING

- Lane within a lane.
- Roads in urban areas having speed limit of 40 KMPH.
- Display of signage.
- Two wheelers may filter between three wheelers & four wheelers when the speed difference does not exceed 15 KMPH.

❑ Rule 39. Pedestrian crossing, Footpaths & Cycle Tracks.

- No vehicle to be driven on footpath/ cycle track unless directed by Police or permitted by a traffic sign.
- Pedestrians/invalid carriage / wheel chairs have a right of way at uncontrolled Pedestrian crossings (RRR 11)
- No vehicle to block pedestrian crossing if unable to proceed on account of traffic coming to a stand still.



POST CRASH

1. Creation of Road Accident Fund (164B MVAB)
 2. Golden Hour and Cashless treatment of Road Traffic Accident Victims (Sec-162(2)MVAB)
 3. Protection of **GOOD SAMARITAN**
 - Resident of Samaria who helped a JEW(enemy) who was robbed and beaten on the road by the robbers and was left to die.
 - One who voluntarily renders aid to another in distress although under no obligation to do so
 - Supreme court while order dated 29th oct,2014 in Civil Petition Number 2035/2012 directed the Central Government to issue directions for protection of GOOD SAMARITAN helping a road accident victim.
- MoRTH issued a notification no 25035/101/2014-RS Dated 12th /5 2015 for protection of GOOD SAMRITAN.
 - No civil/ Criminal liability
 - Reward/ compensation for encouraging other citizens
 - No compulsion for revealing identity and deposition as witness in court
 - Action against officials for coercion/intimidation to GOOD SAMARITAN

MVA AMMENDMENT BILL 2016

- Insertion of section 134A(MVAB)after section 134 of MVA 1988
- No civil/ criminal liability for injury/death of accident victim while rendering emergency medical/ non-medical care or assistance
- Rules to be framed by central government for questioning / examination of the GOOD SAMARITIN
- GOOD SAMARITIN means a person, who is in good faith, voluntarily and without expectation of any reward or compensation renders emergency medical or non-medical care or assistance at the scene of an accident to the victim or for transporting such victim to the hospital
- Responsibility of Medical Practitioner 134 MVA & IMC Regulations 2022 (Chapter 7 Professional Misconduct)



MVA AMMENDMENT BILL 2016

• Driving by minor (Sec-199A MVAB)

- Guardian / Owner shall be guilty of contravention of offence committed by juvenile and
- Shall also be liable for imprisonment for three years and fine of Rs.25000/-
- Registration of the vehicle to be cancelled for 12 months
- Juvenile to be taken up under Juvenile justice Act.
- Juvenile committing an offence shall not be eligible for grant of any license till attaining the age of 25 years



MVA AMMENDMENT BILL 2016

- **Fine and Punishment under MV Act. (Sec-177)**
 - Increased drastically minimum Rs.500/-
 - State grant empowered to increase amount of fine by multiplier between 1 to 10, and differentiation between class of vehicles (**Sec-210A MVAB**).
 - Amount of fine to increase every years on 1 April by an amount not exceeding 10% of original amount of fine on issue of notification by Central Government (**Sec-199B MVAB**).
- Electronic monitoring and enforcement of road safety on highways, Roads and urban areas by the State Government. Provision of Fund By central Govt. for indentified cities. (**Sec-136A MVAB**)



MVA AMMENDMENT BILL 2016

- **Dangerous Driving (Sec-184 MVAB)**
 - Jumping a red light,
 - Violating a stop sign,
 - Use of handheld communication device while driving,
 - Passing or overtaking other vehicles in a manner contrary to law,
 - Driving against the authorised flow of traffic
 - Driving in any manner that falls far below what would be expected of a competent and careful driver and where it would be a obvious to a competent and careful driver that driving in that manner would be dangerous.



MVA AMMENDMENT BILL 2016

- Disqualification / Revocation of D/L (Sec-206(4)MVAB)
 - Commission of offence u/s
 - 183 Over Speed
 - 184 Dangerous driving
 - 185 Drunken Driving
 - 189 Racing and trails of speed
 - 190 Vehicle in unsafe condition
 - 194C Not wearing Helmet
 - 194D Non Standard Helmet
 - 194E Passage to Emergency
 - First offence disqualify form driving for 3 months.
 - Second or subsequent-offence- revocation
 - Acknowledgement of seizure. Would not authorise the holder for driving
- Responsibility of Road Maintenance Agency **198MVAB**
- Delegation of Powers by State/Central Govt. **215A MVAB**



DELHI CONTROL OF VEHICULAR TRAFFIC ON ROADS AND STREETS REGULATIONS 1980

- **4. Control on animals on roads-**
- **17. Side walk-**
 - On any road where there is a distinction between a side walk, etc., and a vehicular road, pedestrians must walk on the side walk,
- **RRR 22/119/177 MVA : TRAFFIC SIGN & TRAFFIC POLICE**
 - A driver of a motor vehicle and every other road user shall obey direction of the police officer, Any direction indicated by traffic sign & signal fixed by an authority or indicated by automatic signaling device fixed at road intersection.



DELHI CONTROL OF VEHICULAR TRAFFIC ON ROADS AND STREETS REGULATIONS 1980

- **22. Precautions to be observed by pedestrians , etc**
 - (1) The driver of every vehicle approaching a pedestrian crossing shall unless he can see that there is no pedestrian crossing the road or about to cross the road, proceed at such a speed as to be able, if necessary, to stop the vehicle before reaching it.
 - (5) No pedestrian shall remain upon any crossing longer than is necessary for the purpose of passing from one side of the road to the other with reasonable dispatch.
 - (6) No pedestrian shall cross any street or road except at the demarcated pedestrian crossing or through a sub-way or over-bridge where one exists. Pedestrians shall obey all reasonable directions given by the policeman at these crossings.



DELHI CONTROL OF VEHICULAR TRAFFIC ON ROADS AND STREETS REGULATIONS 1980

- **22. Precautions to be observed by pedestrians, etc**
 - (8) No pedestrian shall diagonally cross a road except in the instance wherein they are permitted to so cross according to road signs etc. at an intersection.
 - (9) Any person who is liable to protect an infant or a child (below age of 12 years) under his/her care shall not let it walk or remain any public road or street without being attended.



DELHI CONTROL OF VEHICULAR TRAFFIC ON ROADS AND STREETS REGULATIONS 1980

• 29.Regulation of cycles-

- (i) No persons shall carry on any part of the cycle ridden by him, any other persons except a child below the age of 12 years,
- (ii) All cycles ridden or wheeled in any road or street shall have lower portion of the rear mud gad painted white over a length of nine inches from the end of the mudguard upwards and shall have a red reflector fitted thereon so as to be clearly visible from behind,
- (iii) cyclists shall ride only on the cycle track wherever provided on roads,



DELHI CONTROL OF VEHICULAR TRAFFIC ON ROADS AND STREETS REGULATIONS 1980

• 29.Regulation of cycles-

- (iv) No person shall ride any bicycle or tricycle from half an hour after sunset till half an hour before sunrise unless such vehicle is fitted with a lamp showing light forward
- (v) Every person riding a cycle or a cycle-rickshaw shall have ready and available for immediate use a suitable bell capable of giving audible and sufficient warning of its approach and position and shall sound the same whenever expedient to prevent danger to any member of the public,
- (vi) All cycles and cycle-rickshaws ridden in a street or road or public place shall have efficient brakes,



LAWS & THEIR ENFORCEMENT

• Traffic Laws

- Do the various aspects of management come within the purview of law.
- Is the law designed to secure needs of the traffic
- Are the laws clear, uniform & rational.
- Are the laws known to the people.
- Is the existing law strong.
- Is the law liable to be misused or disobeyed
- Are the laws reviewed periodically to determine deficiencies and find out solutions.
- Is the law properly received by the people for their benefit.

• Enforcement

- Is the enforcement of law adequate.
- Training and orientation of Traffic Police Personnel.



ORIENTATIONS FOR TRAFFIC POLICE

• Violators are not criminals.

- Two categories of traffic offenders:- Those who break the norms of safety & Those who interfere with smooth flow of traffic or indulge in technical irregularities.

• Conflict management.

- Vehicles and people are contesting for space & priorities to save time.
- Harmonization of varied interests/ goals is a difficult task.

• Eternal vigilance.

- Initiate preventive action at the initial stage for problem not to grow.

• Public Acceptability.

- The baton is the symbol not of the power of police but the power of the will of the people. Public support necessary for compliance with regulations. Public education must precede enforcement.

• Police is not a revenue collecting agency

- Object is to improve his driving habit for safe and smooth flow of traffic.



ORIENTATIONS FOR TRAFFIC POLICE

- **No Quota or target for prosecution**
 - Strict enforcement of the offences which have a higher propensity to cause damages.
 - 1) Offences wherein Police empowered to arrest without warrant.
 - Dangerous driving.
 - Driving under influence of alcohol/ drugs.
- **Other areas where police need to be alert and active.**
 - Carrying of iron bars.
 - Travel on foot board / top of the roof / sitting on goods.
 - Over loading of people and goods.
 - Violation of speed limit and Racing and trials in public roads.
 - Red light jumping.
 - Driving against the flow of traffic.
 - Wrong overtaking.
 - Distracted driving

Thank You

3-star or better road infrastructure for safety of VRUs

Improving Star Ratings for VRUs on Indian Roads: Some Case Studies

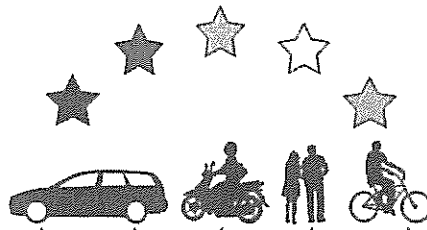
One Day National Workshop on
"Road Safety for Vulnerable Road Users"
Pune 31-May 2019
Organized by AITD

Jigesh Bhavsar
Senior Road Safety Engineer, iRAP
Technical Manager, IndiaRAP



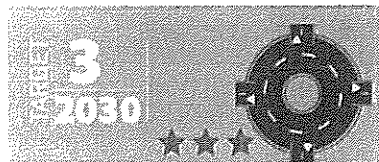
What is Star Rating?

- Star Ratings are based on road inspection data
- Simple and objective measure of the level of safety which is 'built-in' to the road
- Five-star road segments are the safest while one-star are the least safe
- Star Ratings can be completed worldwide, in urban and rural areas and without reference to detailed crash data, which is often unavailable in low-income and middle-income countries, or is sparse in high-performing high-income countries striving for vision zero outcomes.

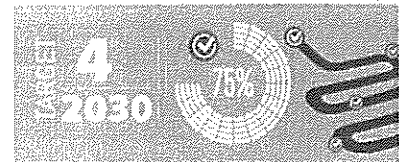


Targets 3 & 4: What They Mean for Safer Roads Globally

UN Member States have agreed on 12 new Global Road Safety Performance Targets to drive action across the world.



Target 3: By 2030, all new roads achieve technical standards for all road users that take into account road safety, or meet a three star rating or better.

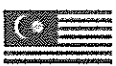


Target 4: By 2030, more than 75% of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.

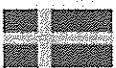
NATIONAL GOVERNMENT LEADERSHIP



United Kingdom: 90% of travel on 3-star or better strategic road network by 2020, and 4 and 5-star motorways



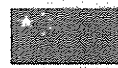
Malaysia: 75% of travel on 3-star or better high volume roads by 2020



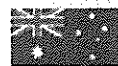
Sweden: 75% of network at 3-star or better by 2020 and near 100% by 2025



New Zealand: 4-star roads of national significance; Wellington Gateway toll roads to be a minimum 4-star standard



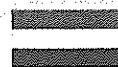
China: Five year Road Safety Plan requires national implementation of road assessments and rapid treatment of high-risk road sections



Australia: Queensland target 90% of travel on 3-star or better roads by 2022; Tasmanian Midlands Highway 3-star minimum standard



Chile: Autopista Central toll road upgrade to meet minimum 3-star standard



Netherlands: No 1 or 2-star national roads by 2020

INTERNATIONAL INSTITUTIONAL LEADERSHIP



Asian Development Bank: Recommendation for 4-star roads for pedestrians and cyclists in linear settlements, 4-star for vehicles on roads carrying 50,000 vehicles or more, and 3-star or better for all other road projects



UN Global Road Safety Performance Target: By 2030, all new roads achieve technical standards for all road users that take into account road safety, or meet a three star rating or better

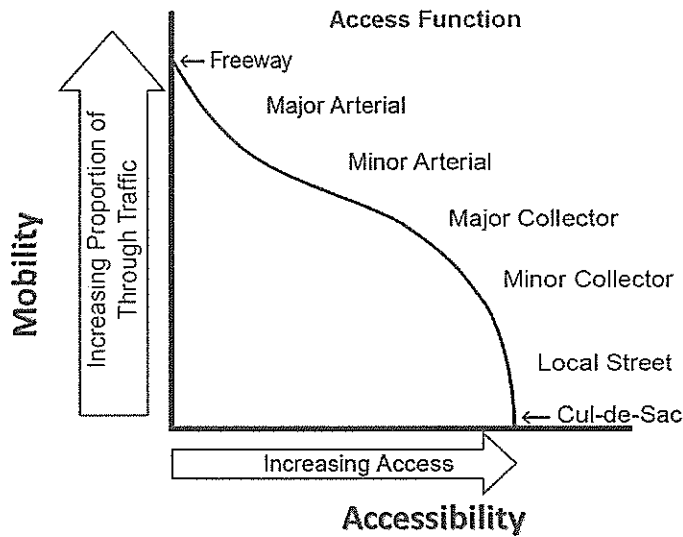


Millennium Challenge Corporation: Eliminating 1 and 2-star roads in Moldova, Philippines, El Salvador, Cote d'Ivoire and Senegal



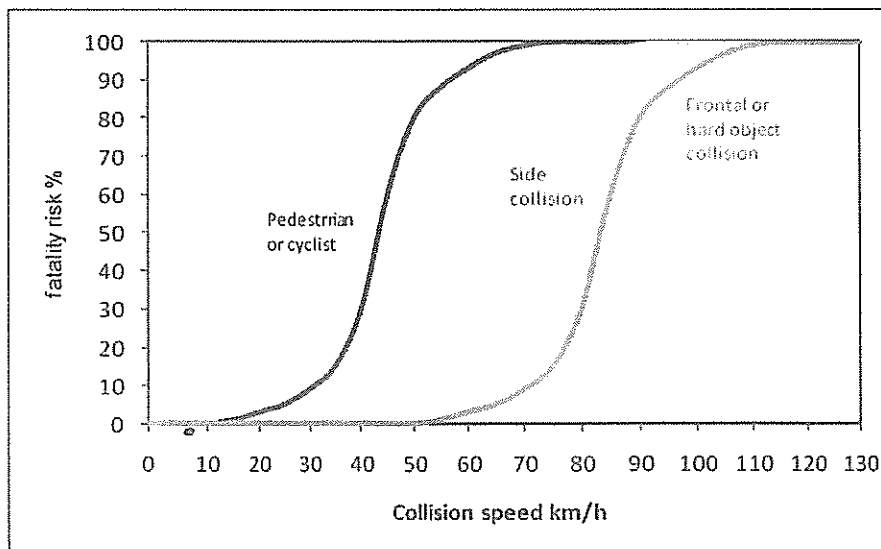
World Bank: Minimum 3-star roads for projects in India and Kazakhstan, amongst others.

Accessibility v/s Mobility



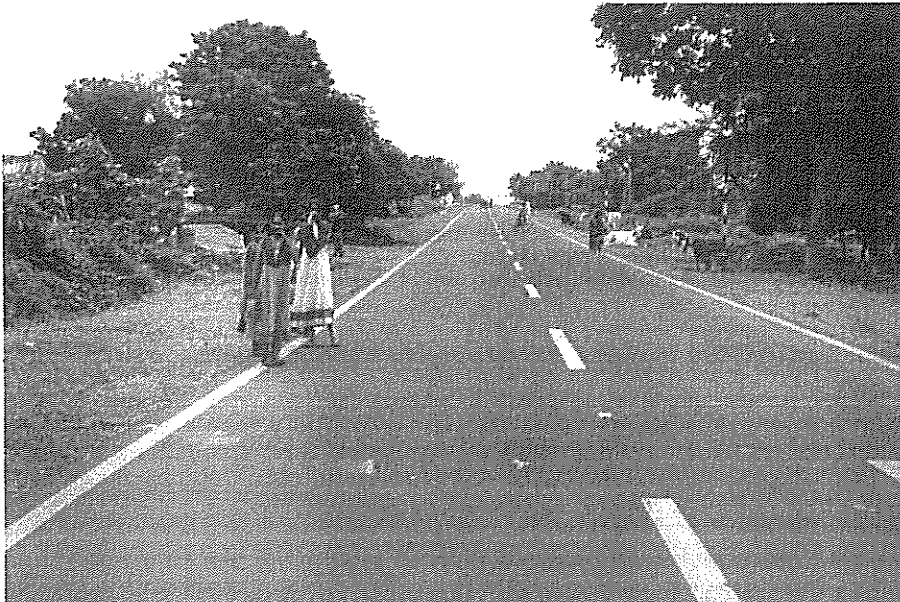
Source: Access management, State of Wisconsin - Department of Transportation

Speed is Central to Safety



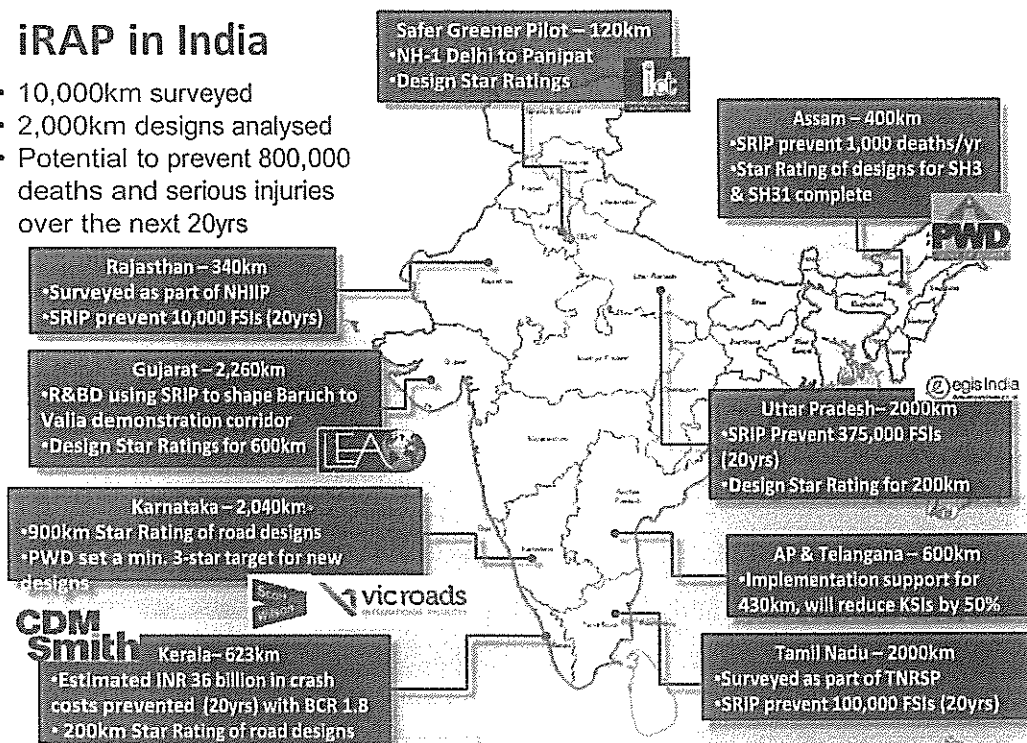
OECD, 2008, *Towards Zero: Ambitious Road Safety Target and the Safe System Approach*

Pedestrians and bicyclist on highways

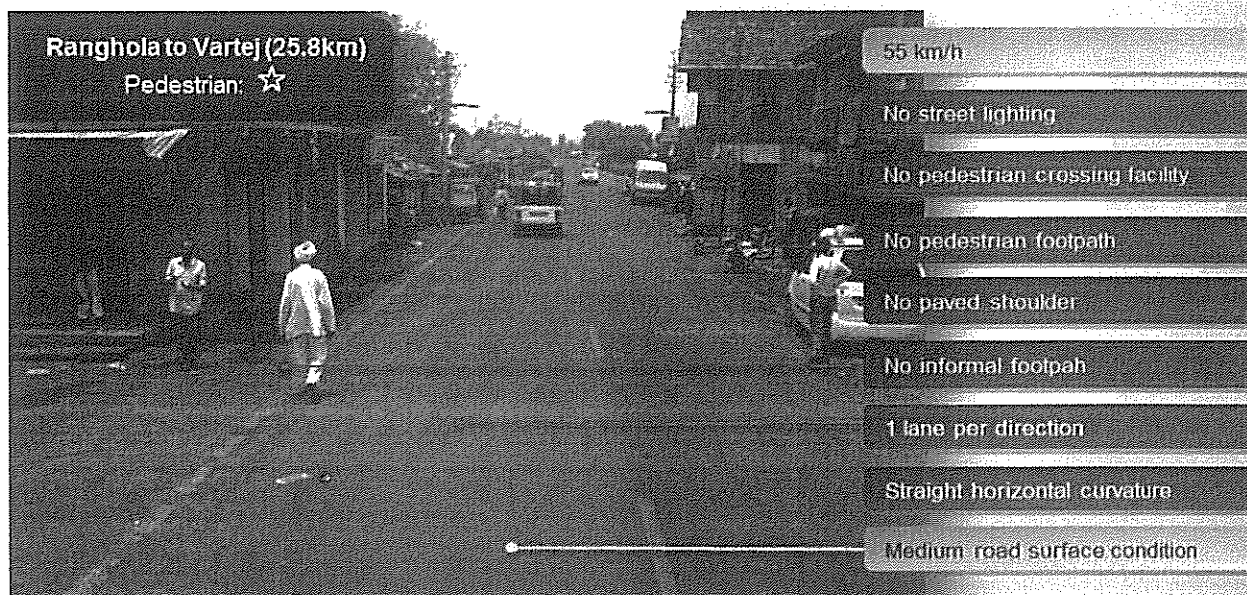
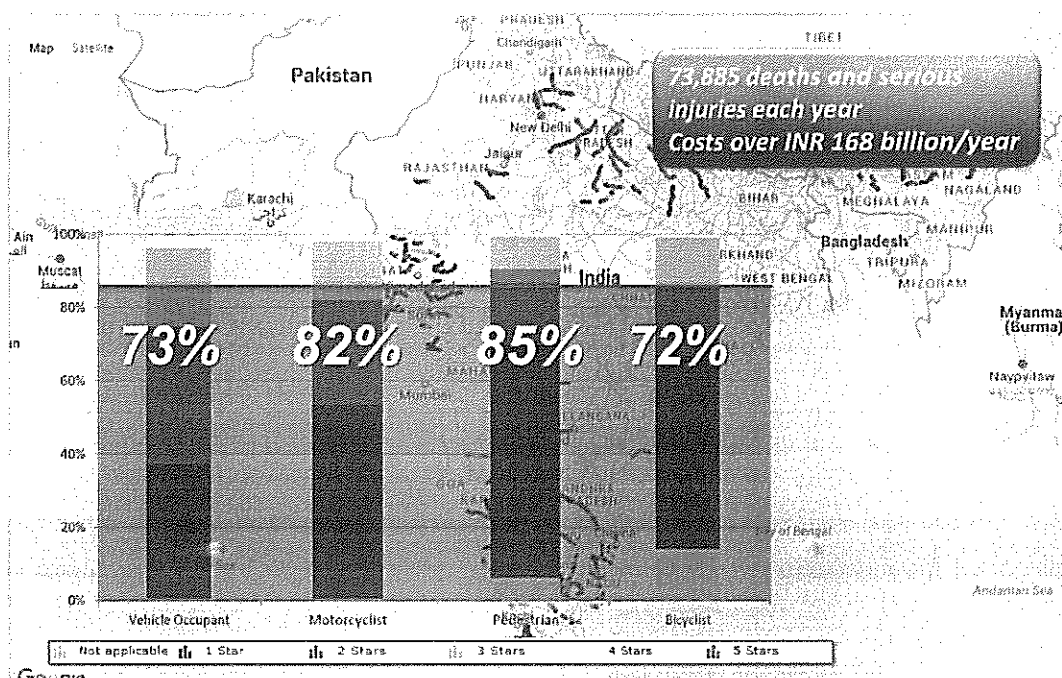


iRAP in India

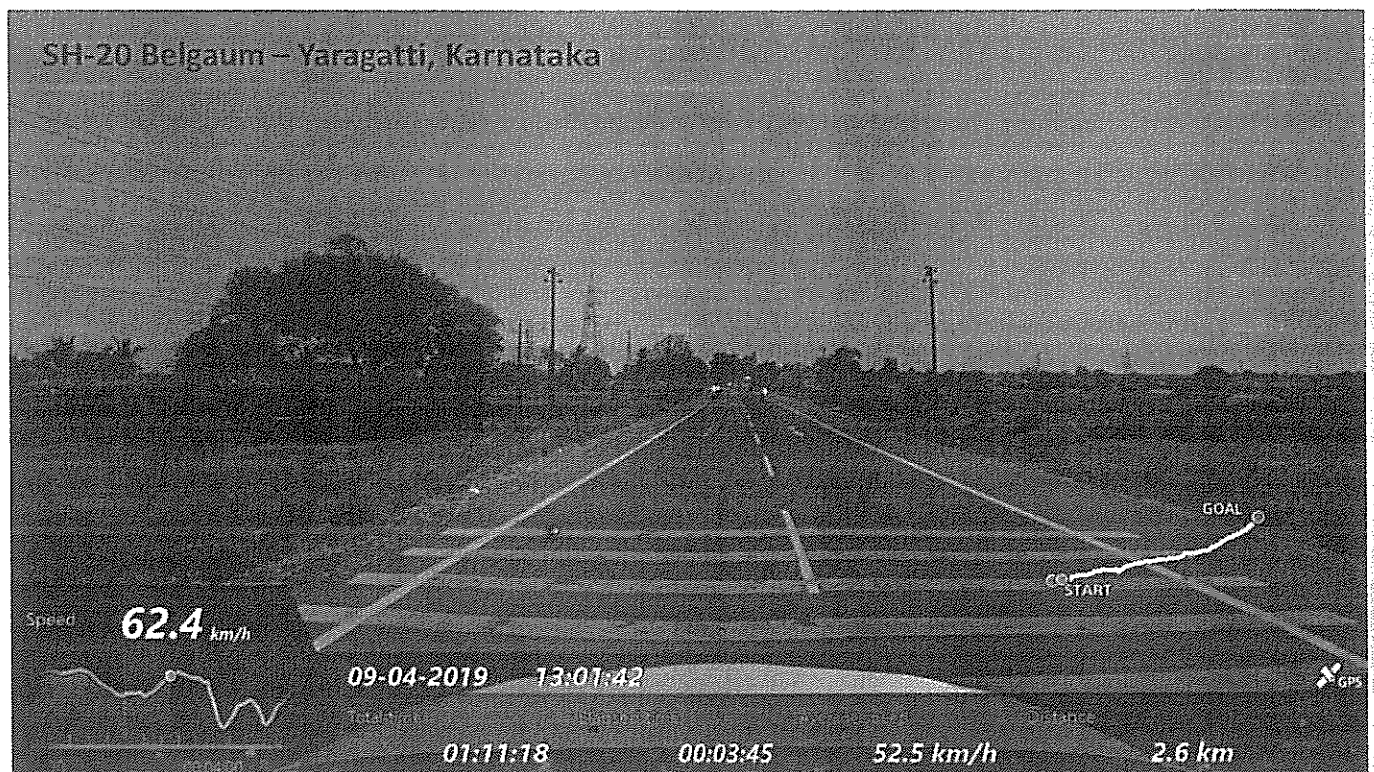
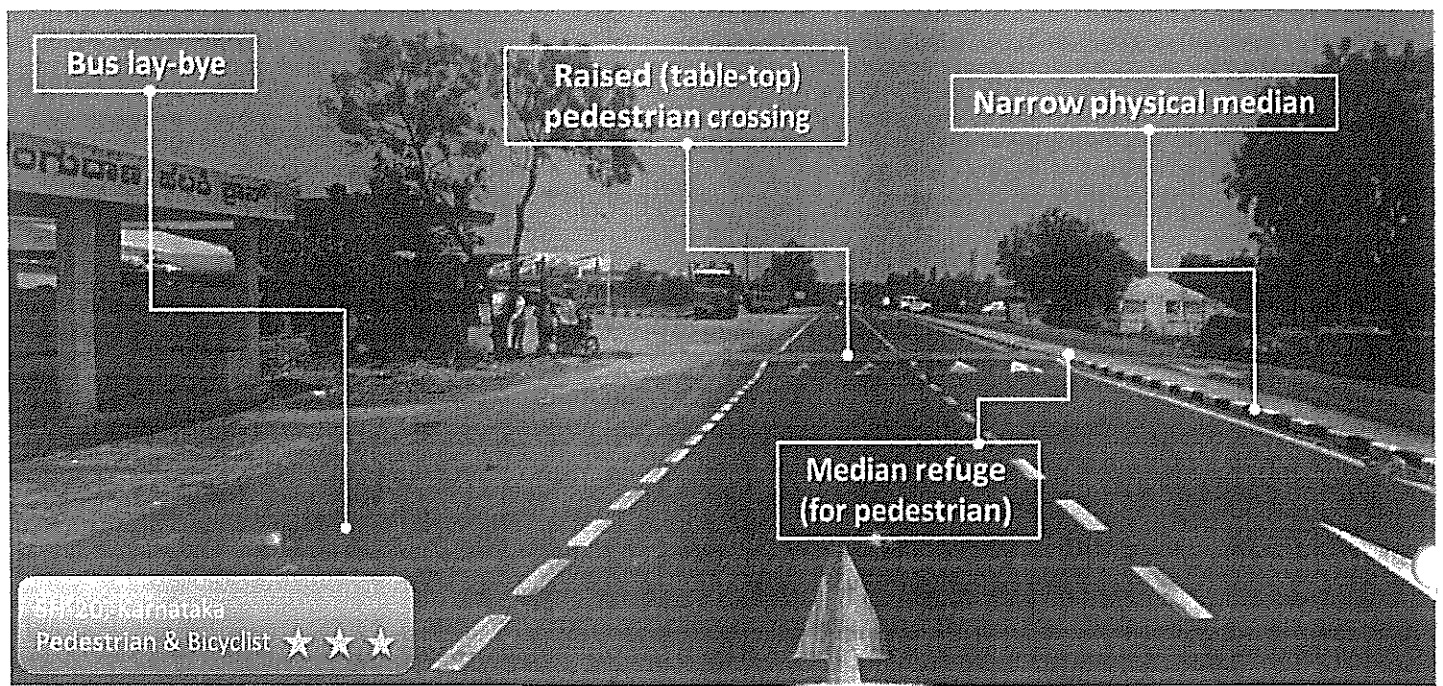
- 10,000km surveyed
- 2,000km designs analysed
- Potential to prevent 800,000 deaths and serious injuries over the next 20yrs



Star Rating Results India



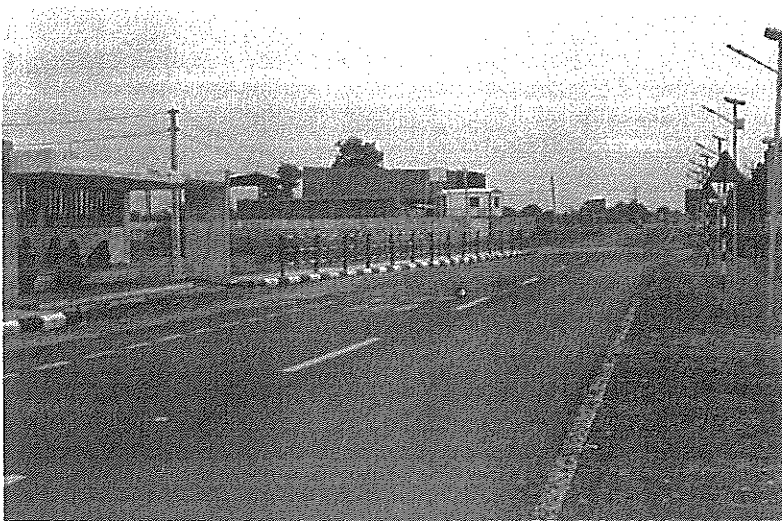
SH-20 Belgaum – Yaragatti, Karnataka



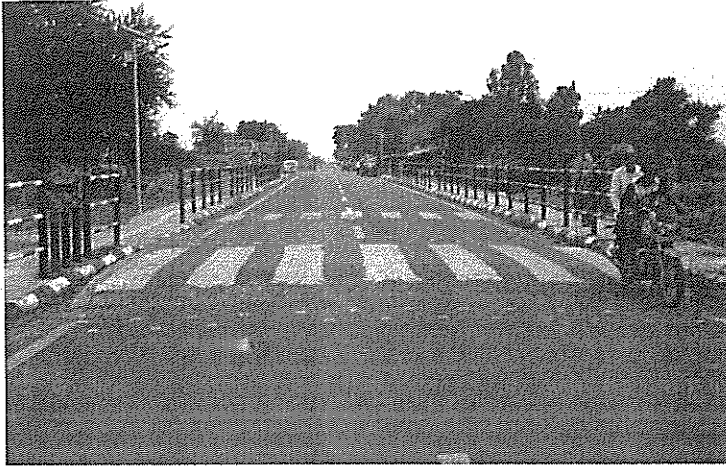
SH-55
Himmatnagar – Mehsana,
Gujarat



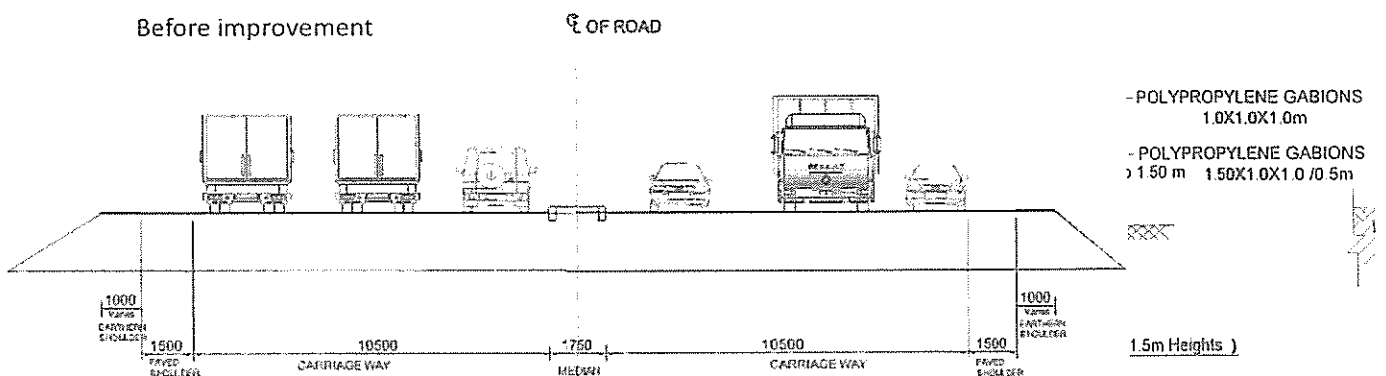
Pedestrian facility upgrade (bus stop, footpath),
Gujarat State Highways



Pedestrian facilities and traffic calming, Gujarat State Highways



3-Star or better – Gujarat Demo Corridor (Bharuch – Dahej)



Design_1

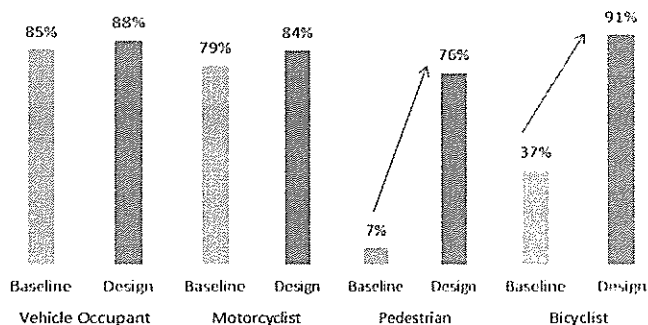
Fewer pedestrian crossings and
traffic calming
No footpath

Design_2

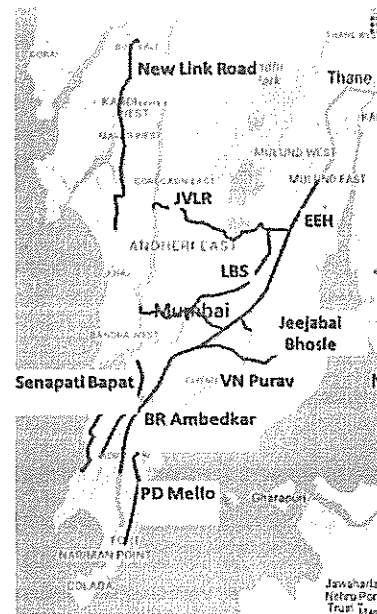
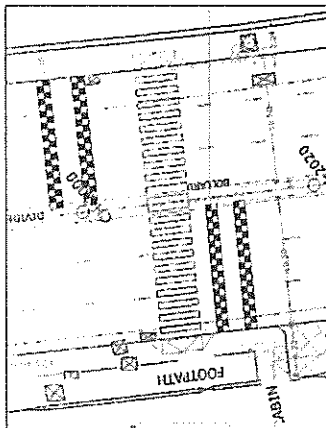
More pedestrian crossings and
traffic calming
Footpath with fence

LBS Marg, Mumbai (urban road)

Baseline and Design Star Ratings of LBS Marg (17.7km)

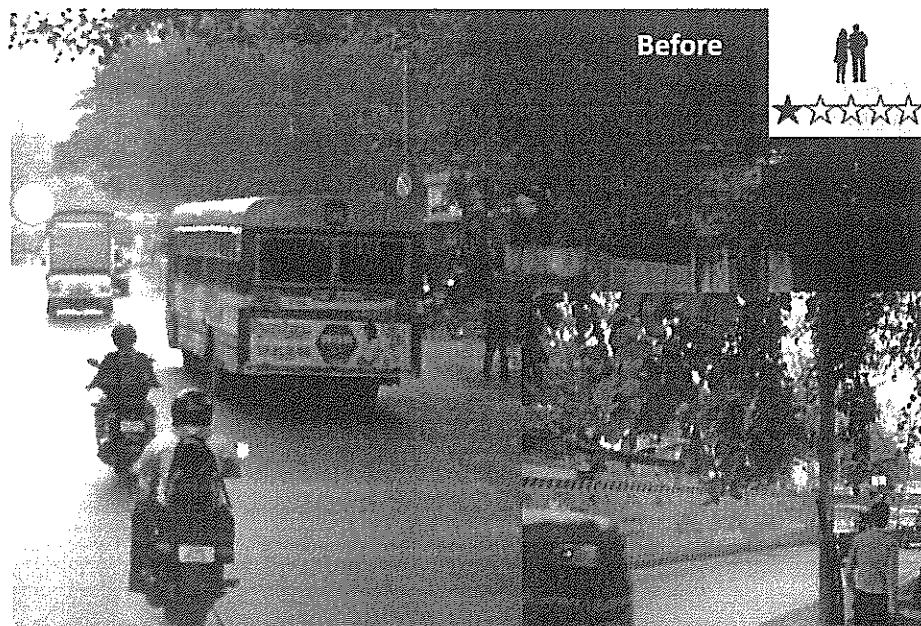


Design has speed humps within 5 m of pedestrian crossing

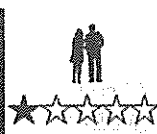


Estimated number of annual fatalities and serious injuries on LBS Marg

Before improvement	Estimated after improvement	Reduction
143	71	51%



Before



LBS Marg Mumbai
Improved road infrastructure for pedestrian



After



Summary

- Solutions for medium volume roads
 - Footpath and pedestrian crossing facilities
 - Traffic calming with adequate delineation
 - Street-lighting (solar ?)
- For high volume roads like 4 / 6 lane NHs
 - Segregation – Underpass (incl. light vehicles, cattle, etc.)
 - FOBs may not work in all conditions
 - Service roads

Thank You

Email: jigesh.bhavsar@irap.org

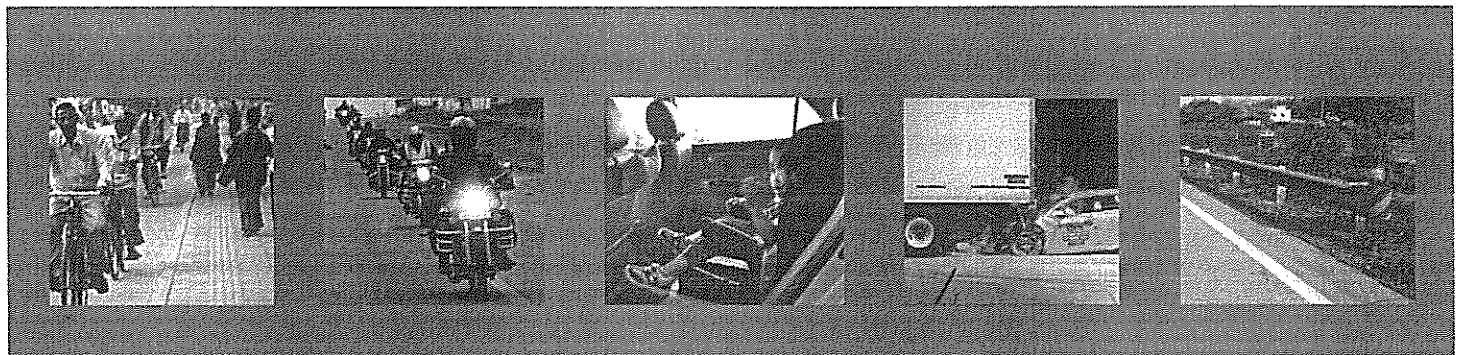
Website: www.irap.org



Case study of Road Accidents involving VRUs in Indian Cities

National Workshop on Road Safety for Vulnerable Road Users, 31 May 2019, Pune

Bhuvanesh Bharath Alwar, Road Safety Engineer
JP Research India Private Limited

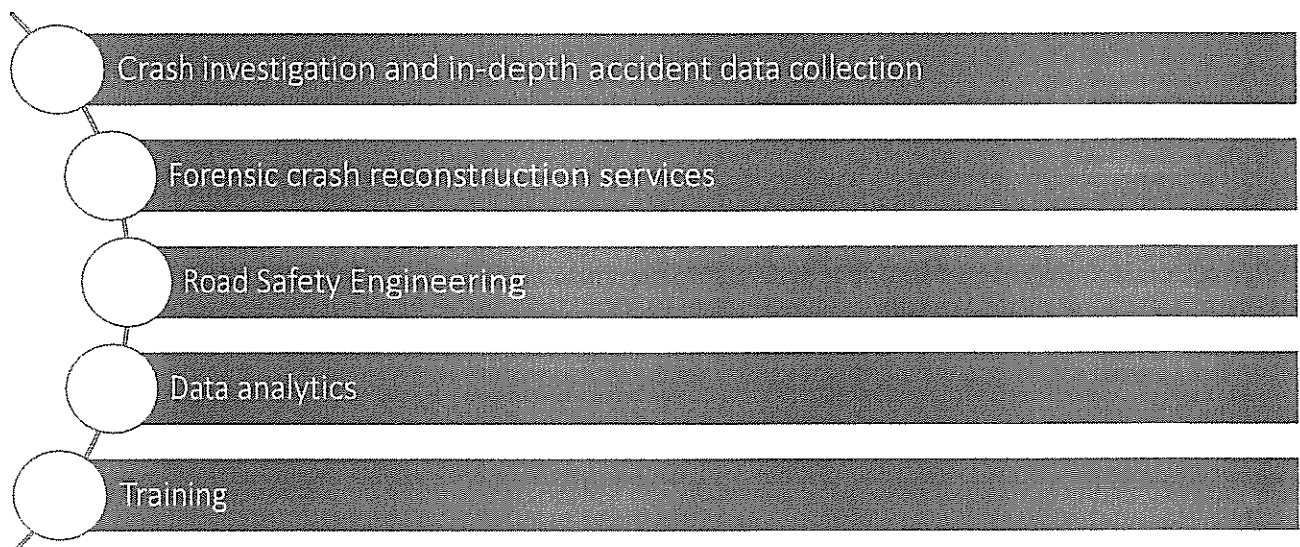


11 April 2019

JP Research India Pvt. Ltd.

2

JP RESEARCH INDIA PVT. LTD. (JPRI) EXPERTISE

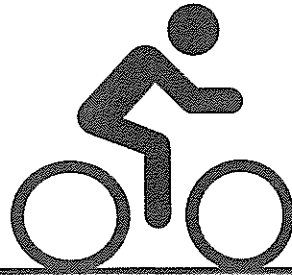


VULNERABLE ROAD USERS

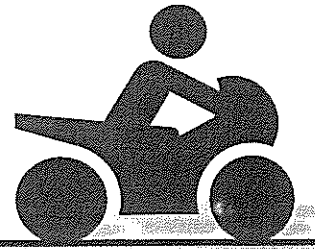
For the purpose of this work, the following road users are considered vulnerable:



Pedestrians



Bicyclists



Motorcyclists

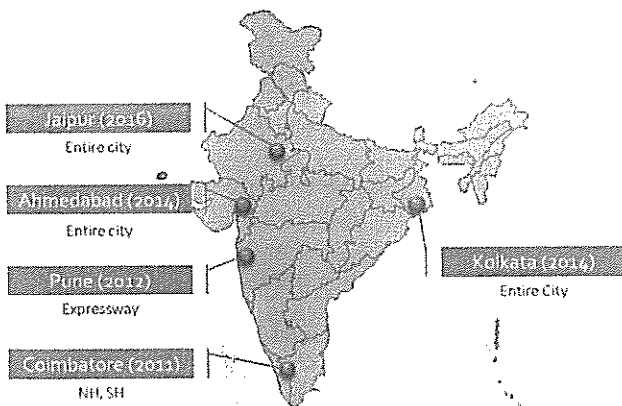


RASSI

FUELLED BY SCIENCE. DRIVEN BY DATA

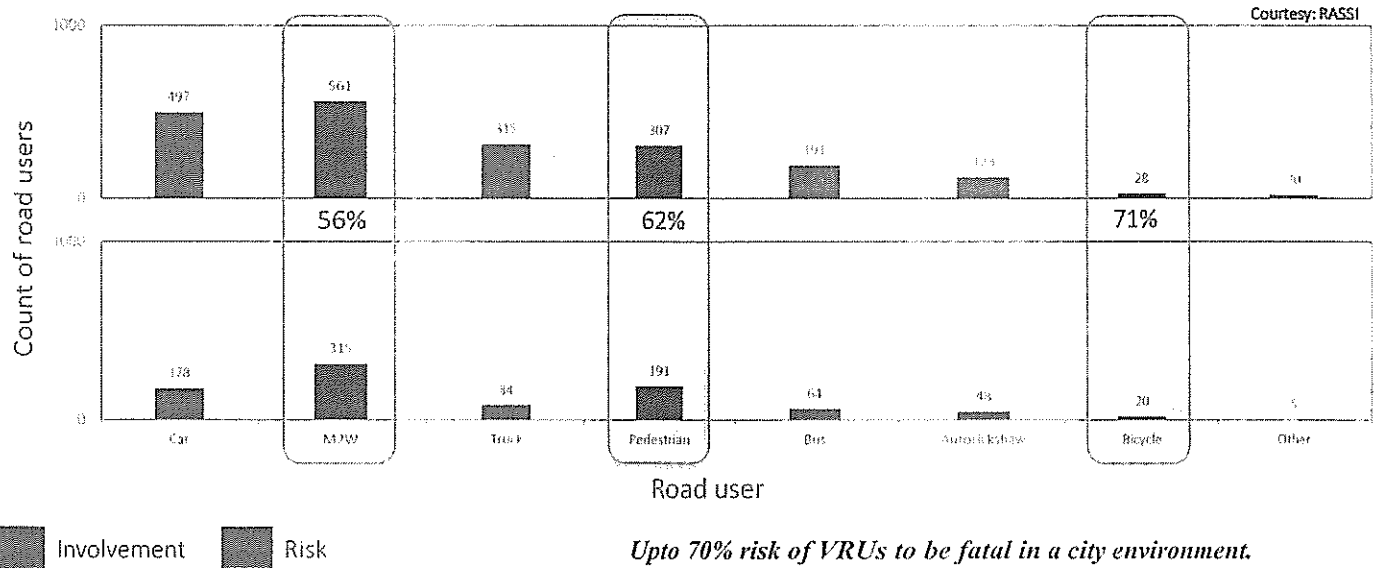
www.rassi.in





- In-depth-crash data collection from 2011 through on-site crash investigations.
- A state-of-the-art nationwide in-depth crash database unique to India.
- Analytical/technical capabilities to identify India's crash experience relating to road infrastructure, vehicle design and human behavior.
- 4,000+ crashes collected from 5 data centers in different geographic regions.

INVOLVEMENT AND FATALITY RISK OF VRU (URBAN)

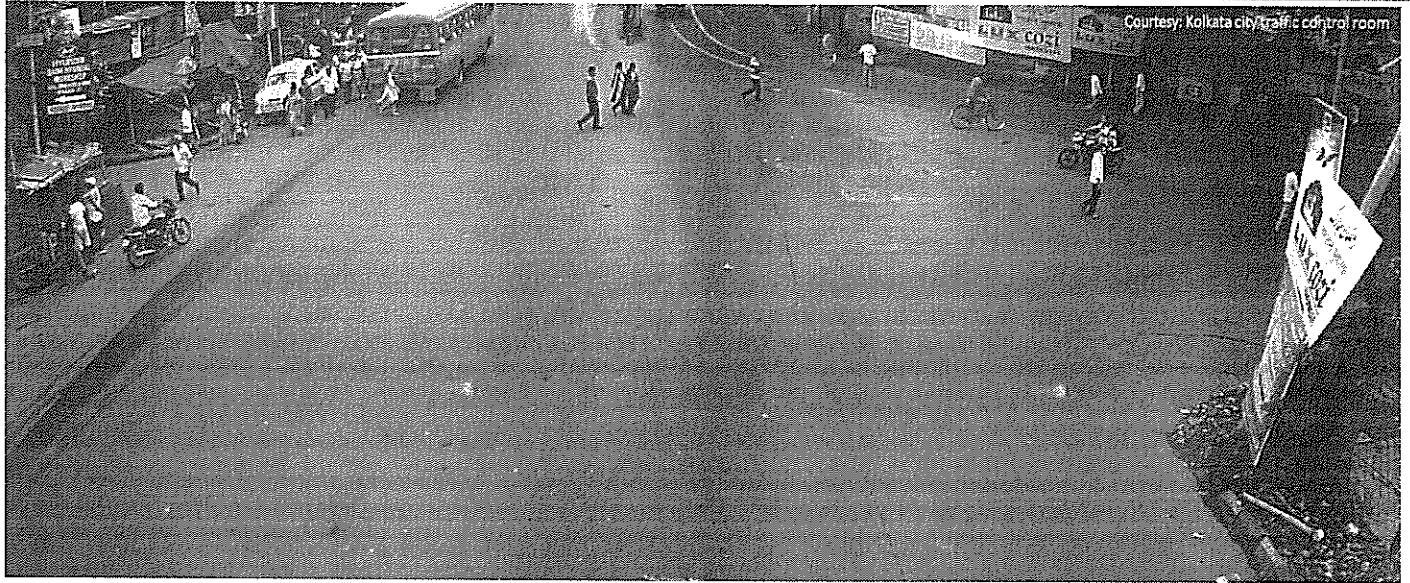


CONTRIBUTING FACTORS – PEDESTRIANS N = 307 CRASHES INVOLVING ATLEAST ONE PEDESTRIAN

	Human	Vehicle	Infrastructure
Pre-Crash	Dangerous behaviour on roadway (47%) Pedestrian inattention (24%) Disobeyed signal (4%)	--	Poor pedestrian infrastructure for crossing (28%) Poor pedestrian infrastructure for walking along side (4%) Defective traffic signals (2%)
Crash	--	--	Roadside man made structures (2%)
Post Crash	--	--	EMS availability (0.3%)

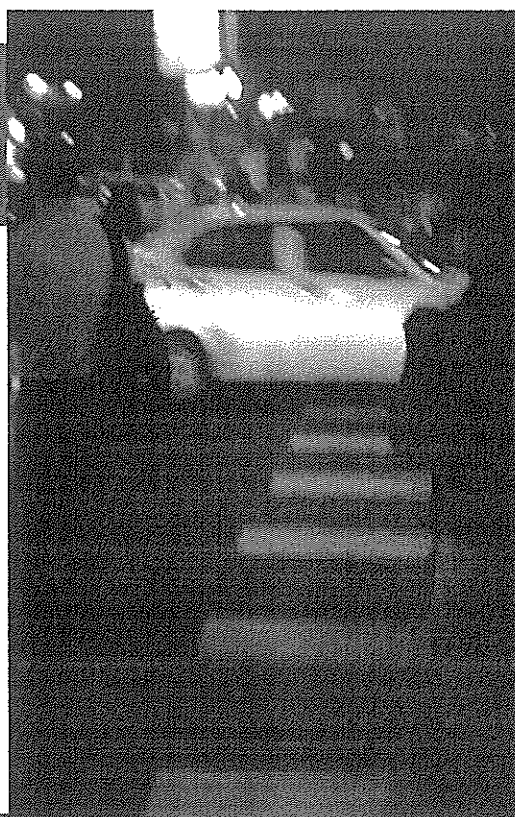
Courtesy: RASSI

PEDESTRIAN INFRASTRUCTURE



PEDESTRIAN INFRASTRUCTURE





CONTRIBUTING FACTORS – MOTORCYCLES

N = 514 CRASHES INVOLVING ATLEAST ONE M2W

	Human	Vehicle	Infrastructure
Pre-Crash	Excessive speed for condition (12%) Driver behaviour other (10%) Illegal road usage (9%)	Overloading people (6%) Defective/missing mirrors (1%) Defective tires (1%)	Poor road marking and signage (13%) Intersection (9%) Undivided road (4%)
Crash	Helmet not used (54%) Helmet not used properly (8%) Overloading of occupants (0.2%)	Fall down (25%) Knock down M2W (9%) Knock down of pedestrians (8%)	Roadside manmade structures (14%) Road side trees plantation (1%) Other road side objects (1%)
Post Crash	Improper evacuation of occupants (0.2%)	--	EMS Availability (0.4%)

Courtesy: RASSI

MOTORCYCLIST INFRASTRUCTURE



MOTORCYCLIST INFRASTRUCTURE



CONTRIBUTING FACTORS – BICYCLISTS

N = 23 CRASHES INVOLVING ATLEAST ONE BICYCLIST

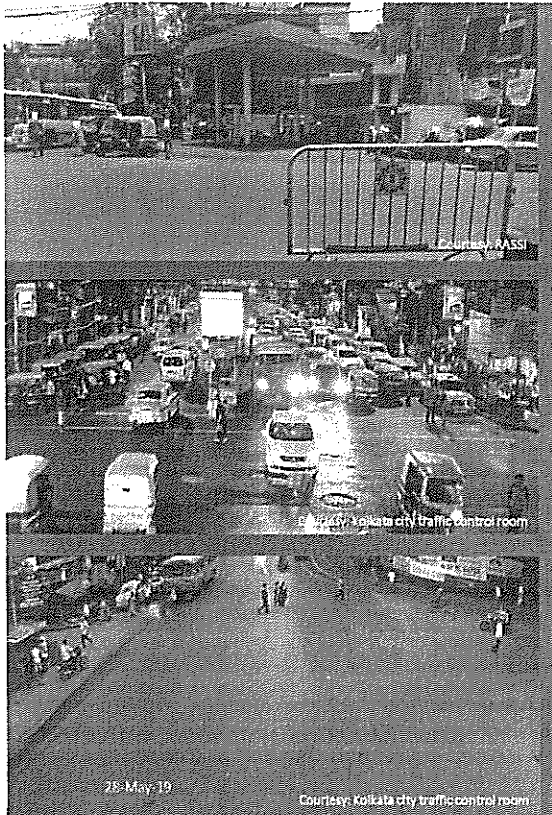
	Human	Vehicle	Infrastructure
Pre-Crash	Turning suddenly or without indication (22%) Disobeyed traffic signal (13%) Improper lane change/lane usage (13%)	Absence of reflectors (17%)	Undivided road (4%) Road traffic flow (4%) Deposits on road (4%) Poor road marking and signage (4%)
Crash	Helmet not used (78%) Occupants in cargo (4%)	Knockdown of bicyclist (4%) Non enclosed occupant cabin (4%) Crash protection others (4%)	Road side manmade structures (4%)
Post Crash	--	Ejection (4%)	--

Courtesy: RASSI

BICYCLIST INFRASTRUCTURE



Courtesy: Kolkata city traffic control room



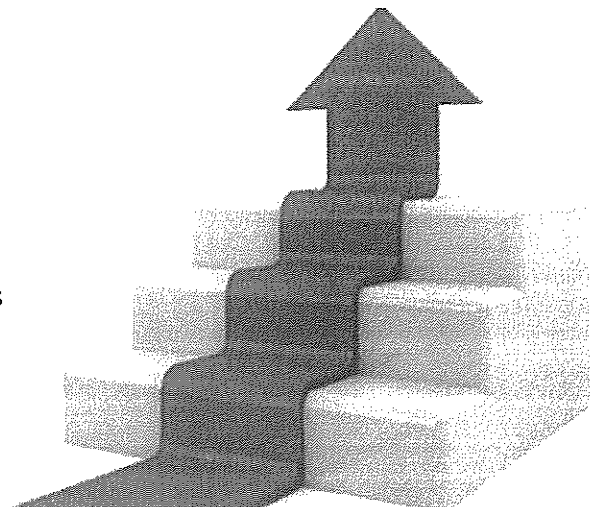
WHAT WENT WRONG

- No footpath at the originating point of pedestrian.
- Pedestrian crossing marked but inefficient.
- No pedestrian refuge islands.
- No road marking and pedestrian crossing zones.

STEPS AHEAD

Base infrastructure needs to be properly planned and installed for physical and temporal separation of VRUs and other traffic.

- Footpaths
- Crossing zones
- Sufficient green times
- Possible separate lanes for motorised two wheelers



"It is a capital mistake to theorize before one has data."

- Sherlock Holmes



THANK YOU!

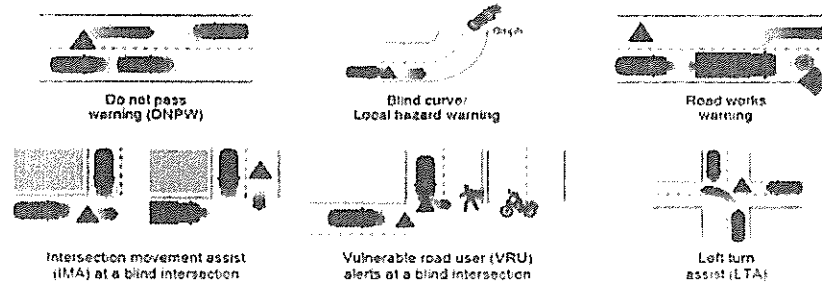
www.jpri.in

contact@jpri.in

Enhancing Road Safety for VRU using Intelligent Transport System (ITS)

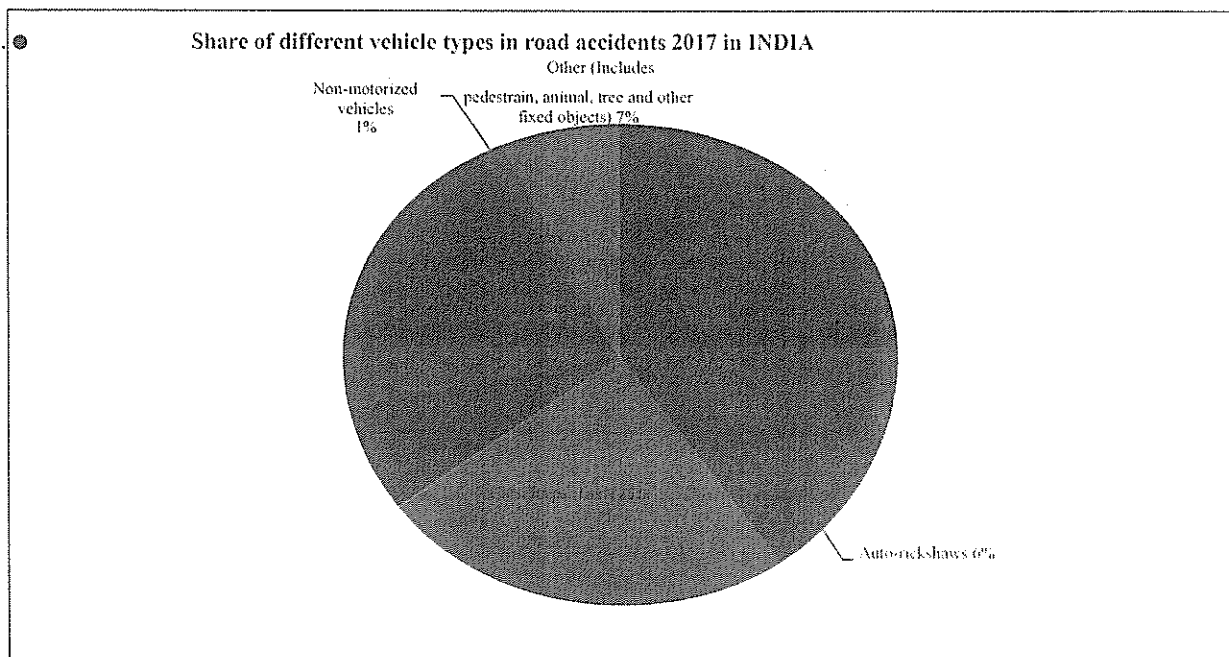
Direct communications for active safety use cases

Low latency communication with enhanced range, reliability, and NLOS performance

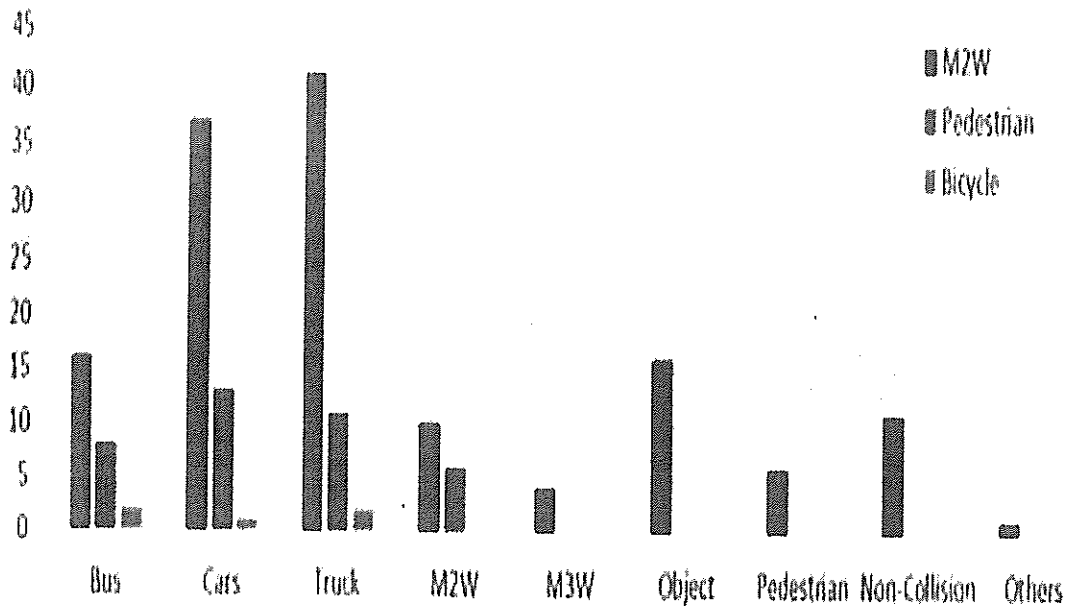


Prof. P.K. Sarkar
**ASIAN INSTITUTE OF
TRANSPORT DEVELOPMENT**

VRUs involved in Road Accidents



Collision partners for VRU.



Possible ITS Areas for Applications for Safety of VRUSs

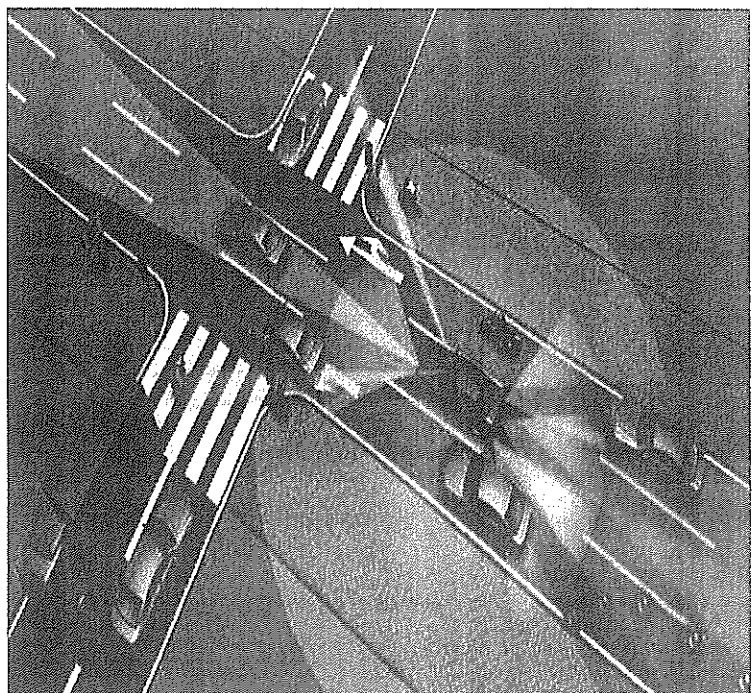
- | | | | |
|----|--|----|---|
| 1 | Blind Spot Detection | 12 | Urban Sensing System |
| 2 | Intelligent Pedestrians Traffic Signal | 13 | Automatic Counting of Bicycles and Pedestrians |
| 3 | Intelligent Speed Adaptation | 14 | Night Vision and Warning |
| 4 | Red Light Camera | 15 | Information on Vacancy on Bicycle Racks |
| 5 | Intersection Safety | 16 | Bicycle to Car Communication |
| 6 | Pedestrian Detection System + Emergency Braking | 17 | Rider Monitoring System |
| 7 | Navigation System for non-motorised VRUs | 18 | Crossing Adaptive Lighting |
| 8 | PTW Oncoming Vehicle Information System | 19 | Infotainment |
| 9 | VRU Beacon System | 20 | Real-time Information Systems for Public Transport |
| 10 | Digital bicycle rearward looking assistant | 21 | Pedestrian Road Weather Warning |
| 11 | Roadside Pedestrian Presence warning system | 22 | Forward Obstacle Detection for Cyclists |
| | | 23 | Green Wave for Cyclists |

Objectives of using ITS to Improve Safety Of The VRUs

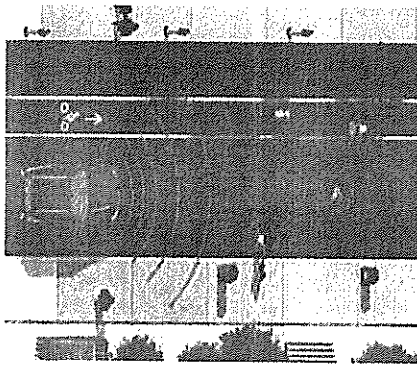
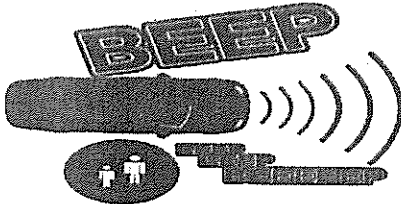
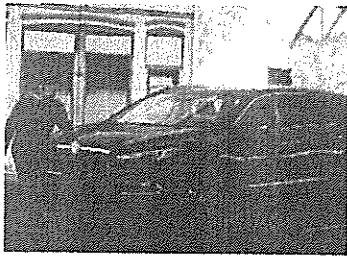
1. Demonstration of Application of ITS measures in order to improve the safety and mobility of VRUs;
2. Highlight the results of pilot study on VRU conducted by EU related to Application of Intelligent Transport Systems

Blind Spot Detection

- Blind Spot Detection is considered by lots of experts as a promising ITS for the safety of VRUs, especially in supporting truck drivers when turning right and avoiding cyclists crashes.



Pedestrian Detection System



This uses a **camera combined with radar to detect vulnerable road users** through their shape and characteristics. The way in which pedestrians move relative to the path of the vehicle is calculated to determine whether they are in danger of being struck

Alert the driver to an imminent crash and help them use the maximum braking capacity of the car and Apply the brakes independently of the driver if the situation becomes critical

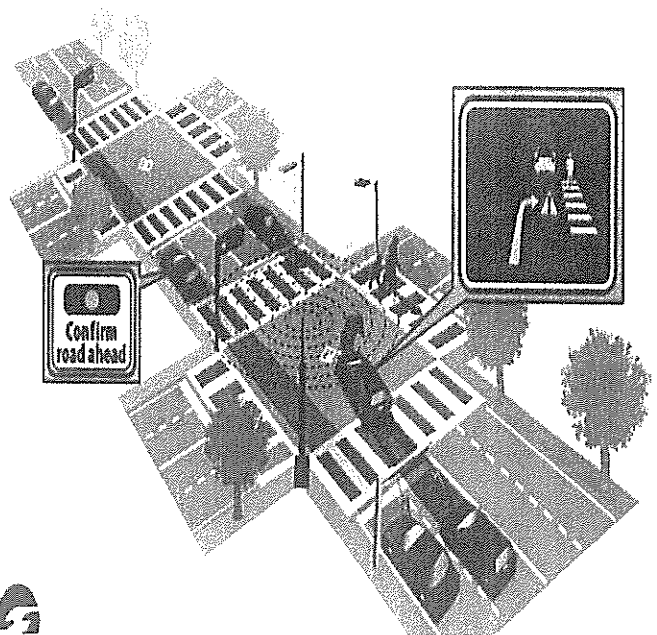
It is important to note that AEB systems are designed to support the driver only in emergency situations and that the driver remains responsible for the vehicle at all times.

VRU Beacon Systems

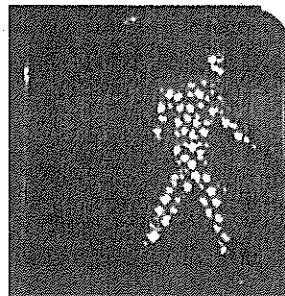
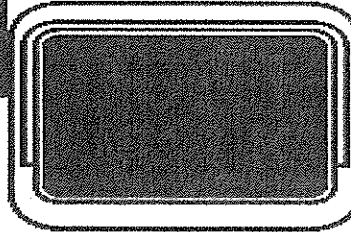
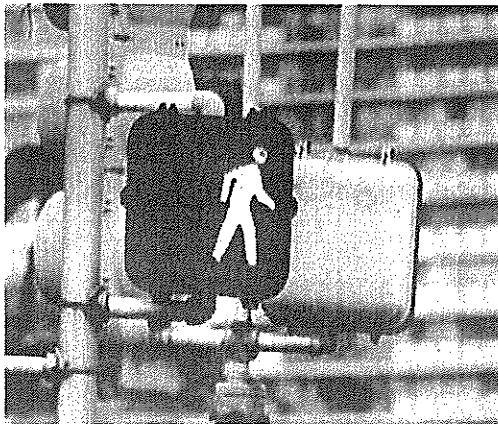
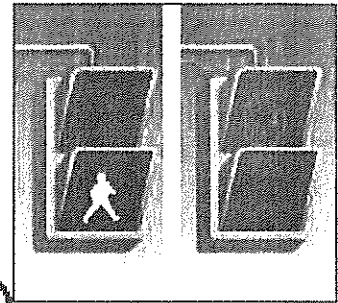
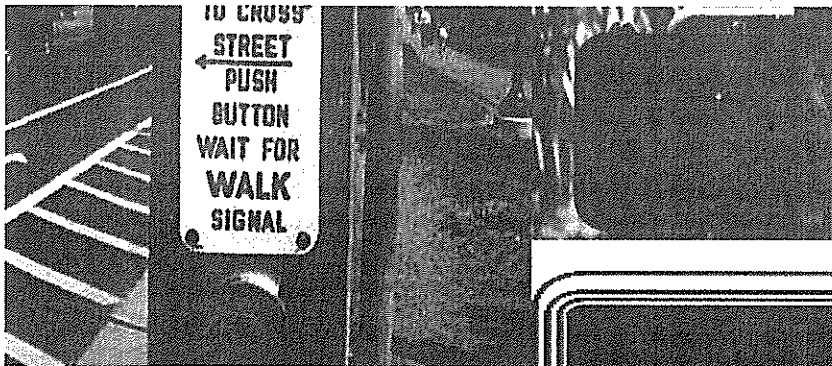
- VRU Beacon Systems

- The use of tags for kids through infrastructure, such as bus stops, combined with warnings for both the bus driver, to inhibit the start at boarding and alighting, and for other vehicle drivers to warn of children presence.

- According to the experts, beacons should indicate type of user, but that new icons may be difficult to comprehend. Regarding negative side effects, it may be difficult for the system to discriminate between "on boardwalk"/safe and unsafe conditions.
- In addition, traffic complexity is increased since traffic communication increases.



Pedestrian Traffic Signals



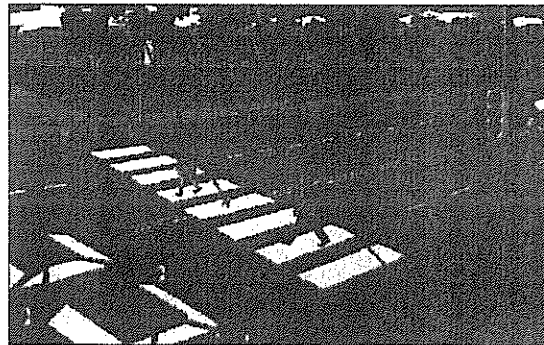
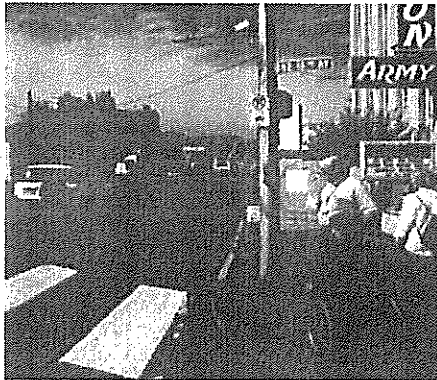
Countdown signal makes pedestrians feel safer at managing the crossing, it calms down drivers because they know how long they have to wait, and it helps the traffic flow because slower pedestrians will avoid starting to cross at the middle of the green light.

Pelican Crossing/Push Button System



Automatic Pedestrian Detection System

- The system takes care of signal timing automatically.
- If pedestrian takes more time to cross the road the pedestrian green light is adjusted accordingly to facilitate the movement of those pedestrians.
- Can be used as part of traffic light as a permanent feature or as part of traffic light but on request basis.



Automatic Pedestrian Detection System

Automatic Pedestrian Detection System

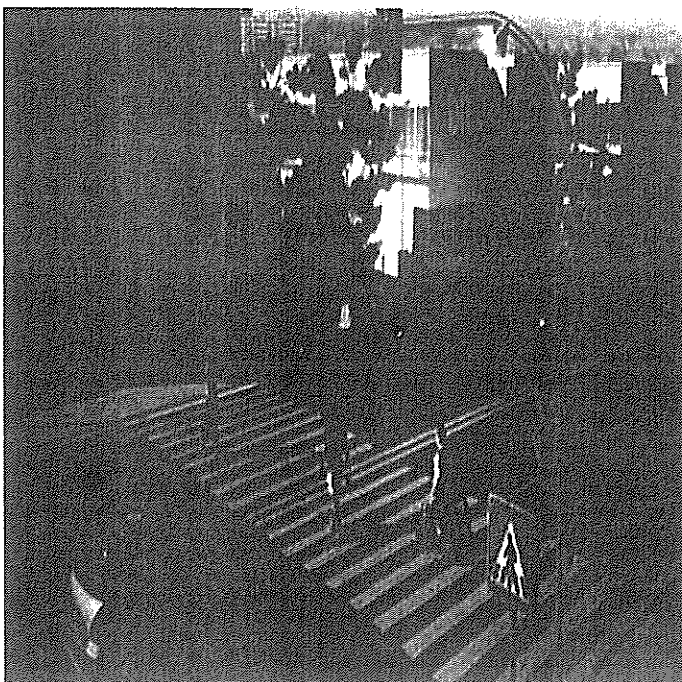


Automated pedestrian detection devices called **PUFFIN (Pedestrian User-Friendly Intelligent)** crossings have been in use in the United Kingdom for several years. They use an **infrared detector** or **pressure-sensitive mat** to sense **pedestrians waiting for a crosswalk signal**. These devices also notice if a pedestrian leaves the area and can cancel the pedestrian walk signal, if necessary. If a pedestrian takes longer than the allotted amount of time to cross the crosswalk, the PUFFIN signal is able to lengthen the WALK signal.

Benefits of Use of ITS to Reduce Road Accidents

- ITS systems have reduced the decrease of fatalities in all over the world.
- It is mostly vehicle-centric
- VRU fatalities have not decreased in the same level as other road users:
 - Fatalities among car occupants were reduced by 50% between 2000 and 2012, whereas decreases were only 34% for pedestrians, 31% for cyclists and 17% for motorcyclists, International Road Traffic Accident Data Analysis (IRTAD, 2014) in European Countries.
- ⇒ It is desirable that the VRU should be addressed as integrated element in the ITS, by taking into account safety, mobility and travel comfort of VRUs

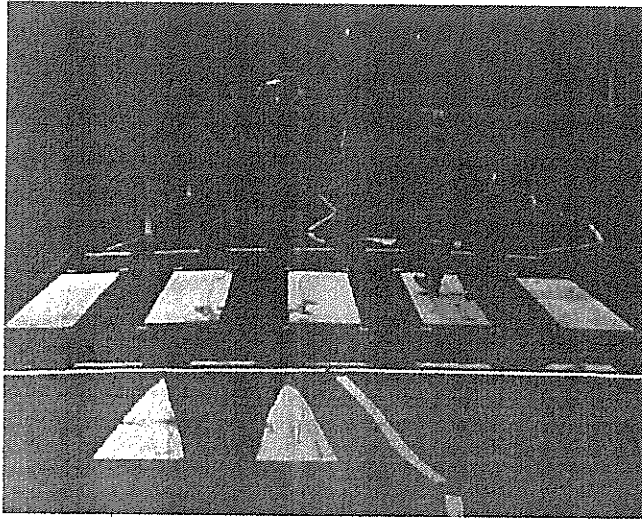
Emerging Technologies: Smart pedestrian crossing- in Spain



Badajoz, Spain now has its first smart pedestrian crossing. At one of the city's main accident black spots, a smart crossing has been installed to prevent accidents in a particularly dangerous part of the city centre.

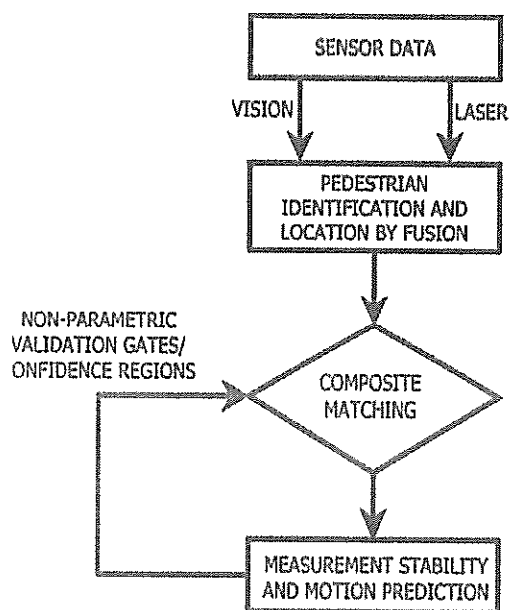
The traffic-light turn amber signal if a pedestrian is approaching the crossing. When a vehicle is driving down the street at over 30 kilometres per hour, a red light warns pedestrians of the danger. Safety is reinforced at night with LEDs that light up to warn cars of pedestrians at the crossing.

Line of Sight Project, In London



Mettle Studio, on another crossing project called the Line of Sight – a strip of red LEDs that light up when pedestrians are crossing the street. The red lights warn cars anytime someone steps onto the crossing. Once pedestrians cross the street, they flash and then go out entirely.

Traffione –A Sensor monitoring Pedestrian Movement



A sensor that monitors vehicle and pedestrian traffic

It uses that information to control traffic signals. In addition to a camera, this device uses thermal imaging, which enables it to more easily detect pedestrians in the dark

If the system detects pedestrians waiting to cross the street, it can extend the red light for vehicles

The Starling Crossing (STigmergic Adaptive Responsive LearnING). It's being designed by a London-based company called Umbrellium for insurer Direct Line, and it's currently at the prototype stage.

If you step on the curb on this street of the future, a pedestrian crossing will automatically appear in front of you when it's safe to cross. If a crowd wants to cross simultaneously, the crossing widens; if someone staring at a smartphone veers into traffic, warning lights illuminate around them. The markings look similar to those that are usually painted on the road, but because they're created with LED lights, they can continually change.



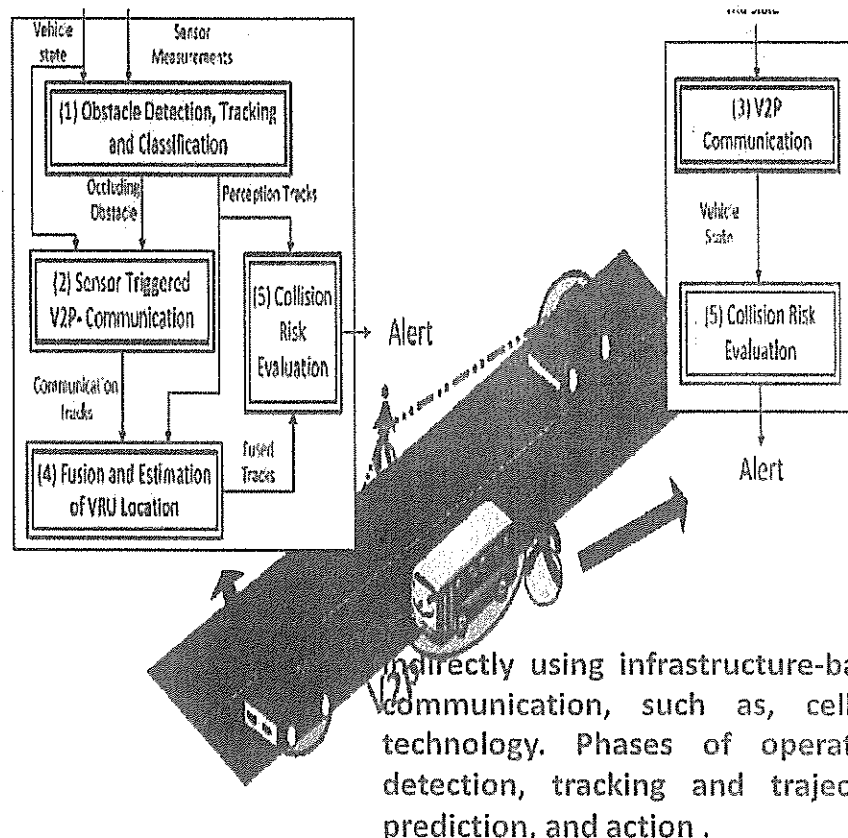
the Starling Crossing (STigmergic Adaptive Responsive LearnING Crossing
<https://vimeo.com/237217992>

COMPONENTS OF V2P (Direct & Indirect))

V2P systems can be broadly classified into the following components:
 Vehicle device

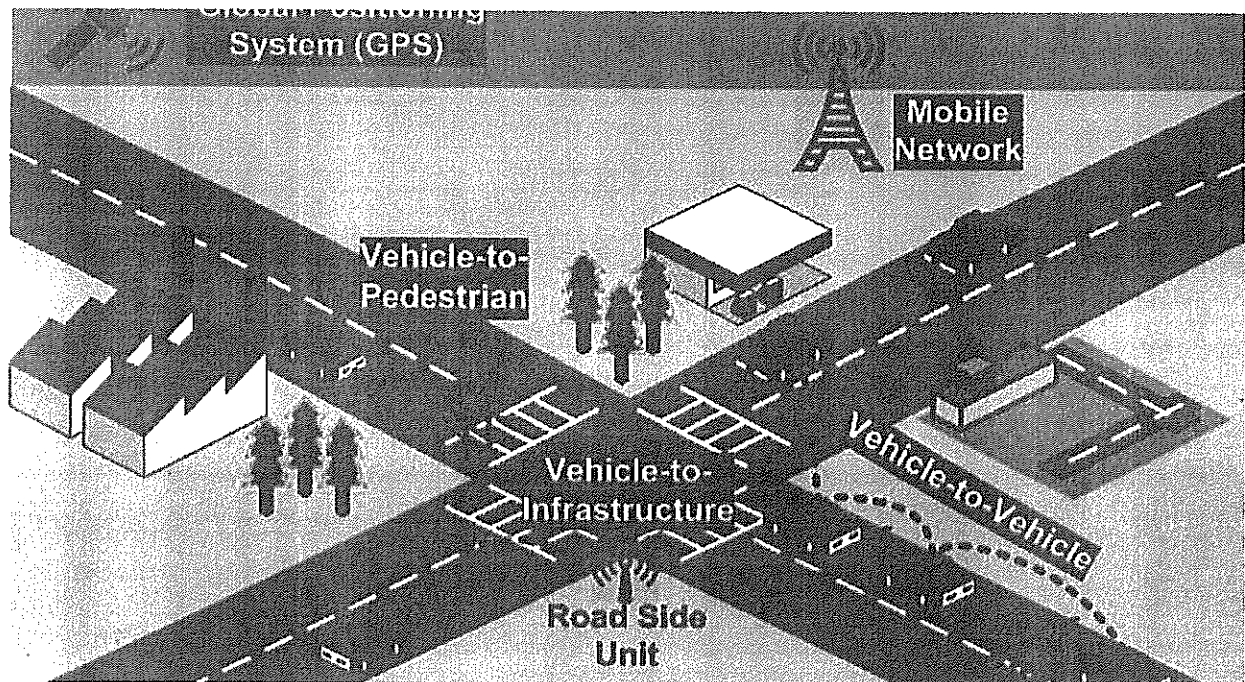
VRU device
 Infrastructure
 Information processing unit

If V2P system relies on direct communication then the system comprises of only two components viz. *Vehicle device* and *VRU device*



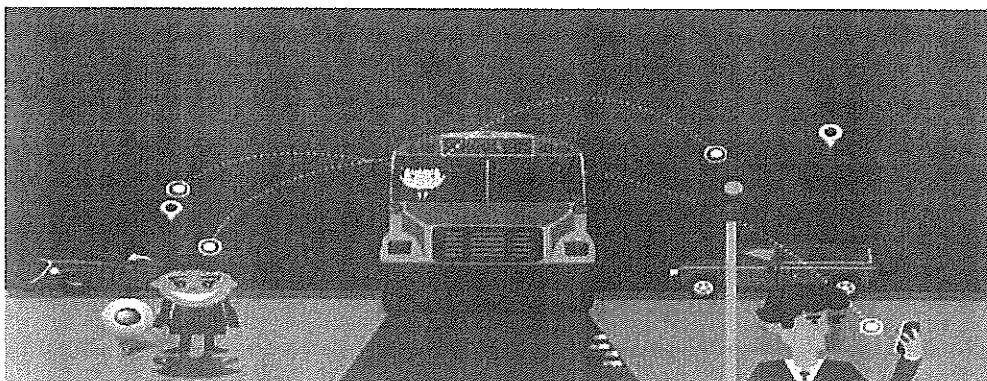
Indirectly using infrastructure-based communication, such as, cellular technology. Phases of operation: detection, tracking and trajectory prediction, and action .

Examples of V2P with Direct & Indirect

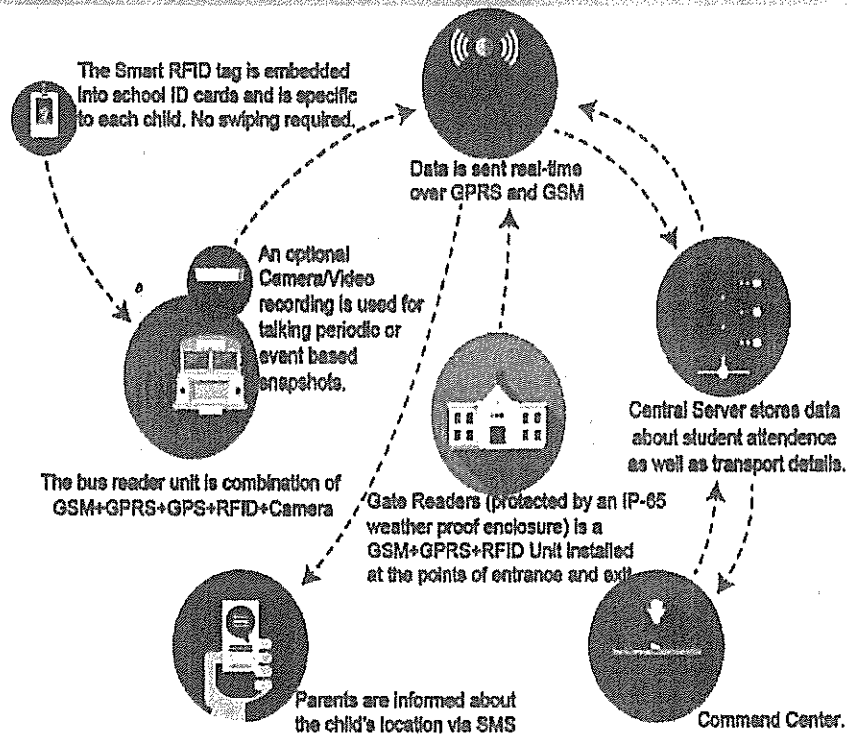


Safety for Children at Bus Stop

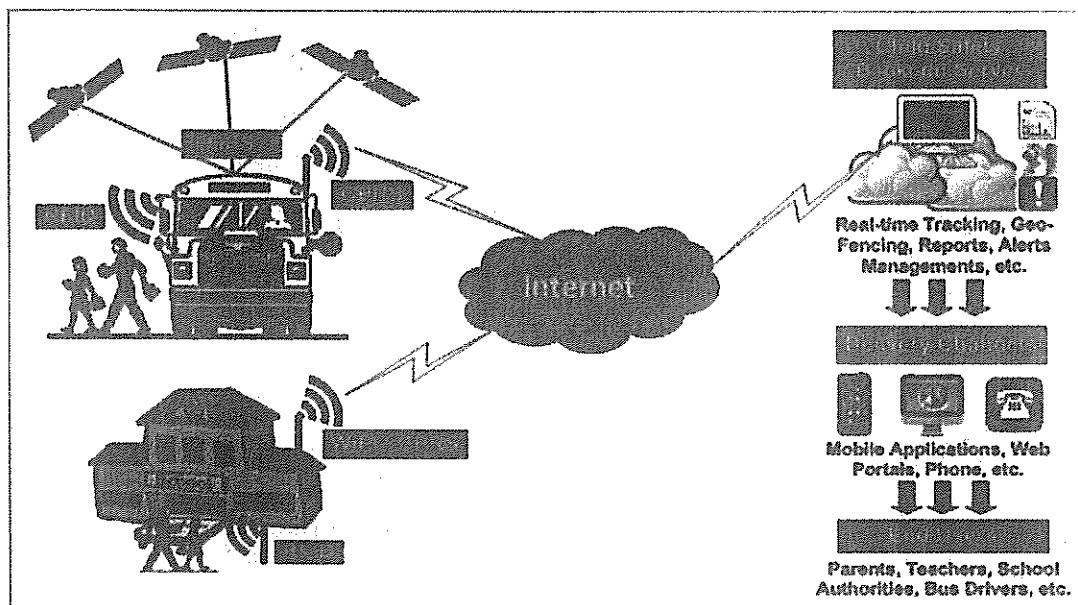
SafeWay2School developed a RFID-based VRU unit for children that consists of a standalone radio unit able to communicate with intelligent bus stops, which warn drivers with flashing lights about the vicinity of VRUs.



How It works centrally?



Overall System Architecture for school Children Safety

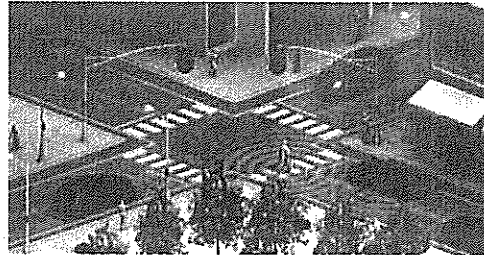


(V2VRU) communications

- In the third approach, apps on a smartphone transmitting also location data, possibly as standard C-ITS messages (ETSI ITS-G5 in Europe)

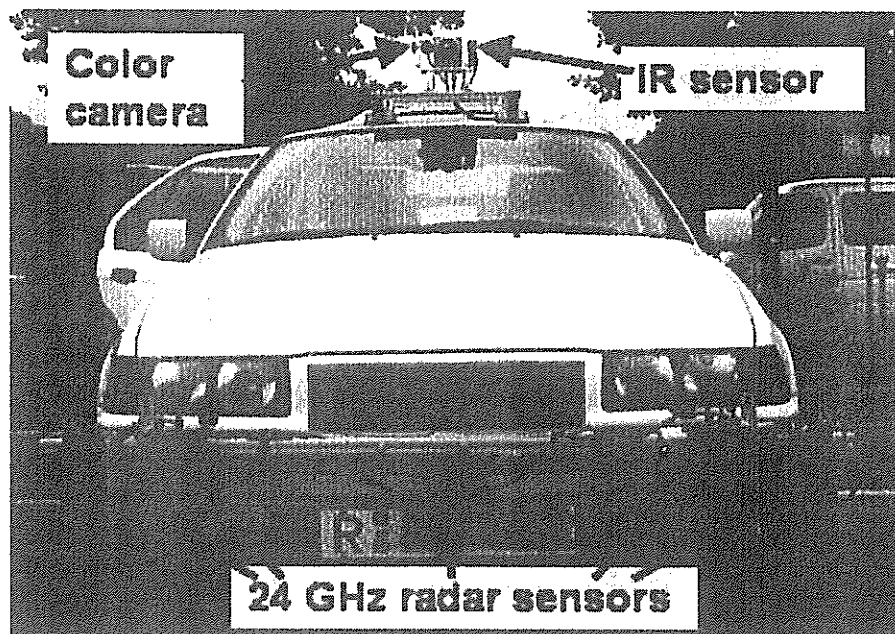
WiFiHonk, a Wi-Fi-based system, that enables vehicles and pedestrians to exchange safety messages without camping on Wi-Fi network. The system stuffs Wi-Fi beacons with safety messages in order to achieve this goal.

The app, developed by students at the University of Missouri in Kansas City, is for both drivers and pedestrians, and combines their smartphone's WiFi, GPS, accelerometer, and gyroscope to determine their exact locations



A V2P system that enables the exchange of safety messages through a combination of cellular infrastructure and direct Wi-Fi communication. A central information processing server processes the safety messages that it receives from vehicles and pedestrians and calculates the collision risk.

VRU Sensors



ITS projects for VRU

The EU-sponsored VRUITS pilot project

- The EU-sponsored VRUITS project has prioritized ITS applications which have a potential to improve the safety, mobility and comfort of vulnerable road users (VRUs) and performed a quantitative safety, mobility and comfort assessment for the 10 most promising systems.
- The 10 selected ITS were:
- VRU beacon system, Powered Two Wheelers oncoming Vehicle information, Bicycle-to-vehicle communication, Cooperative Intersection safety, Green wave for cyclists, Pedestrian & Cyclist detection with Emergency Braking, Blind spot detection, Intelligent pedestrian traffic signal, Crossing adaptive lighting and Information on bike rack vacancy.
- cooperative intersection safety for cyclists in Helmond (the Netherlands) and intelligent pedestrian traffic signals in Valladolid and Alcalá de Henares (Spain)

ITS Applications for VRUITS Pilot Projects in Europe

1.0 Intelligent Pedestrian Traffic Signal Crossing

2.0 Adaptive Lighting

3 Intersection Safety

4.0 VRU Beacon System

5.0 PTW oncoming vehicle information system

6.0 Information on Vacancy on Bicycle racks

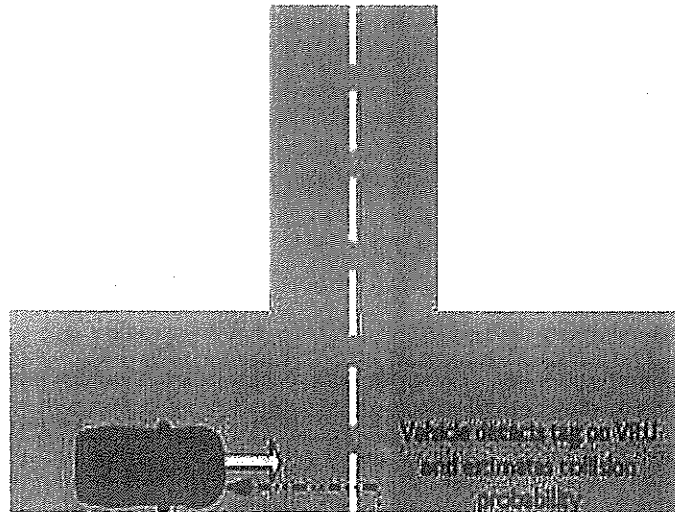
7.0 Bicle to car communication

8.0 Green Wave for Cyclists

9.0 Pedestrian & Cyclist Detection System+ Emergency Braking

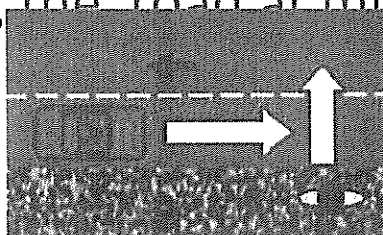
10.0 Blind Spot Detection4.0 1.0

communications and VRU safety is a rather new research topic.



Ko-TAG project demonstrated an in-vehicle collision avoidance and mitigation system for VRUs, using car mounted transmitter-receivers, which can locate tags carried by VRUs, transmitting basic data at 5.9 GHz using a proprietary air protocol .

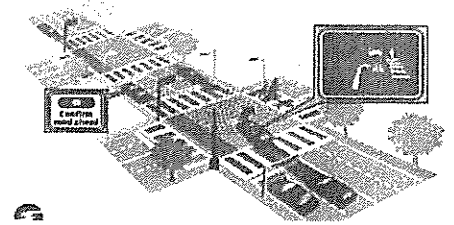
- **Pedestrians**
- Pedestrian crossing the road at mid-block
- At junctions:



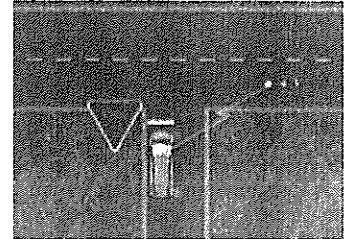
- **Cyclists & PTWs**
- Vehicle pulling out into the path of oncoming VRU
- Vehicle turning into VRU's path

Co-operative systems

VRU beacon system: VRU has tag that broadcast data. The vehicle driver is warned about potential collisions



PTW oncoming Vehicle Information System PTW riders and cars exchange messages and are warned of potential collisions



Bicycle to vehicle communications: Cyclists and cars exchange messages and are warned of potential collisions

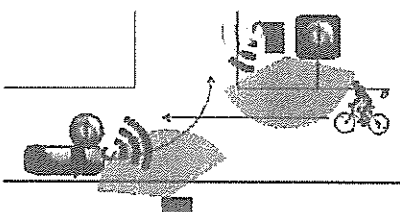


Co-operative systems

- **Green wave for cyclists:** System provides speed advice to cyclists



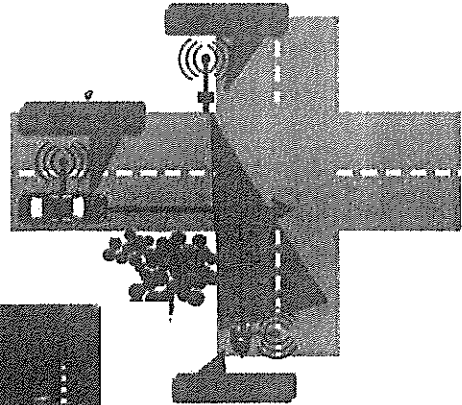
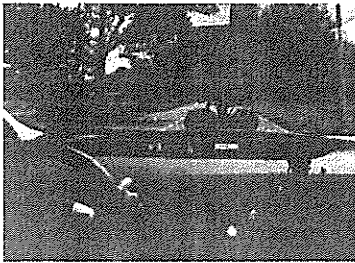
Intersection safety: Road side unit detects VRUs and warns road users



VRUITS Trials: Helmond

Intersection Safety with Cooperative AEB

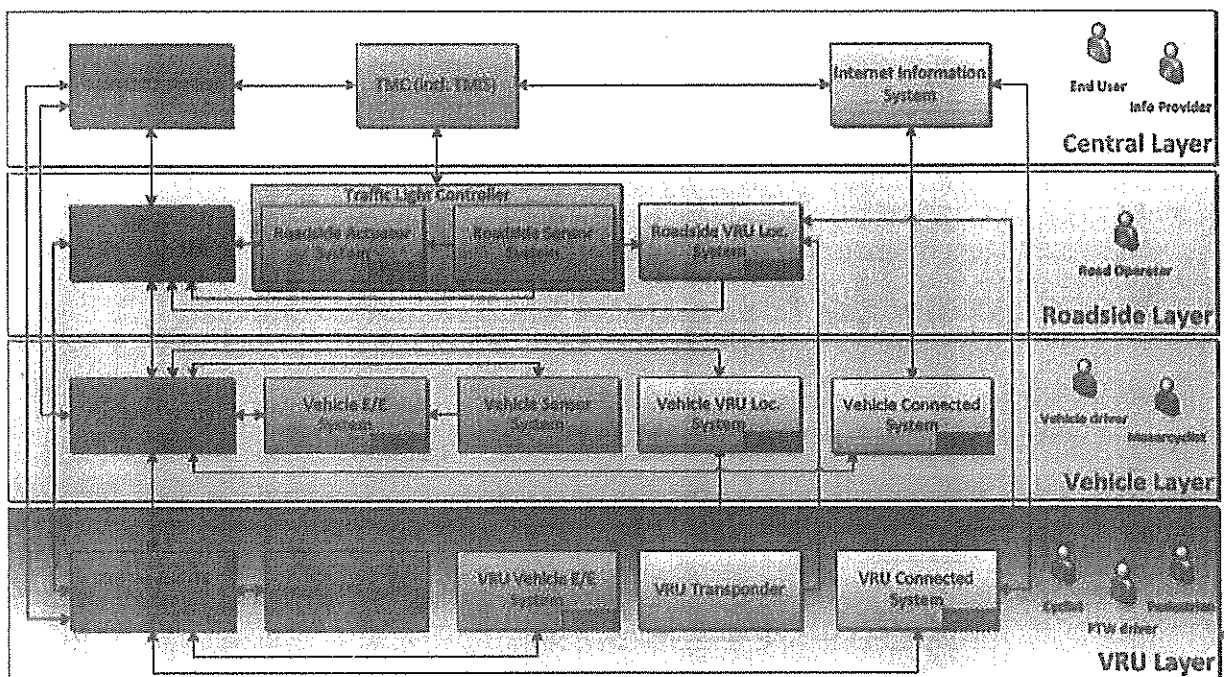
VRU detects cyclists and PTWs and send data to car; car assesses risk; warns both driver and sends message to cyclist, car brakes automatically. Cyclist is warned (haptic & visual)



31



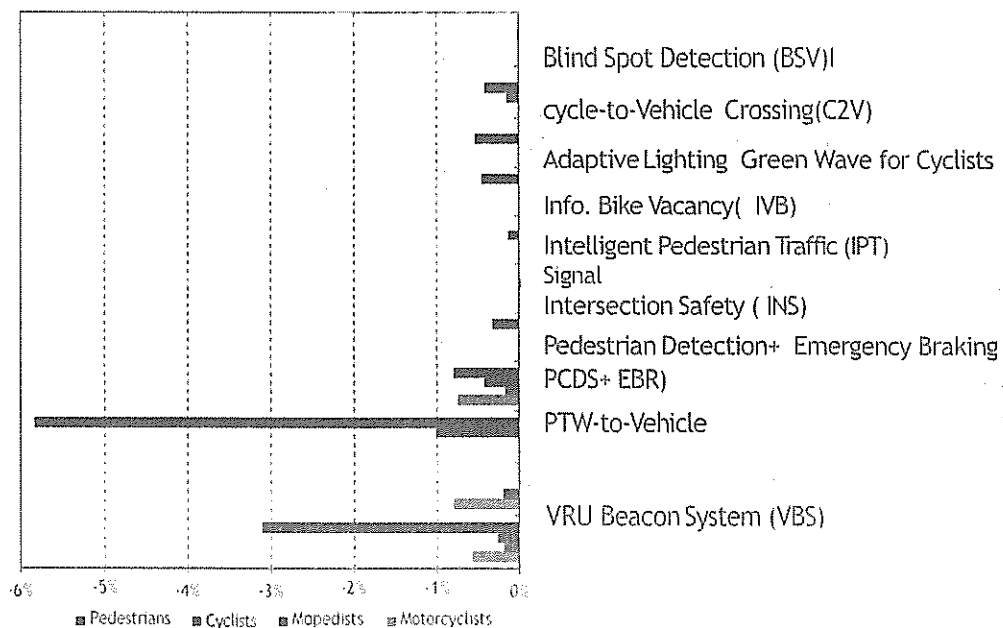
Functional architecture



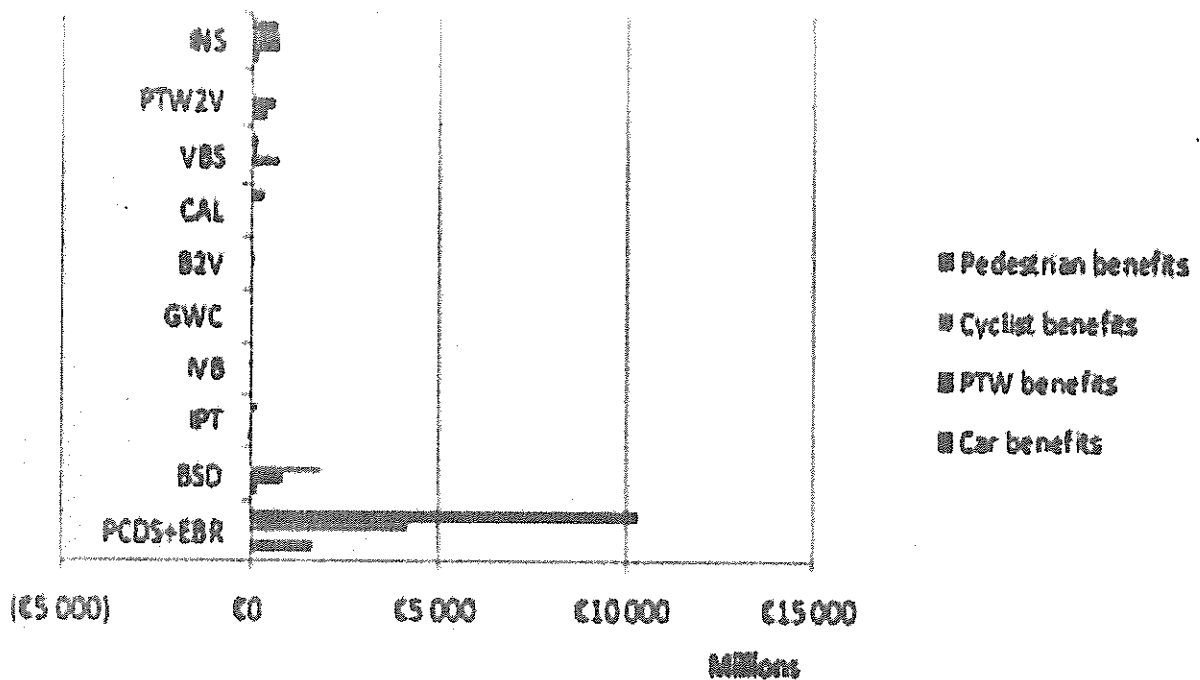
Summary of V2P Detection and Notification Technology

Technology		Vehicle	Pedestrian	Infrastructure
Communication Method	DSRC	DSRC Radio	DSRC-Capable Phone	
	GPS via Cell	Smart Phone	Smart Phone	X
	Wi-Fi Direct	Wi-Fi Direct Equipped	Wi-Fi Direct Capable Phone	X
	Infrastructure Sensors	DSRC Radio		X
Notification Method		Display	Phone Screen + Audio	
		Vehicle Speakers	Wearable Technology	

Safety Results by VRU group,
% reduction of all road fatalities, EU-28 (100% penetration)



ITS impact costs of implementation and safety benefits
for the different road user groups (in M€).



CBA Results medium scenario
2030

	Cost Efficiency		
	Benefit - Cost (BC) ratio		
Effectiveness			
NPV of Benefits	<1	(1-3)	>3
< 500 M€	IVB (information on Bike Vacacy), BSD(Blind Spot Detection)*	GWC (Green Wave Cycles)	B2V (Bike to Veh), CAL(Adap light Green Wave)
> 500 M€	PCDS (ped Dec Sys)+EBR, BSD	VBS(VRU Beacon System , IPT(Intel Port Sys)	INS (Int Sef), PTW2V

Recommendations regarding integration of VRUs (2/2)

- To evolve standard and guidelines for enhancing Safety for VRU using ITS
- To standardized procedures for assuring both the privacy of VRUs and the security of the messages transmitted by the VRU
- To start with local infrastructure related implementations which can reach a critical mass of VRU users.
- To promote Bluetooth integrated in most smartphones, as tool for improving mobility, especially of users with special needs
- To support standardisation of Cooperative Observation Service
- To carry out more research on cases and road user behaviour of VRUs to improve risk assessment



The Speeding Behaviour and Its Correlates Aspects of Vulnerable Road Users for the understanding of Accident Causation in India

**Presented by
Neelima Chakrabarty
Sr.Pr. Scientist,
TES Division**

**ONE DAY NATIONAL WORKSHOP ON THE "SAFETY FOR VULNERABLE ROAD USERS"
ORGANIZED BY NATIONAL CENTRE FOR ROAD SAFETY (NCRS)
ASIAN INSTITUTE OF TRANSPORT DEVELOPMENT (AITD), AT PUNE ON 31st MAY 2019**

Major themes of the presentation



- **Road Accidents in India : A snapshot**
- **Major Causes of Road Accidents in India**
- **Salient Finding of CSIR-CRRI & NIMHANS joint study entitled "Inclination to speeding and its correlates among two-wheeler riding Indian youth"**
- **Vulnerable Road Users and Causes of Road Accidents in India**
- **Risk Assessment of Crash and Remedies**

- India is home to second largest road network in the world but unfortunately, the safety is compromised. VRU shares for nearly 80% of road deaths and injuries i.e. Pedestrians (30-40%), two wheeler riders (30-40%) and cyclists (~10%)
- Inclination to speeding and its correlates among two-wheeler riding Indian youth has found more prominent in India
- Year wise Two wheeler rider death due to speed and non wearing of helmets is on rise.
- Transportation policies have given peripheral importance or no importance

(Ref: NIMHANS Report :Advancing Road Safety in India— Implementation is the key ,2017)

CSIR

3

Psychological Perspectives



No Perception of Fear for Accident

4

CSIR-CRRI

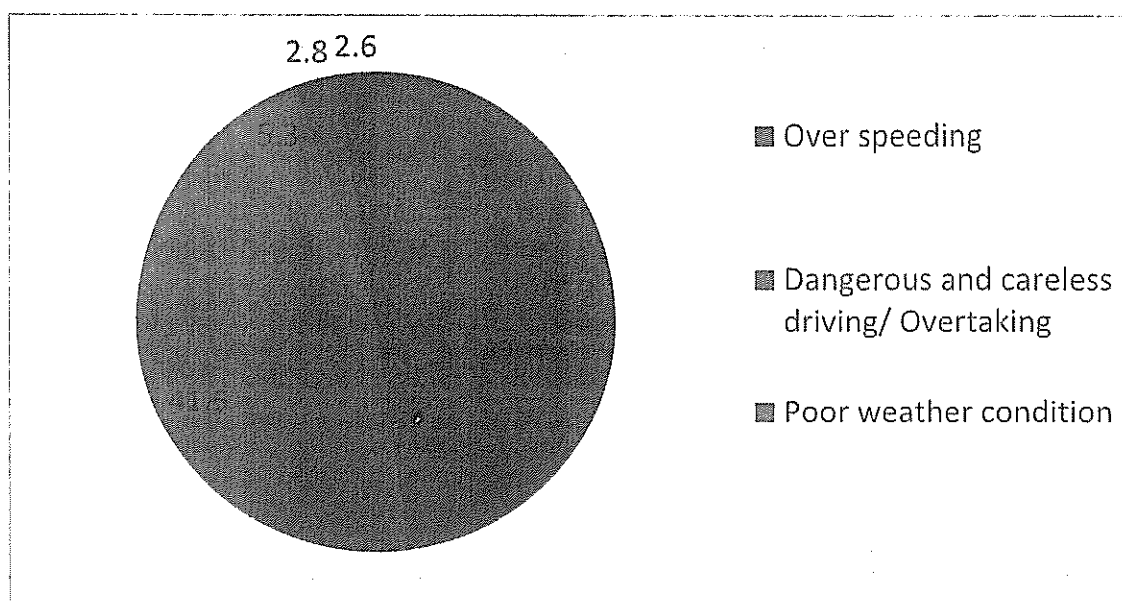
6/5/2019

CSIR

4

- Mixed nature of the road users with varying speed sharing same space
- Low level of sensitivity towards enforcement and self regulation
- Lack of sensitivity and fear towards injury & death
- Lack of Testing Facilities & Data Base

Major Causes behind Road Accidents (2014)



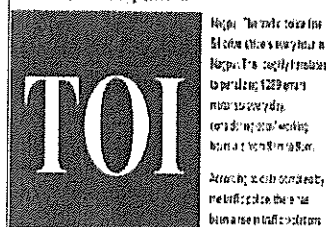
How does this impact Motor Vehicle Drivers Directly?

The Motor Vehicles Amendment Bill 2017, passed in the Lok Sabha, has proposed for a hike in penalties by as much as 5 times. Here's a sneak-peek into the proposed penalties against the older penalty card:

Section		Old Penalty	New Proposed Penalties
177	General	Rs. 100	Rs. 500
New	Rules of road		
177A	regulation violation	Rs. 100	Rs. 500
178	Ticketless travel	Rs. 200	Rs. 500
179	Disobedience of authorities' orders	Rs. 500	Rs. 2,000
180	Unauthorized use of vehicles without license	Rs. 1,000	Rs. 5,000
181	Driving without license	Rs. 500	Rs. 5,000

Over 200% rise in traffic violation cases in 7 months Nagpur

By Anurag Singh, Nagpur, 21 Aug 2017, 7:45 AM

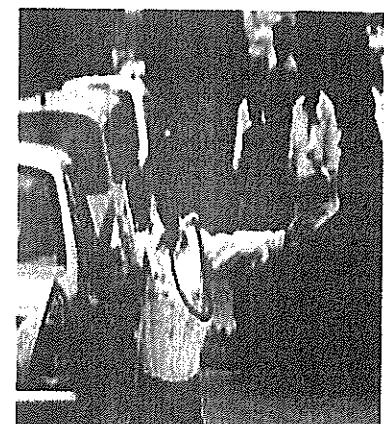
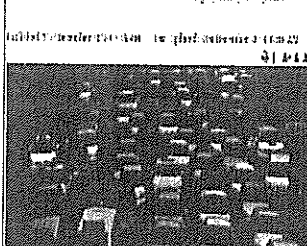


hindustantimes

Rule violations, deaths in accidents up in Delhi in 2016
A report by Hindustan Times on the increasing trend of rule violations, including the penalty card, has caused a lot of concern in Delhi.

Significant rise in traffic violation cases in Andhra Pradesh

By Anurag Singh, Hyderabad, 21 Aug 2017, 7:45 AM



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Accident Severity Increased



Number of Road accidents per lakh population (2000-2015)

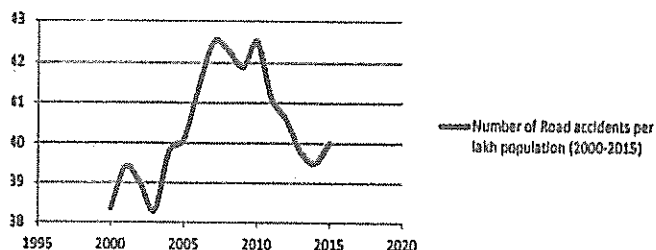


Figure 2: Trend of number of road accidents per lakh population (2000-2015)
(Source: Road Accidents in India: 2015, Government of India, Ministry of Road Transport & Highways; <http://morth.nic.in/showfile.asp?fid=3143>)

Trend of accident severity* (2003-2015)

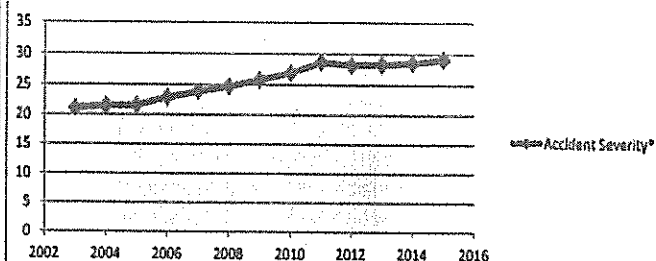


Figure 1: Trend analysis of the accident severity from 2003 to 2015

Number of Person killed per lakh population (2000-2015)

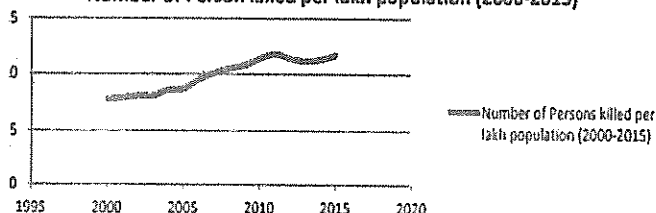
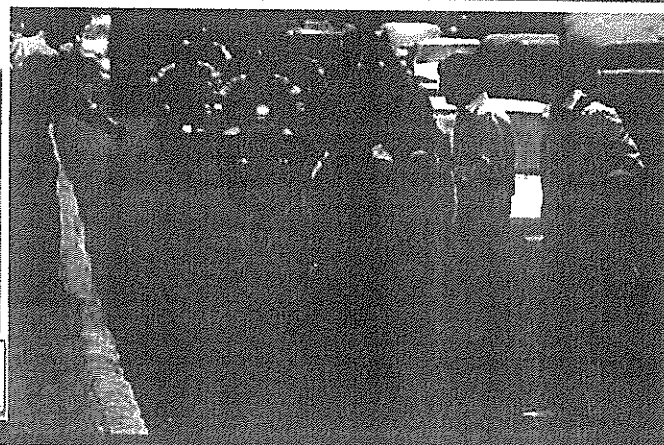


Figure 3: Trend of number of person killed per lakh population (2000-2015)
(Source: Road Accidents in India: 2015, Government of India, Ministry of Road Transport & Highways; <http://morth.nic.in/showfile.asp?fid=3143>)



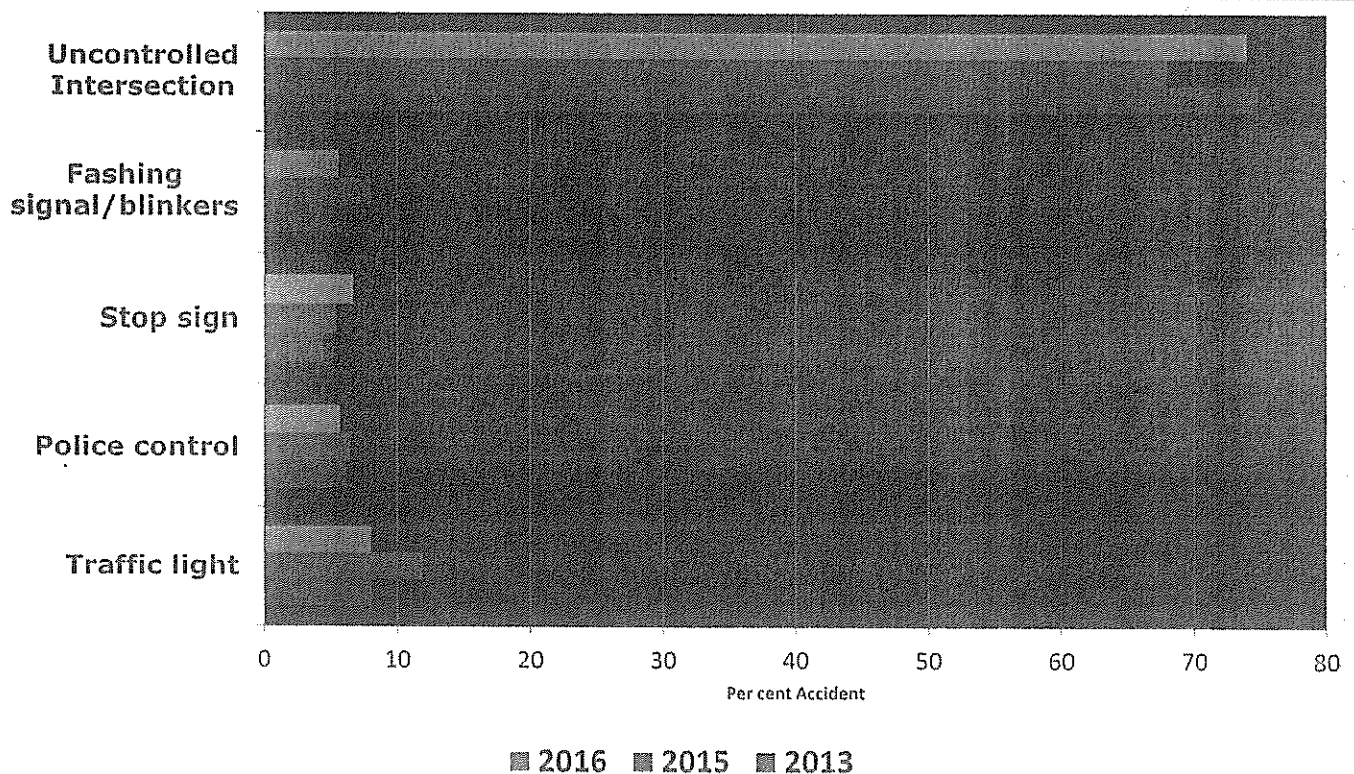
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Accident Severity Increased

Year	2013	2014	2015	2016
Number of Road accidents	4,90,383	4,89,400	5,01,423	4,80,652
Number of deaths in RTA	1,38,258	1,39,671	1,46,133	1,50,785
Number of injured in RTA	5,09,667	4,93,474	5,00,279	4,94,624
Number of person killed per 100 RTA	28.2	28.5	29.1	31.4

Lack of Safety Attitude



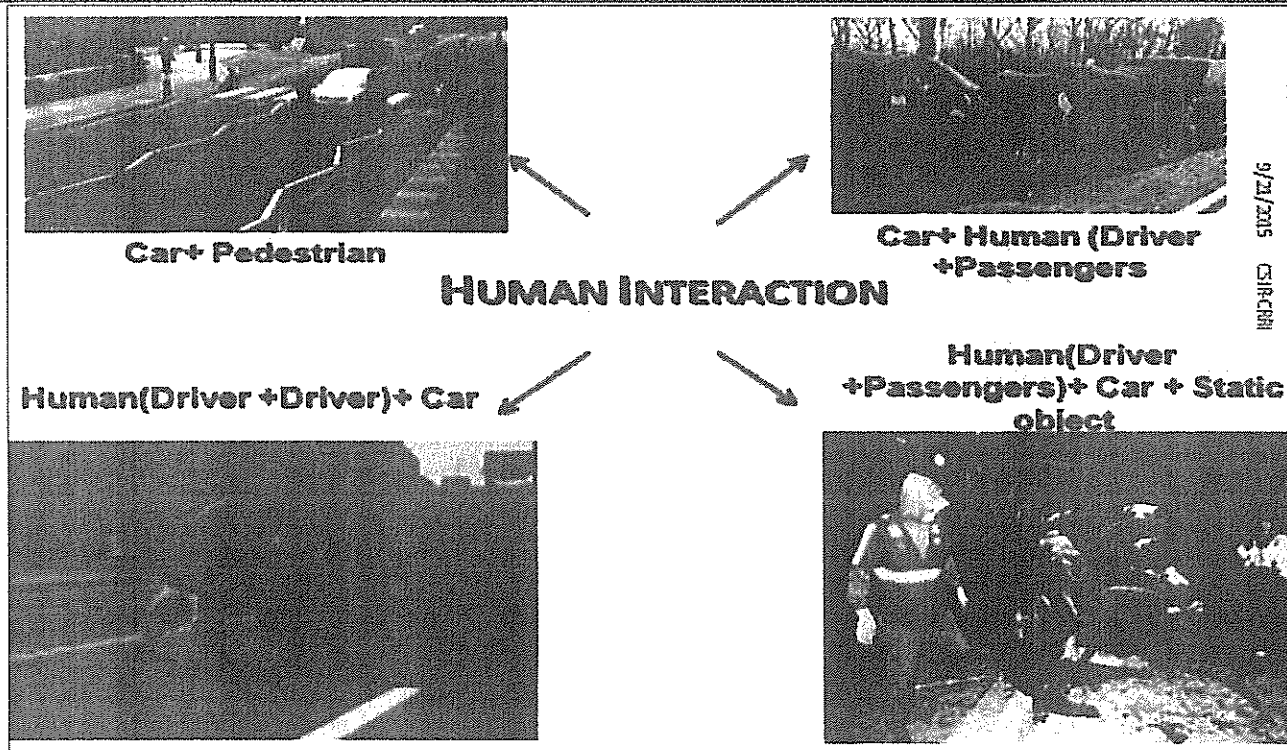
Category	2015	2016
Regular license	3,96,381(79.01%)	4,05,079(84.6%)
Learners license	59,435(11.89%)	41,405(8.7%)
No licence	45,191(9%)	32,088(6.7%)

MoRTH Report 2016

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Unsafe Human Interaction



• Materials and Methods:

A cross-sectional survey design was used to tap domains such as riding/speeding behaviour, factors contributing to speeding, inclination for competing, perceived speed and safety, etc.

- **Sample :** 961 two-wheeler riding college-going young men and women in Bangalore.

Study Findings

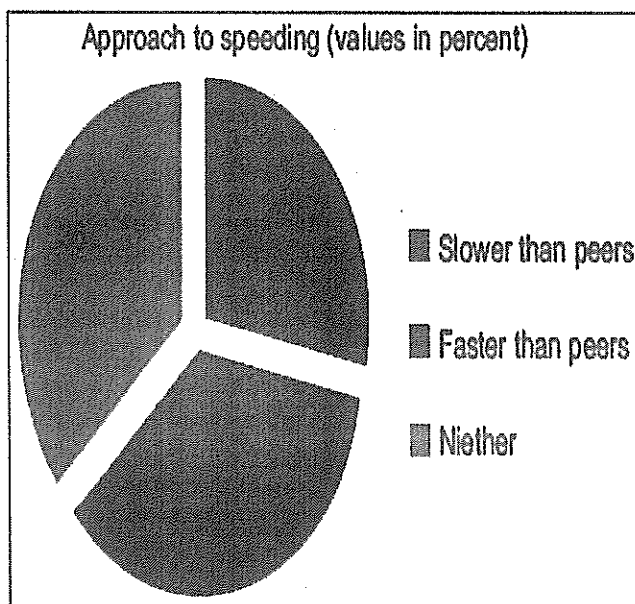


Figure 1: Self report of participants on their approach to speeding as compared to their peers

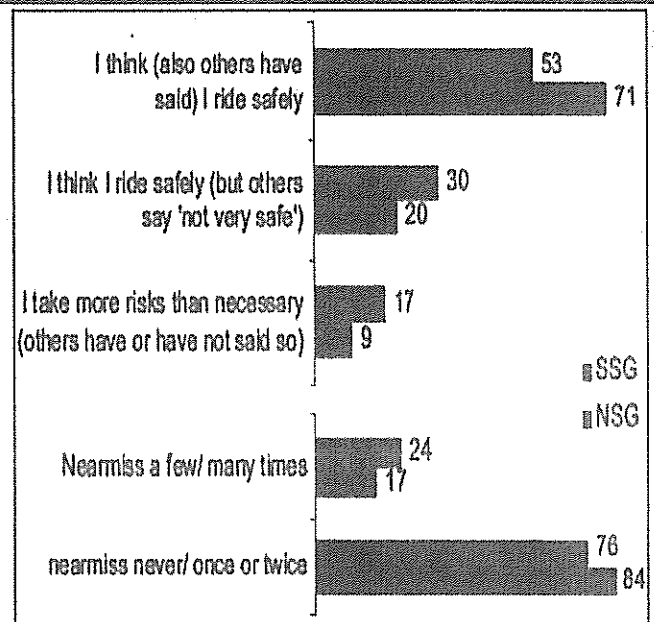


Figure 2: Safe riding and accidents. SSG = Speeding subgroup, NSG = non-speeding subgroup

Correlates of inclination to speeding: Subgroup differences

Tendency for thrill seeking/impulsivity factors	Mean difference in percentage		χ^2
	SSG	NSG	
Liking for chasing and competing	51	17	1.21 $P<0.001$
Liking for competing with friends	58	41	25.2 $P<0.001$
Speeding and overtaking	55	33	44.9 $P<0.001$
Liking for weaving	27	13	25.3 $P<0.001$
Liking for practice of stunts	22	8	35.1 $P<0.001$
Speeding even when not in a hurry	39	23	25.3 $P<0.001$
Difficulty in stopping at red signal	23	15	10.3 $P<0.001$

SSG=Speeding subgroup, NSG=Non-speeding subgroup

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Triggers/motives for speeding: Subgroup differences

Experiences sought as a result of riding fast	Mean difference in percentage		χ^2	Other reasons/triggers for speeding	Mean difference in percentage		χ^2
	SSG	NSG			SSG	NSG	
Sense of power and control	59	32	65.1 $P<0.001$	Competing	40	22	36.8 $P<0.001$
Sense of joy	75	50	56.9 $P<0.001$	Presence of girl/boy friend	23	13	17.5 $P<0.001$
Relief from anger	34	19	23.7 $P<0.001$	Hurry	75	74	0.09 $P=0.76$
Relief from boredom	25	15	13.4 $P<0.001$	Relief from traffic	48	44	1.01 $P=0.31$
Relief from a cause of distress	32	21	13.2 $P<0.001$	Drinking	7.6	6.9	0.04 $P=0.79$
				Anger as trigger	24	21	0.51 $P=0.47$
				Sadness of mood as trigger	17	14	1.4 $P=0.22$

SSG=Speeding subgroup, NSG=Non-speeding subgroup

Other Study Findings : Lack of Awareness of Road Signs

Auto News | Latest Auto News | including

news | HMSI | Road Safety Week | Road Survey | road signs | road safety | Pune | Mumbai | Bangalore

Indian two-wheeler riders' sense on road signs very low: survey

Nationally, 26% of women interviewed were recognized half the road signs, while the corresponding figure for men was 21% (despite men being majority riders even today).

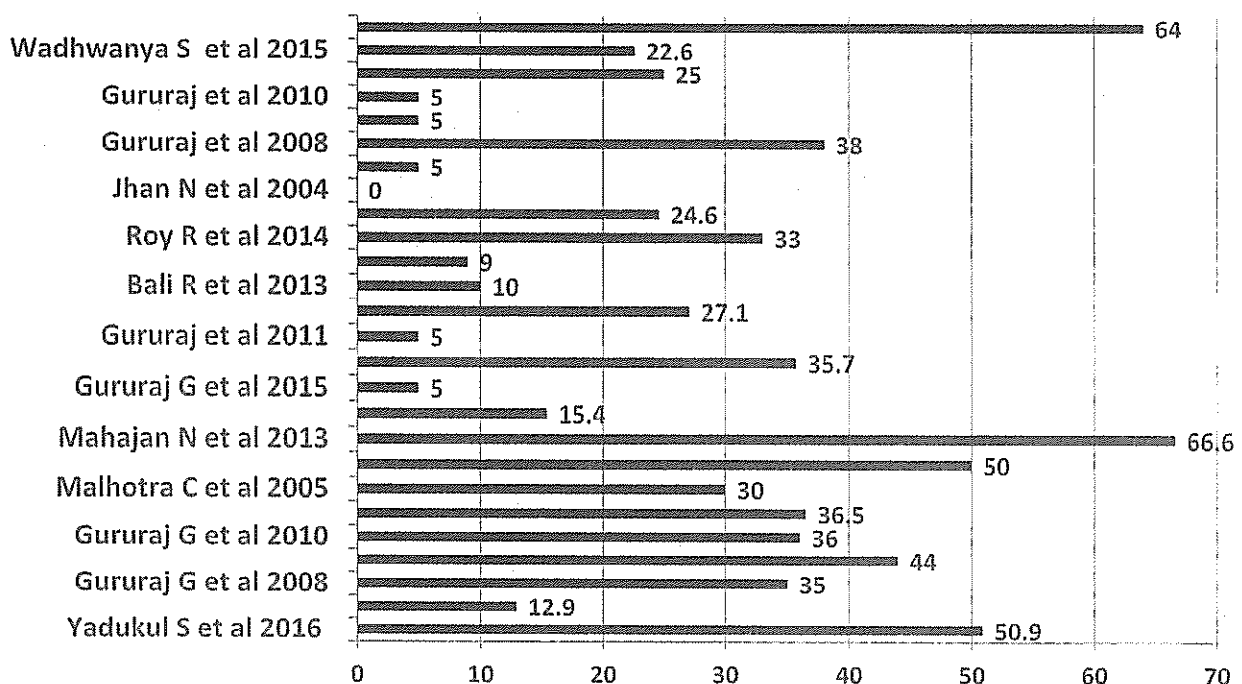
ETAuto | January 24, 2017, 16:58 IST



New Delhi: Honda Motorcycle and Scooter India Pvt. Ltd. (HMSI) undertook a mammoth nationwide 'Honda Road Sign IQ Survey' with an objective to understand the level of awareness of road safety signs and behavior of two-wheeler riders in India.

Helmets Usage is Poor in India

Global Road Safety Status Report (GRSSR) 2015 reports only 40% riders wear helmets all over India

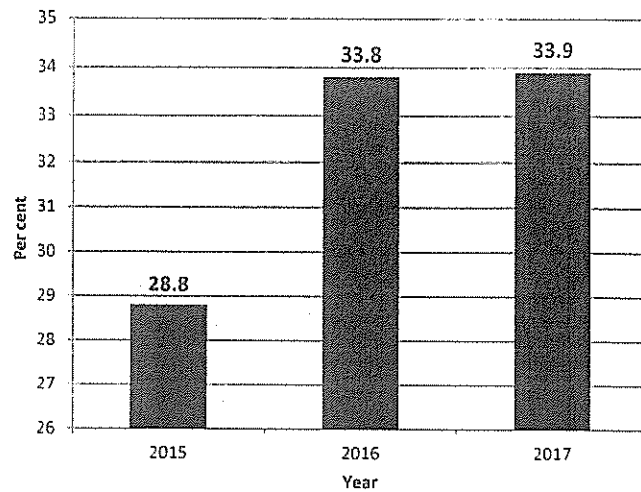


- User preference to wear faulty helmets are putting their lives at risk (ET BUREAU | UPDATED: FEB 04, 2018, 02:39 PM IST)



A construction site helmet does not qualify as a crash helmet. FACT. And what about the other three? And why three? (Photo: Reuters)

Per cent Share of Two Wheelers in Total Accidents in India



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CRRI Study on Use of Mobile while Mobile



Available at www.crridom.gov.in

6/5/2019

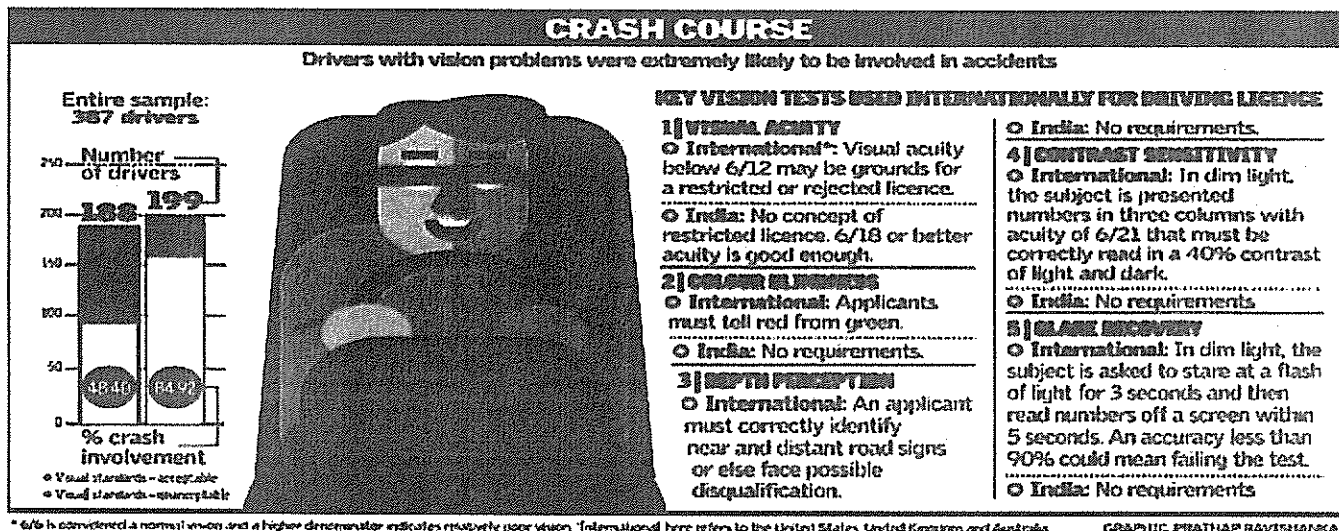
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Lack of Proper Testing

Indian drivers blind behind the wheel?

The Hindu : APRIL 10, 2016 01:33



MORE IN

With driving tests in India not factoring in visual acuity, poor eyesight could be a major culprit in road accidents

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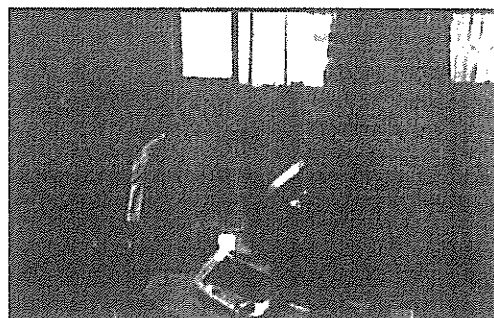
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Visual Limitations of Commercial Drivers in Metropolitan Cities of India



Background

- To address the above road safety issue of poor vision which is prevalent amongst drivers, this research study was conducted by CSIR - CRRI, New Delhi & **Sponsored By Vision Impact Institute** which is non profit organization & headquartered at Dallas, Texas USA funded by Essilor.

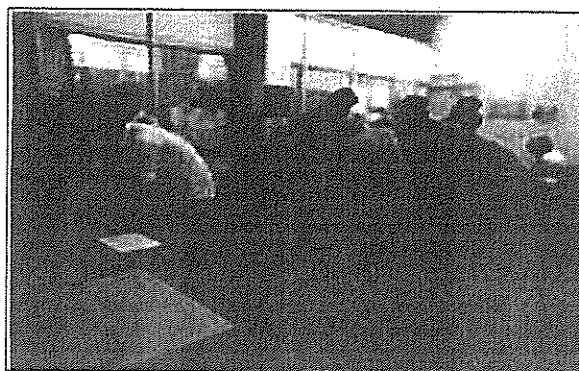


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Objectives & Scope

- Development of unique database of Uncorrected Refractive Errors (URE) of Heavy Commercial Vehicle Drivers of India to understand their overall visual health



Condt.....

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Objectives & Scope

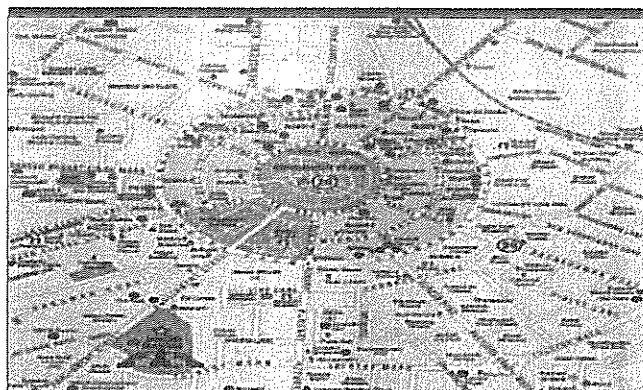
- Empower advocates for action, based on the evidence built through this report and engage key Opinion Leaders to prioritize the vision standards for commercial drivers, thereby reviewing per Sub-section (3) of Section-8 of the Motor Vehicle (MV) Act 1988 for improving road safety in India.

Condt.....

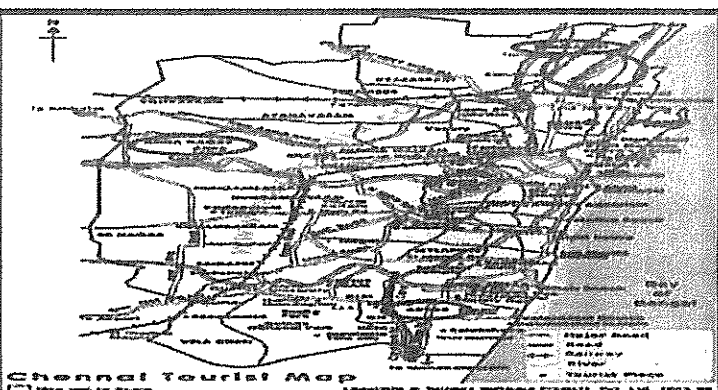
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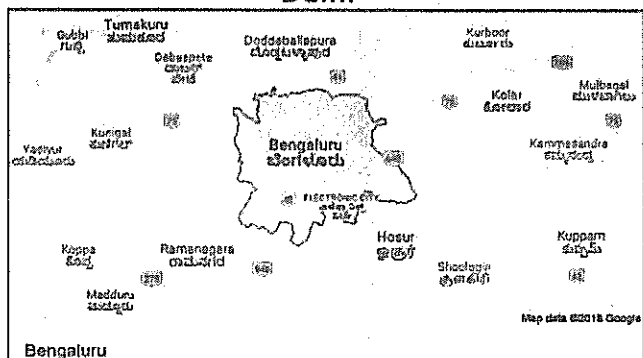
Cities Covered in the Study



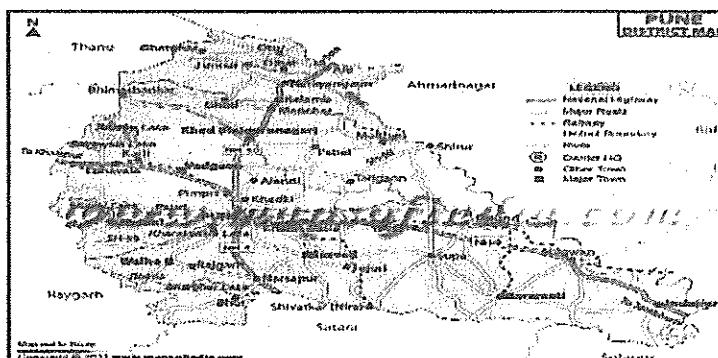
Delhi



Chennai



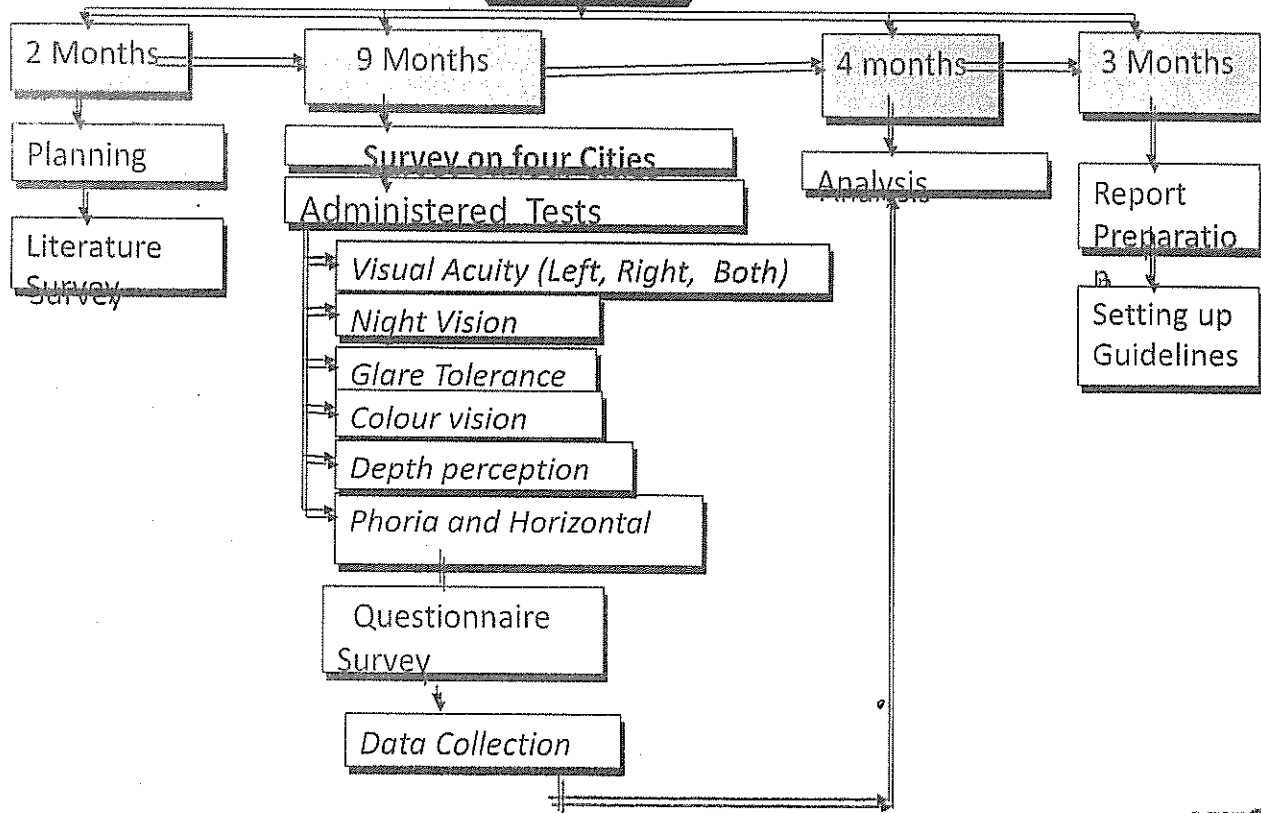
Bangaluru



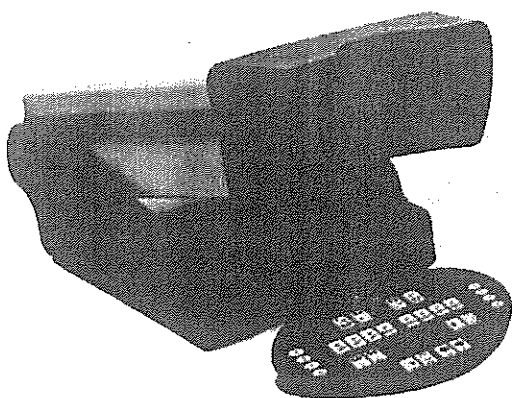
Pune

Sample Size

S.No.	Name of City	Sample Size Collected
1	Delhi	627
2	Chennai	658
3	Bangaluru	625
4	Pune	660
Total		2570



Visual Limitations of Commercial Drivers in Metropolitan Cities of India



Keystone View Vision Screeners

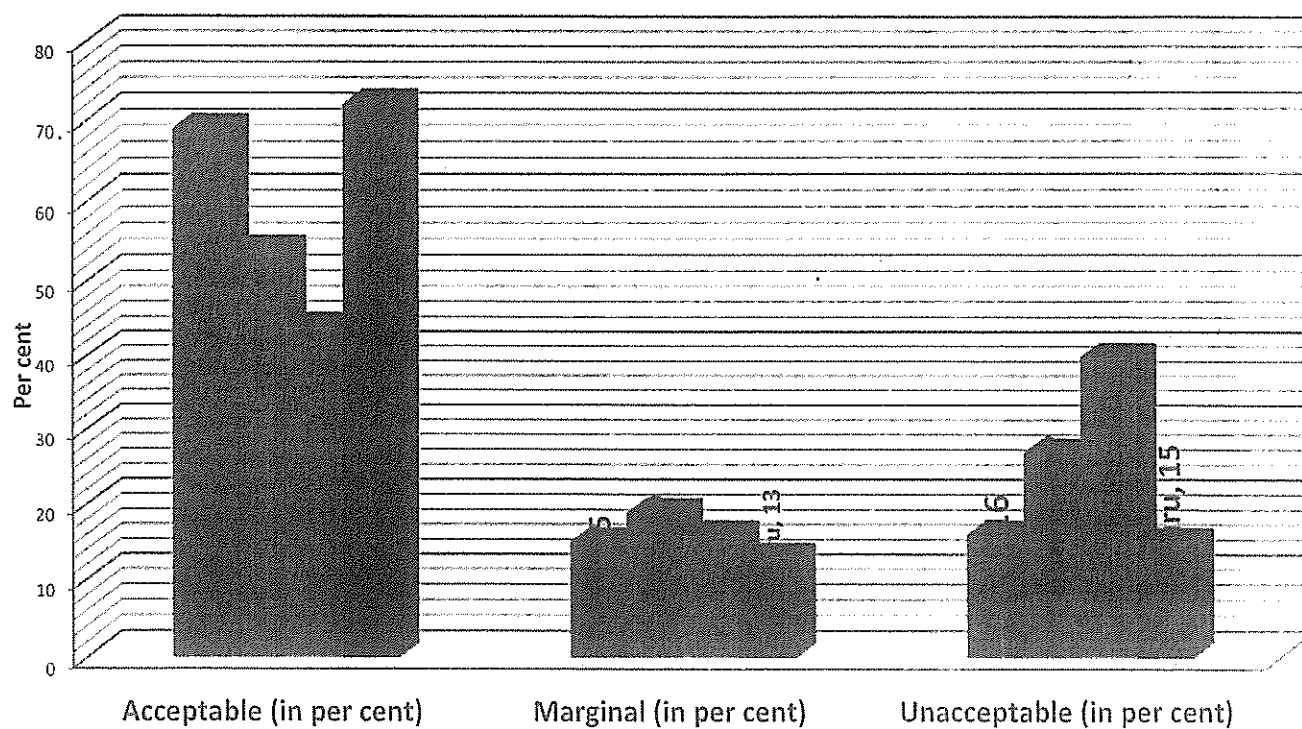
Keystone View Vision Screeners test for all of the essential visionary functions

- ✓ **Left, Right and Both Eyes for Near & Far Visual Acuity**
- ✓ **Color Blindness**
- ✓ **Phoria**
- ✓ **Stereopsis**
- ✓ **Contrast Sensitivity**
- ✓ **Glare Recovery**

Surveys Conducted at Four Cities



Driver Performance for Visual Acuity (Far) for Both Eyes



Both Eye Far VA

- According to SaveLife Foundation, 29 children are killed in road crashes in India everyday.
- Research in US Number of pedestrian injuries
 - ✓ Victims are among 5-9 age group
 - ✓ Occurs mostly near victim's home
 - ✓ Victim running across the road
 - ✓ Mostly occur in the afternoon
 - ✓ Most occur away from pedestrian crossing facility
 - ✓ In many cases the victim did not see the vehicle at all or saw that too late

Psycho Physical Limitation & Vulnerability of Child Pedestrian

According to the Accident Victims' statements

- 44% of them didn't see the vehicle, 34% of these saw the vehicle too late due to obstruction caused by parked or stationary vehicles
- 8% of crashes occurred near the bus stop (due to visual obstruction) or they were trying to catch the bus or walking in front of a bus
- 20% of the accidents occurred at pedestrian crossing due to pedestrian error or driver non-compliance

Factors affecting the Vulnerability of Elderly Pedestrian



50 percent of pedestrian deaths involve people when crossing a road due to one of the following causes:

- Failure of initial judgment
- Made by sensory loss with age
- Failure to modify behavior to avoid a developing incident
- Made by physical and intellectual impairment

Condt next page

(Ref: Carthy et al 1995)

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Factors affecting the Vulnerability of Elderly Pedestrian Condt...



- The high speeding was contributing 8% among total accident cases
- 67% of accidents occurred away from intersections & at mid-block locations
- Elderly women were more slower and at risk than men

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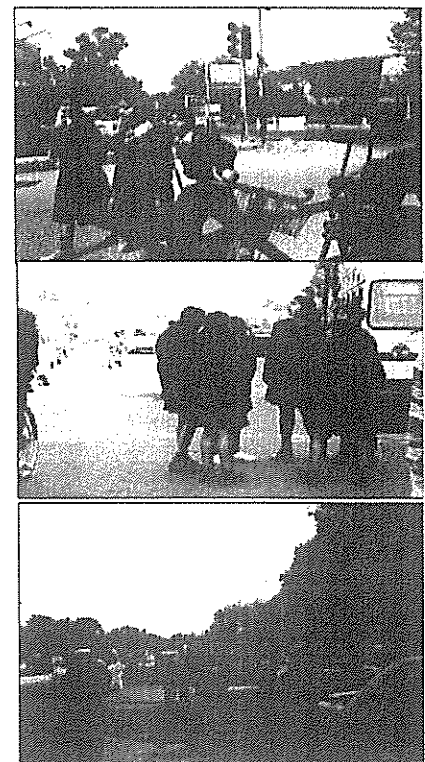
The study conducted on 150 students and teachers highlights

- a) 82% of the students do not use zebra crossing**
- b) 53% have to face Very High Traffic Volume**
- c) 50% expressed that the behavior of motorists/drivers towards the pedestrian near your school premises are aggressive**



Speeding at School Zone

- The speed of the vehicle was the contributing factor in 8% of pedestrian accidents
 - Individual vehicles traveling too fast
- A US study indicates that pedestrian accidents
 - Are mostly occur during morning and afternoon peak periods
 - Fridays and Saturdays over-represented
 - Sundays under-represented
 - 67% of accidents occur away from an intersection
 - Child pedestrian accident mostly occur at mid-block locations
 - Adults 45-65 years pedestrian accidents are equally likely to occur at mid-block or intersections
 - Elderly pedestrian accidents at intersections are more prevalent

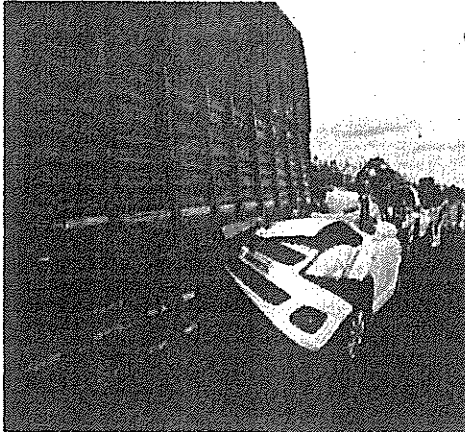


Printed from

THE TIMES OF INDIA

India way behind 2020 target, road accidents still kill over a lakh a year

TIMESOFINDIA.COM | Sep 11, 2018, 12:00 AM IST



• *Four sleeping men were run over by a drunken techie in Delhi, killing two of them*

An overspeeding car hit the divider on Delhi Jaipur highway, was hit by a truck coming from another side, killing six and injuring one

The above two incidents occurred in a span of a day (Sept 9, 2018), and they are hardly the lone ones. In 2017, a whopping 1.47 lakh people died in road deaths in India, which is equivalent to the entire population of Shillong,

the capital of Meghalaya. Every year, over a lakh die as a result of road crashes and the proportion of those who get injured is nearly three to four times higher.

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Risk Assessment of Crash and Remedies



- Risk is calculated to be dependent on both the outcome and the likelihood of the outcome

- It considers following factors

A) **The Exposed Population** e.g. passengers, cyclists, children playing near road etc

B) **Area of Impact** : Local Area covered (small or wider harm e.g. spillage of poisonous gas or oil)

C) **Risk Assessment Associated with the Impact**

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Risk Assessment for Crashes and Related Remedies

- **Road Infrastructure** : Assessment of Area involved ,Cause & Type of damage , time of healing along with process of adapting safe design for overall reduction of chances of repetitive accidents
- **Human Factor** : Psychological and medical assessment of Intensity of crash, type of damage physically & mentally along with process /remedy for overall healing & reduction of chance of repetitive incidences
- **Environment Factor**: Assessment of Area ,Cause ,Type of damage and time of healing along with process /remedy for overall healing & reduction of chance of repetitive incidences
- **Vehicle Factor**: Assessment of Cause ,Type of damage and time of repair along with process inclusion of safety tools for reduction of further chances of repetitive crashes.

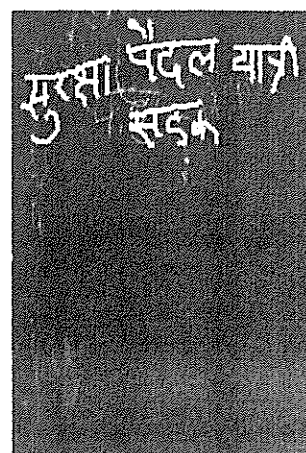
Basic Road Safety Program For Children



Teaching Road Safety Rules in the Form of Poetry

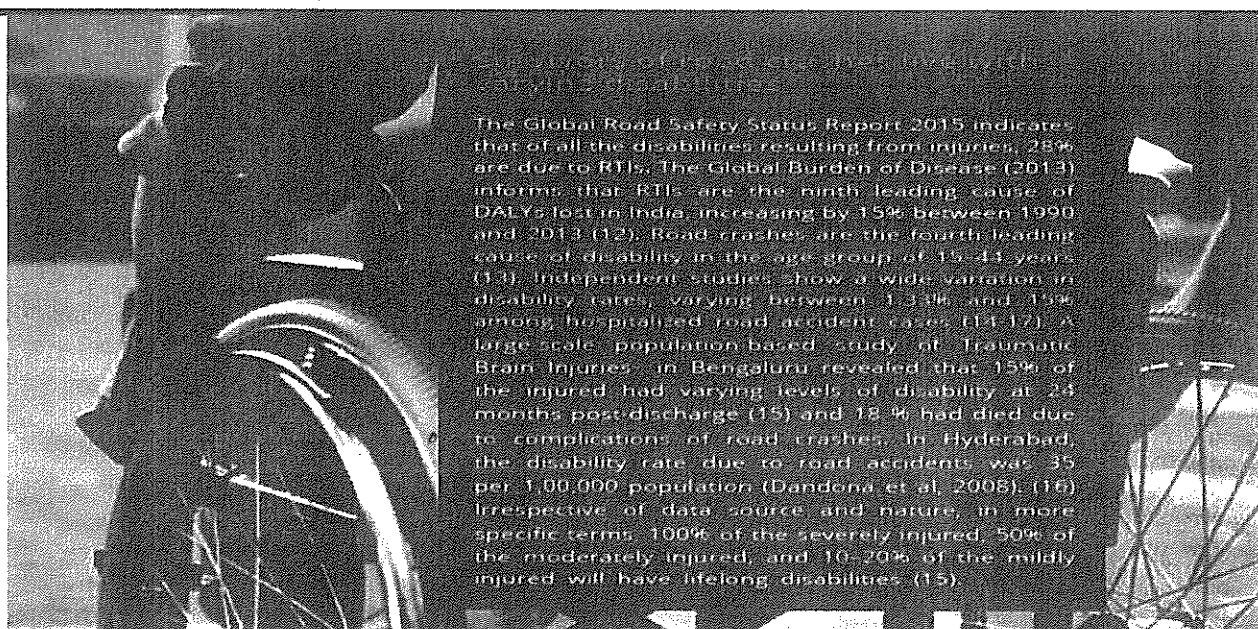
*I am a brave child
I have to face the road
If any traffic is near .
I look left right then left
And listen for a horn
I never cross the road
Until the traffic becomes clear
If any traffic is coming,
I would like to wait a bit,
Because If I run out, I may be hit.
But when the road is really clear
No cars or bus is near.
I across the road so wide,
Hurrah! I'm safe on the other side.*

- **CLEAR GOALS:** Clear learning goals for . By the end of the school year, children should be reading basic Road Safety Rules and signs fluently .
- **DESIGNATED TIME:** 1.5 to 2 hours daily practise .
- **SIMPLE ASSESSMENT:** Children assessed one-on-one using simple tools. Based on their level, children should be placed in groups. Progress will be reviewed periodically.
- **GROUPING BY LEVEL FOR INSTRUCTION:** Each school will have at least 3 groups into with children from Std 3, 4 and 5 and One teacher will be assigned to each group.
- **APPROPRIATE ACTIVITIES & MATERIALS:** Activities and materials should be available for each group/



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Thanks For Your Attention & Giving Time

website: <http://www.crridom.gov.in>
naallma.crrl@nic.in

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