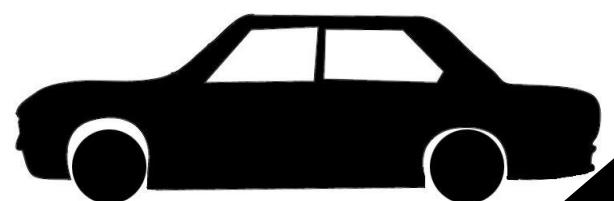




SCENARIO NO. 1



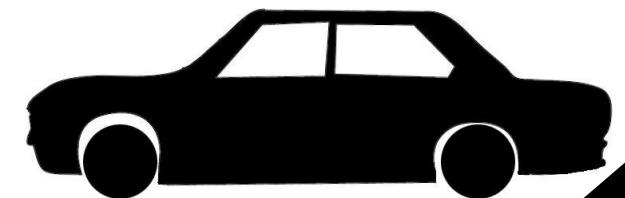
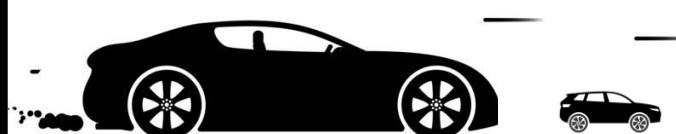
**Damage Road with moving
on opposite lane**



The Scenario represents the situation where the vehicle has to be driven in a opposite lane since the true lane is severely damaged and/or under construction and it is not possible to drive the vehicle in its true lane.



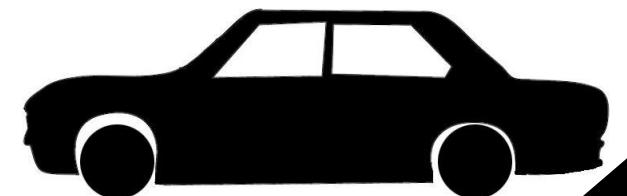
Since the vehicle being autonomous upto Level 3 will follow some lane direction and not finding that may cause the vehicle to stop (in most cases)



The situation is pretty much profound in India and the vehicle in general has to be commanded to move in an opposite lane in such cases at a speed lower than the usual speed.

The ministry of road transport and highways has constructed 13,394 km of highways in fiscal year 2020-21.

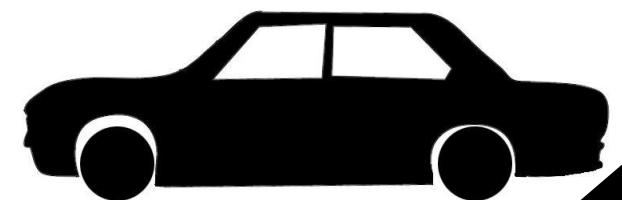
"Tremendous progress has been achieved in building national highways across the country...We have achieved a road building pace of 37 km of highways a day," Mr. Gadkari said.



LIST-1A.3
Road Accidental Deaths in every 100 km-2019
(Road Category wise)

Type of Road	2019				
	Length of Road (in KM*)	Road Accident Cases	Total Number of Deaths	Cases per 100 KM	Deaths per 100 KM
National Highways	114158 [#]	128602	53213	113	47
State Highways	175036 [#]	107327	39624	61	23
Other Roads	5608477 [#]	201467	61895	4	1
Total	5897671 [#]	437396	154732	7	3

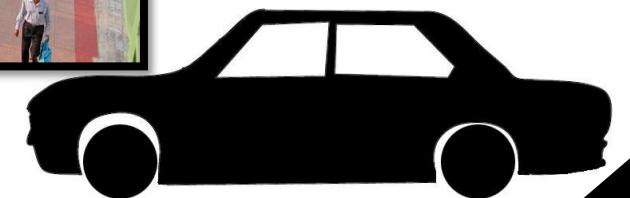
The report suggest that death per every 100 kms is approximately 47 and the contribution of road construction is 13 per 100 kms. This data is seen when the driving is manual. So, making an autonomous vehicle can be a very critical job.

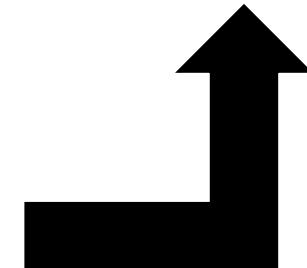
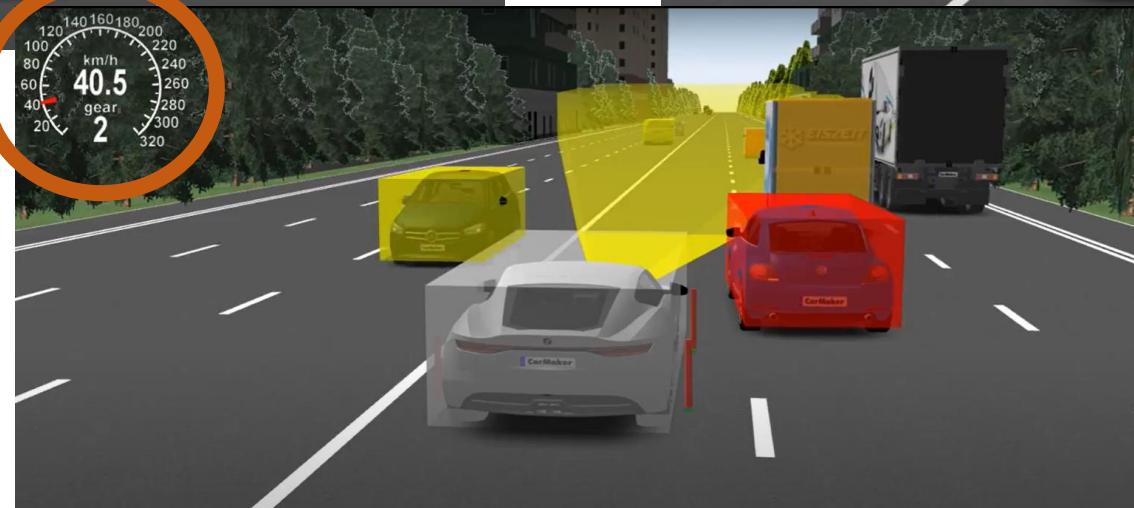
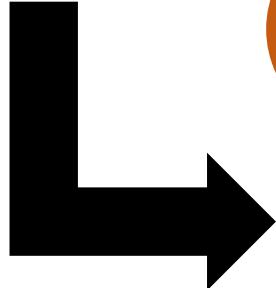
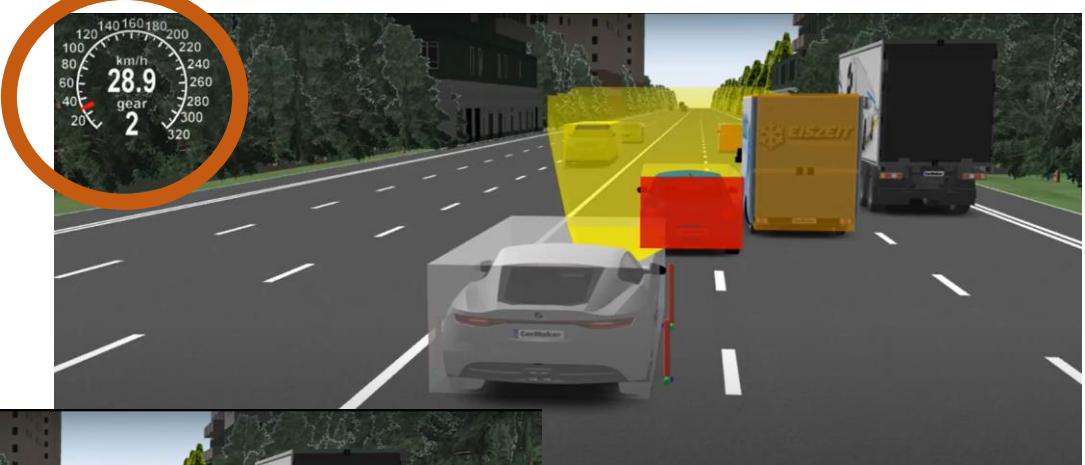
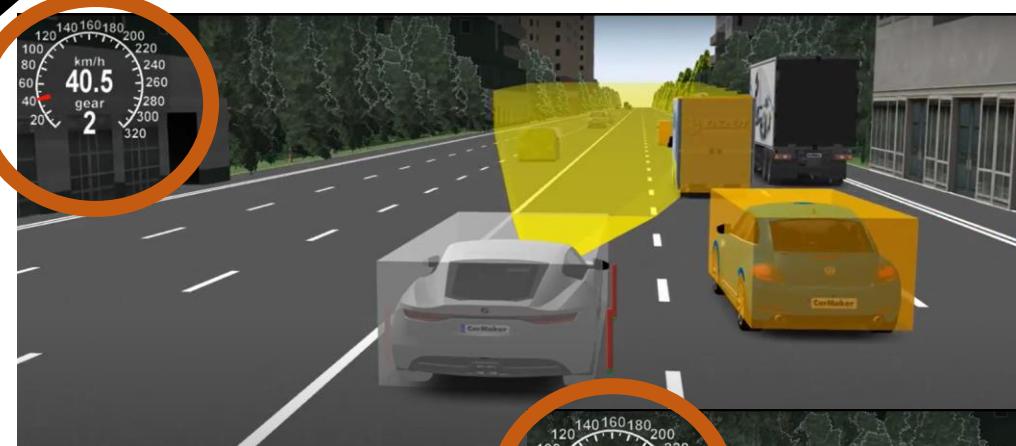




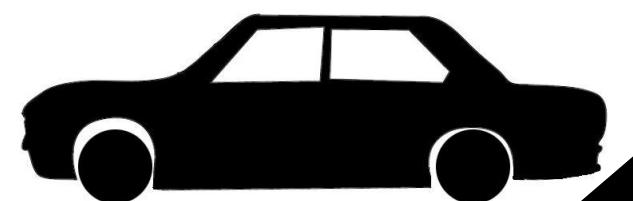
SCENARIO NO. 2

Double Lane Change (Suddenly)

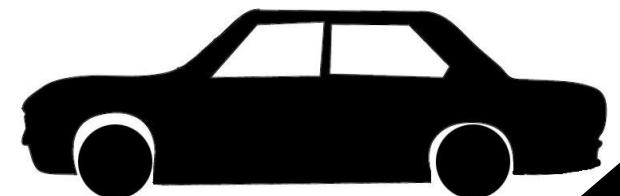




The General Description of the scenario is can be observed from the images above where the car in blue suddenly comes in front of us (lane change) and we have to slow down our speed.

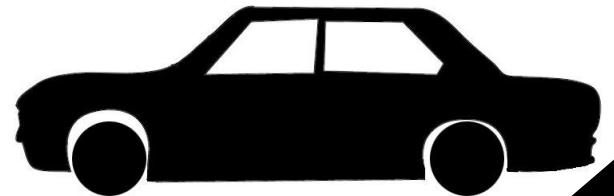


Merging onto a highway or changing lanes on a busy street can be dangerous. Drivers may speed up or fail to use their turn signals when approaching multiple lanes of traffic or moving from one lane to another.





- It is the most common scenario that generally happens on Indian roads
- A sudden lane change by a vehicle can have varying consequences for other vehicles.
- The unsuspecting driver tries to avoid a collision with the vehicle changing lanes and brakes suddenly or swerves out of the way.

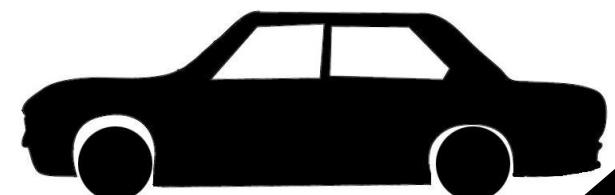


Injury-severity level	Lane change crashes		Other crash types	
	Frequency	Percentage	Frequency	Percentage
Slight	1355	31.7%	6536	41.6%
Medium	2105	49.2%	6536	41.6%
Severe	429	10.0%	1351	8.6%
Fatal	390	9.1%	1286	8.2%

Lane Change Crashes contribute almost 30-50 % of other crashes.
That a very significant number.

Table 1. Statistics of injury-severity levels.

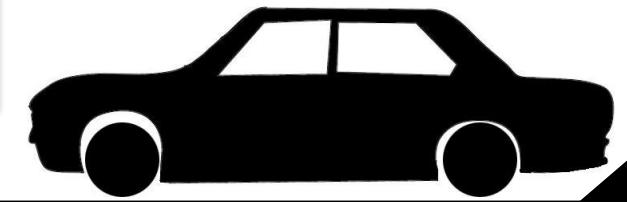
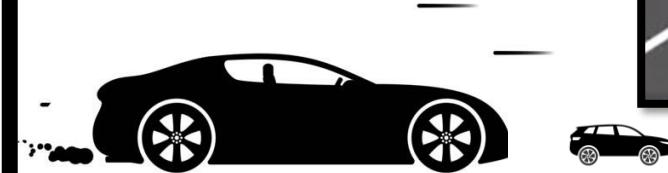
Table shows that The lack of discipline of keeping to one's lane, causes the highest number of accidents





SCENARIO NO. 3

Car facing each other on a one way
“Village Road”

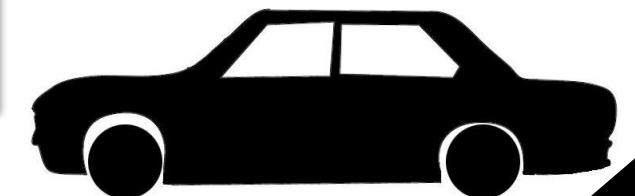




This scenario explains a typical road condition in villages.

The roads are not multi lane.

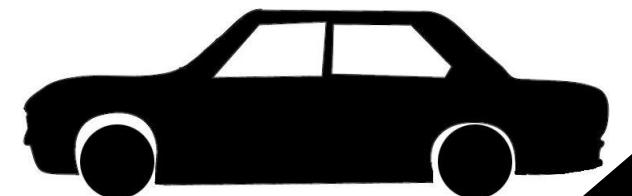
The presence of a one way road or a road in which both routes vehicle will trace along same lane, implies a clear sense of understanding to drop the vehicle below the road and then to pass by as shown in figure.



A single-track road or one-lane road is a road that permits two-way travel but is not wide enough in most places to allow vehicles to pass one another (although sometimes two compact cars can pass).

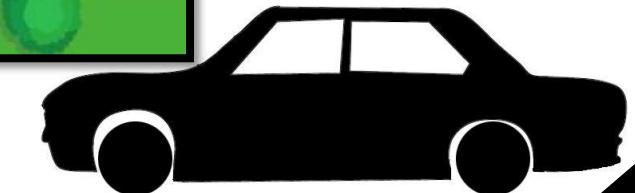
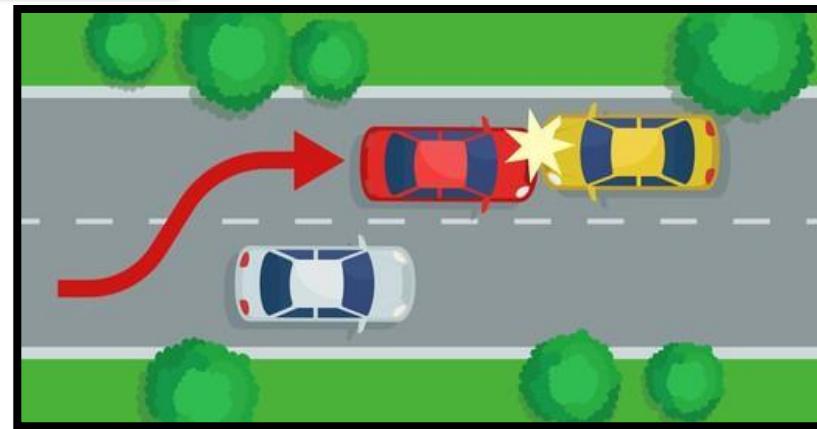
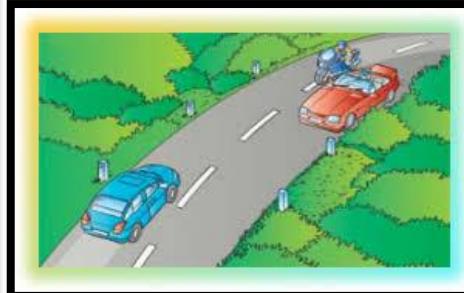
This kind of road is common in rural areas across India.
Rural road constitute more than 70.65% (41,66,926 km) as per ministry of road data.

The problem arises when two cars face each other on single-track road, so both has to go down road to give pass to each other that is not possible for autonomous car.

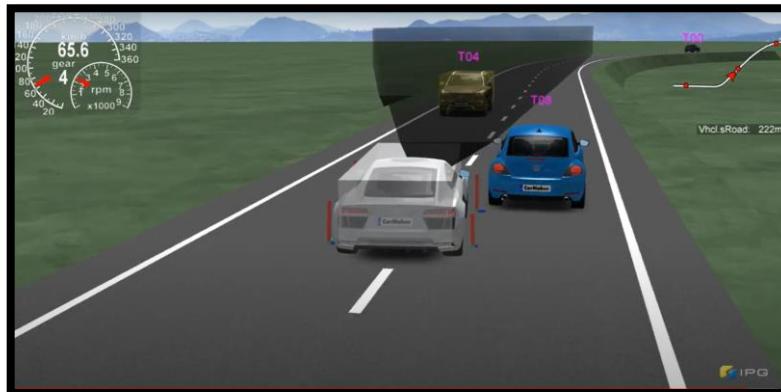
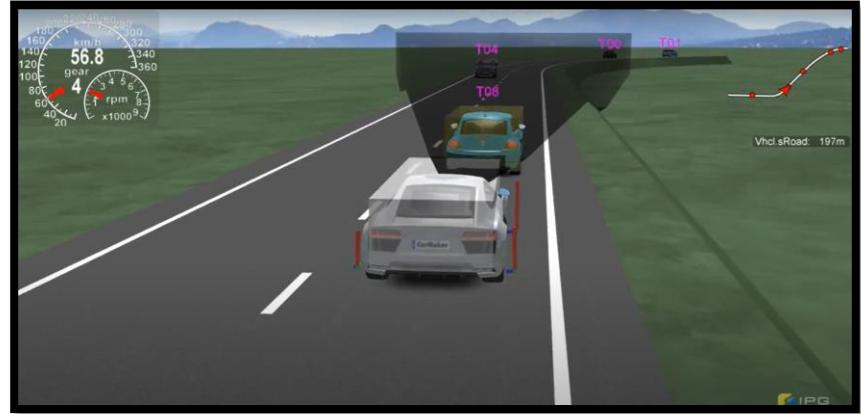


SCENARIO NO. 4

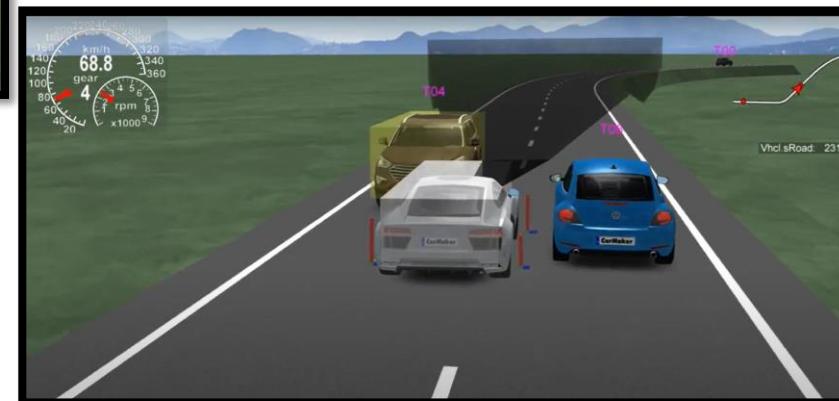
Overtake on a Single Lane
(Collision with opposite lane vehicle)



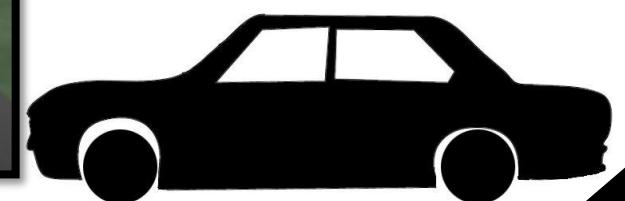
The scenario being very common in India.
The host vehicle in white wants to overtake the vehicle in green. But since it is in a Single Lane road it cannot do that. It is only possible when the vehicle overtakes moving on the opposite lane



Finally it decides to overtake by going to opposite lane road.

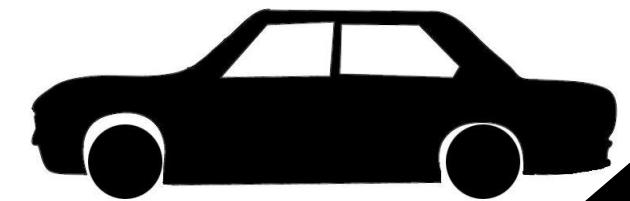


It didn't notice the vehicle which was coming from the opposite lane and faces the collision while overtaking.





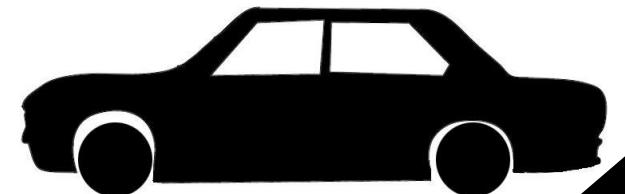
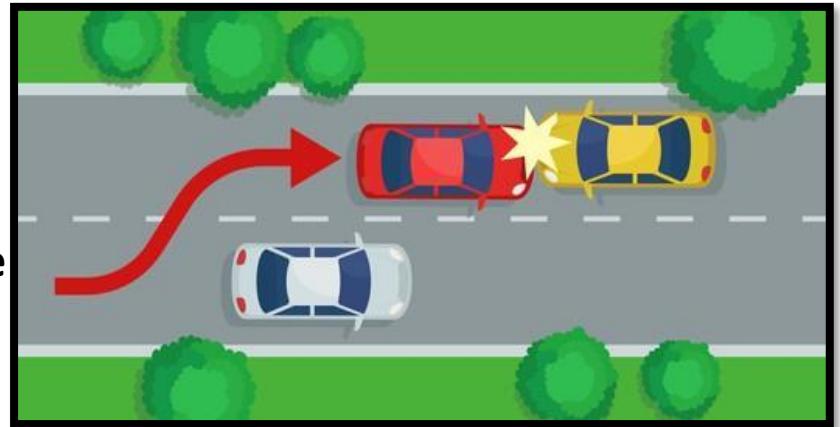
One of the most common road traffic accident scenarios is when a vehicle is attempting to turn right off a single carriageway, while a vehicle behind is attempting to overtake, resulting in a collision.



Overtaking contributed to 24.3% of road accidents which led to 35,219 deaths and 77,067 people being injured.

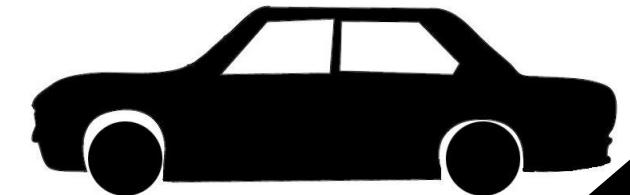
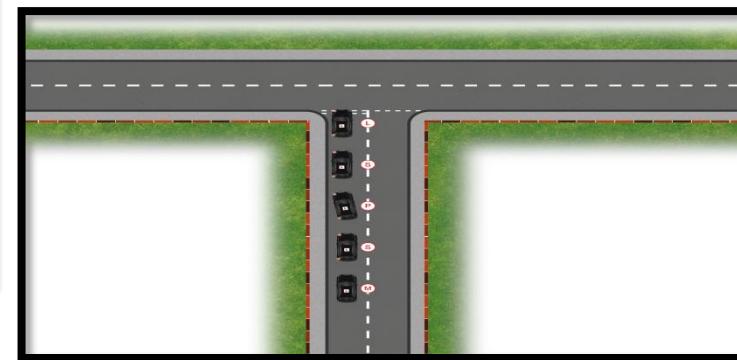
Overtaking ... Over and out?

- 35% hit a vehicle turning right as the overtaking vehicle was attempting to pass
- 16% hit a vehicle travelling in the opposite direction
- 10% side swiped the vehicle being overtaken
- 8% lost control during whilst overtaking or returning to the nearside lane
- 6% hit a vehicle that was turning or crossing at a junction
- 14% involved 'undertaking' (passing on the left)
- 5% resulted from evasive action taken by a driver when attempting to avoid someone else's risky overtaking manoeuvre



SCENARIO NO. 5

T Junction

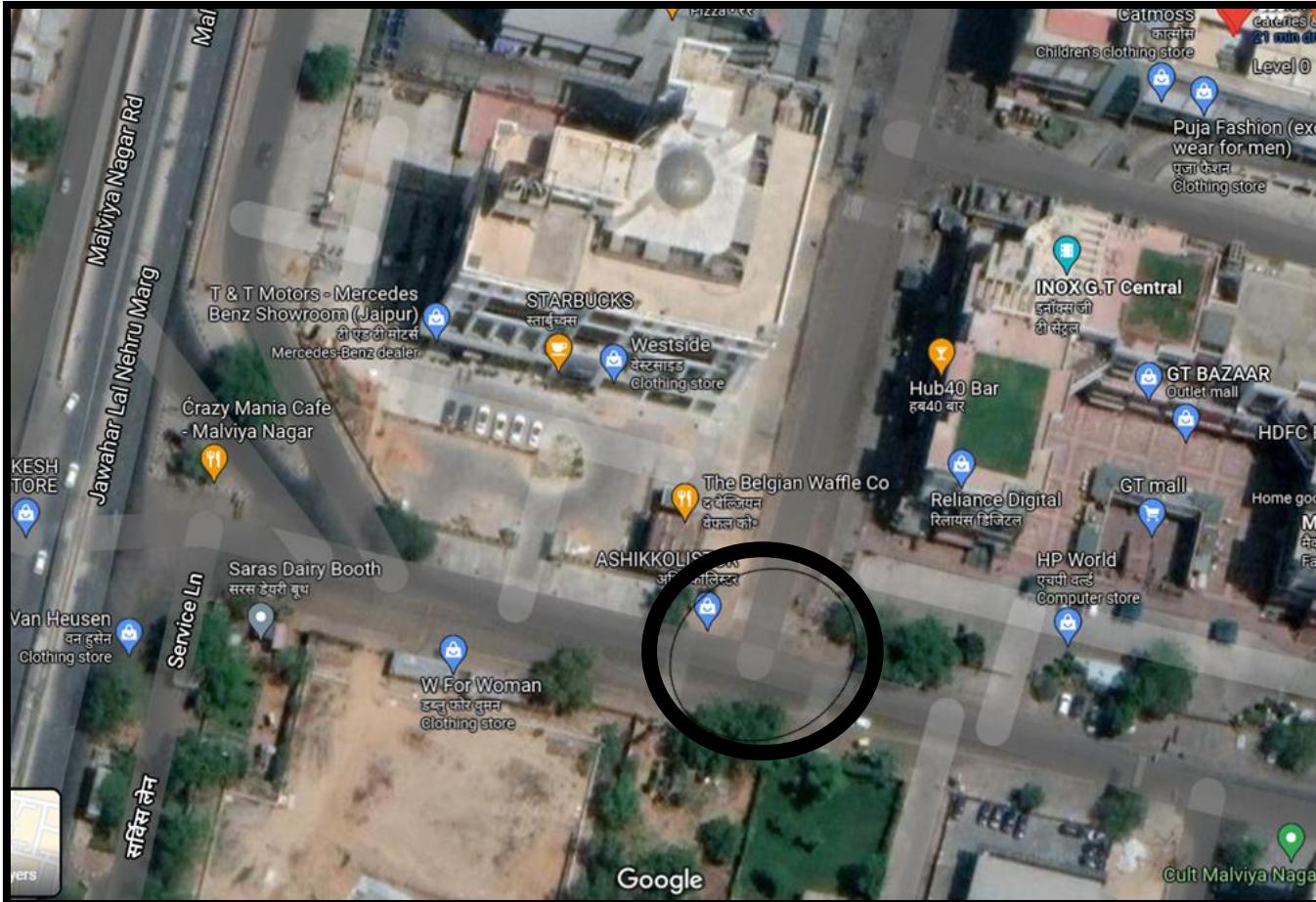


Junctions are omnipresent in both rural and urban areas, and they are some of the most common locations of car accidents.

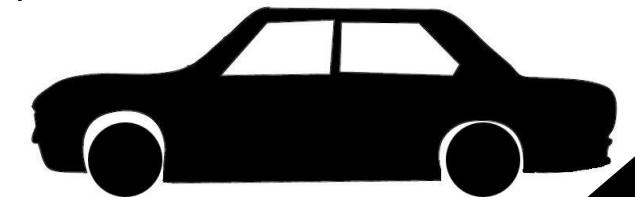
This scenario depicts the situation when the car is being driven straight on a T-Junction road and suddenly an another car turns right in the same lane, thereby providing a possibility for an accident.

As no T-Sign is present there the driver may not know the proper order in which another car is approaching the intersection causing collision to occur.

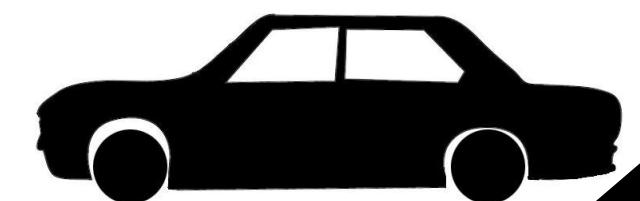




Satellite Imagery of T-Junction Near Gaurav Tower, Jaipur,
Rajasthan



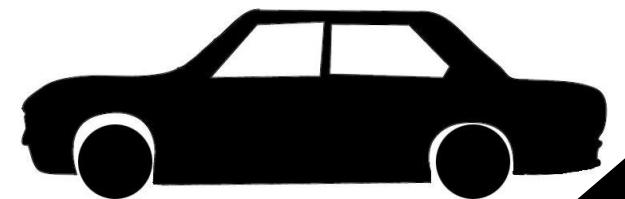
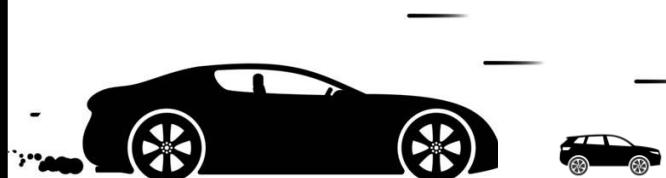
- Road traffic junctions are potential locations for accidents especially when they are not provided with signal and are completely uncontrolled.
- Many road users travel through this junction by means of two wheelers and cars.
- Since the junction is not controlled by any traffic signal nor police lot of conflicts occur near this junction making it a very risky place from safety point of view.

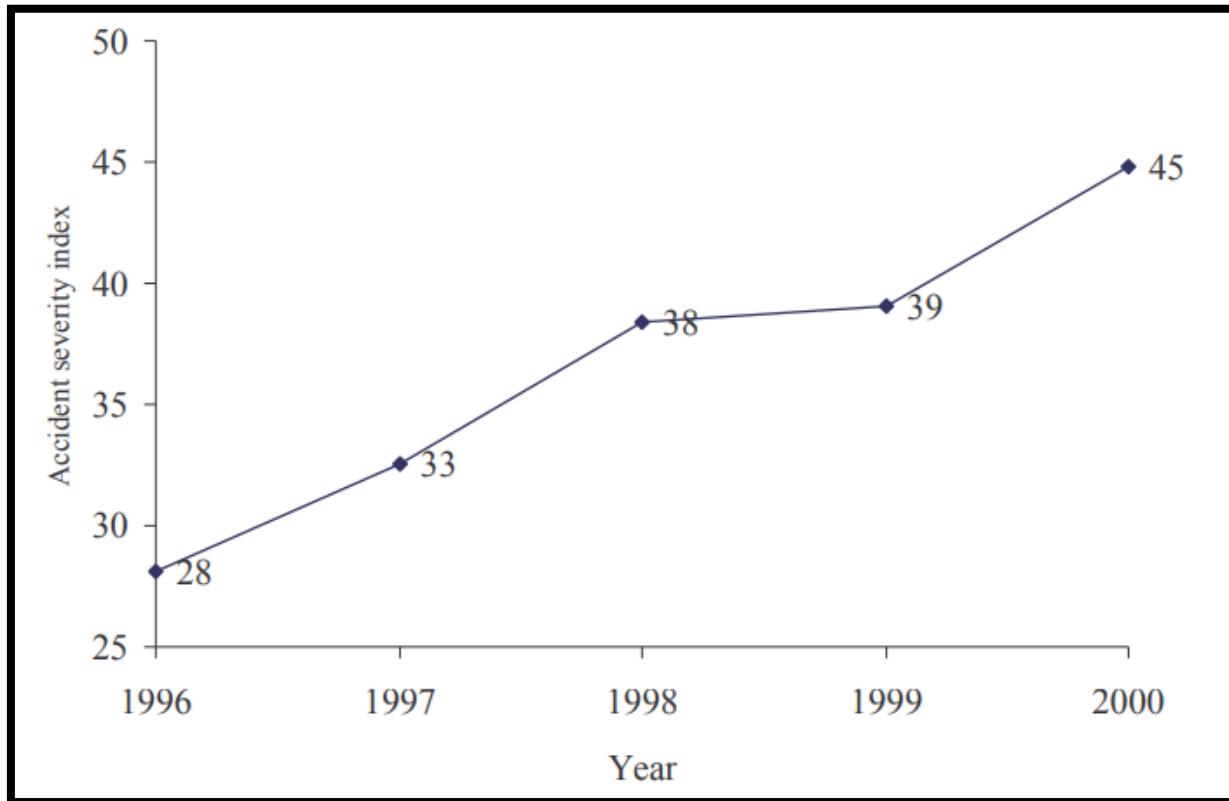


Time		Total No of Vehicles
From	To	
Morning		
8:30	9:30	1884
8:45	9:45	1923
9:00	10:00	1773
9:15	10:15	1485
9:30	10:30	1136
Evening		
15:30	16:30	573
15:45	16:45	607
16:00	17:00	619
16:15	17:15	568
16:30	17:30	487

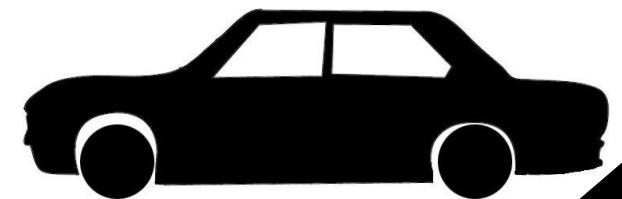
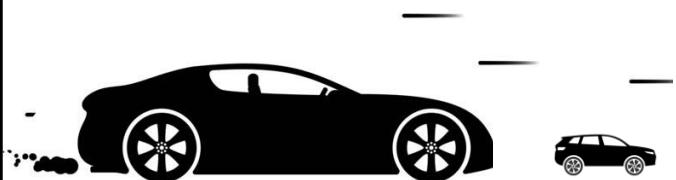


This is the data showing the hour for which volume is high.





This figure represents the accident severity index for India which shows that no. of deaths per 100 accidents on T-Junction have increased over the years, from 28 in 1996 to 45 in 2000, an increase of around 60% in the span of just four years.

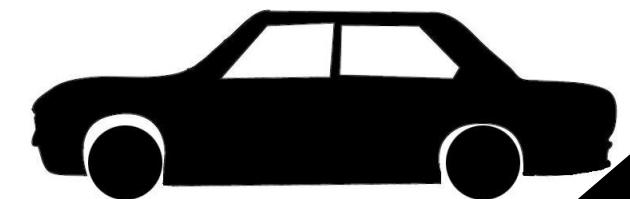




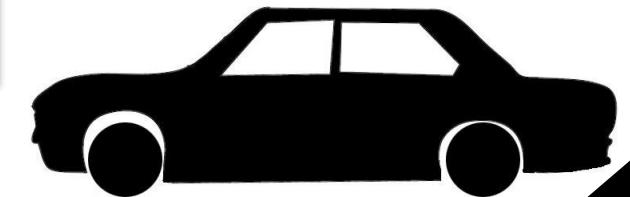
SCENARIO NO. 6



Overtake middle vehicle
from both sides

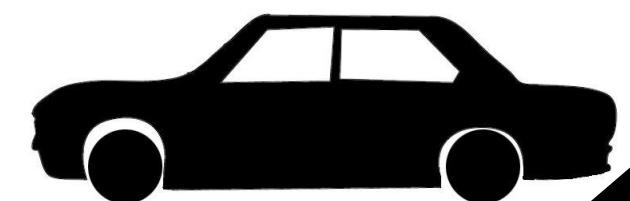


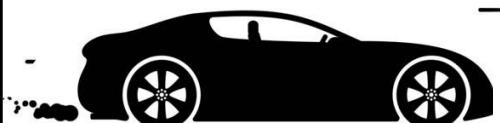
The description of the scenario is clearly shown in the image below. This is the situation in which there is a vehicle in between 2 vehicles ahead of those two and both want to overtake that vehicle not knowing each others presence



The situation is very dangerous as a normal sensor cannot detect the vehicle beyond a vehicle which is also unseen by the driver.

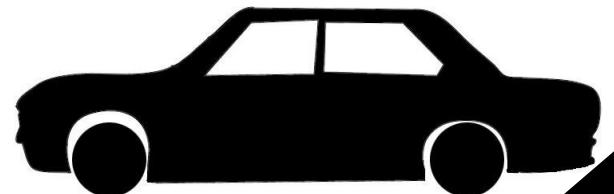
Overtaking in India in such cases is pretty common in city roads and state highways.





SCENARIO NO. 7

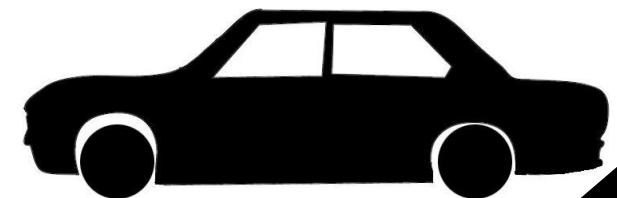
Overtake in a foggy condition
and collide with the vehicle
moving in the lane.



The scenario depicts the situation in which host vehicle is overtaking the vehicle in front of it and while changing the lane. During overtaking the condition is foggy and the vehicle in that lane ahead of host vehicle is moving with slow speed.



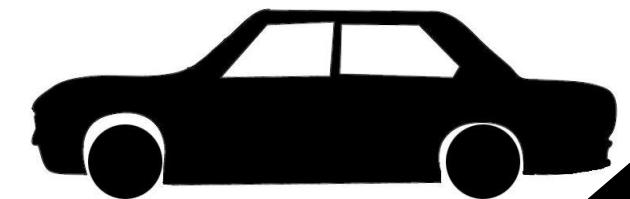
Since the condition is foggy the sensor of host vehicle will not work at a rate which it is safe. So there are high chances of collision.



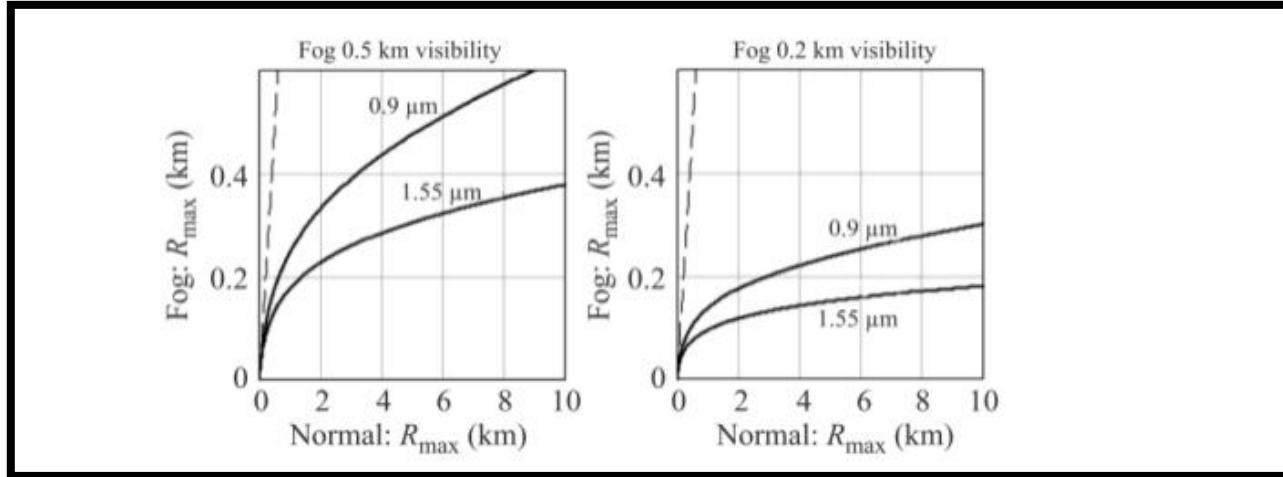


Fog being one of the most common problem, especially in North India, including big cities like New Delhi, Kolkata, Jaipur, Chandigarh, etc.

The situation cannot be ignored as it remains of almost over 2 months of an year in India.



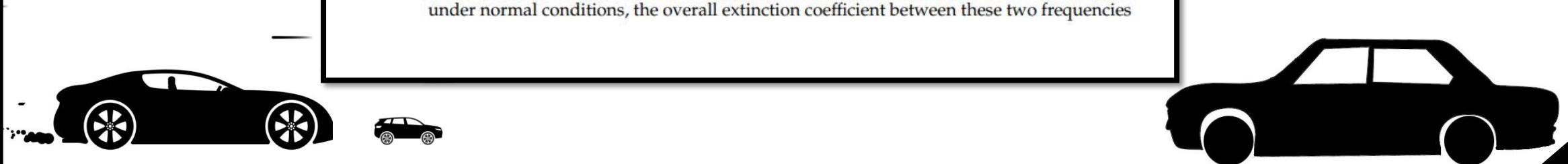
From the graph beside, we can see the major difference of working of sensors while the fog concentration increment.



3.2. Fog

Fog is a visible aerosol consisting of small water droplets suspended in the air or near Earth's surface [39]. It is considered as a low-lying cloud. This weather phenomenon typically begins around midnight and mostly dissipates after sunrise once atmospheric temperatures raises and relative humidity decreases.

Dust or air pollution must be present in the air for fog to occur. Water vapor condenses around these small solid particles, generating droplets ranging in size from 1 to 20 microns [40]. This being the case, LiDAR systems, for which its operating wavelengths are less than fog particles, will be subject to Mie scattering. In addition to the adverse effects from scattering, water absorption has a huge impact on the NIR spectral band. Water's contribution to the extinction coefficient for the 905 nm and the 1550 nm are 0.075 cm^{-1} and 10.8 cm^{-1} , respectively. According to M. Hadj-Bachir et al. and J Wojtanowski et al., under normal conditions, the overall extinction coefficient between these two frequencies



'Fog Accident' - 49 News Result(s)



1 Killed, 16 Injured In Road Accident On Agra-Lucknow Expressway

India News | Press Trust of India | Saturday February 13, 2021

A 37-year-old man was killed and 16 others were injured when their bus rammed into another vehicle travelling ahead of it on the Agra-Lucknow Expressway in Firozabad on Saturday due to dense fog, police said.

 www.ndtv.com

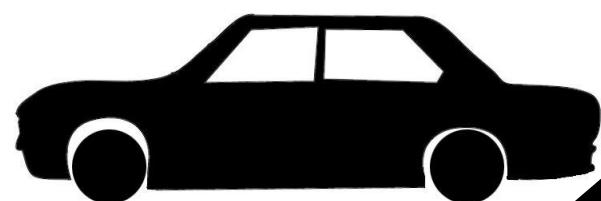


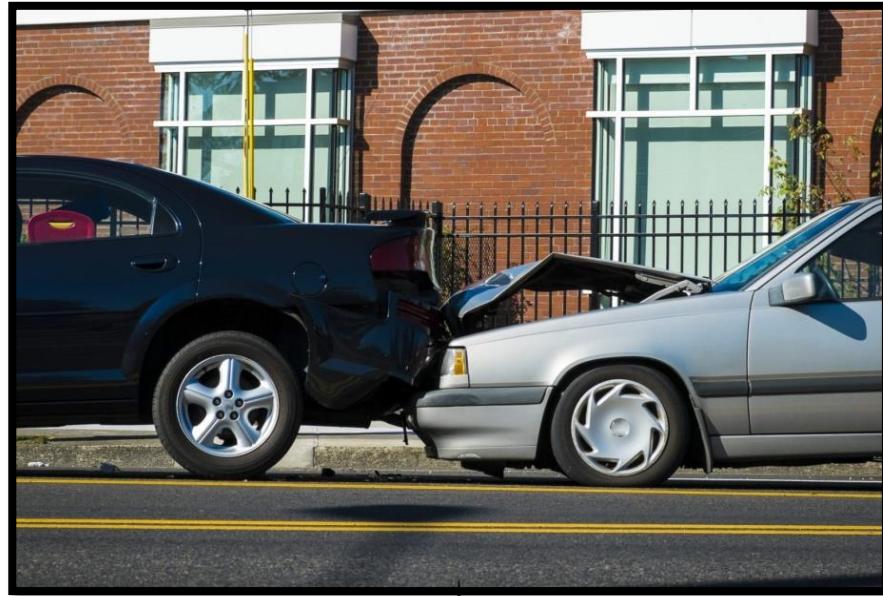
10 Killed, Several Injured In Bus-Truck Collision In UP, Rescue Ops On

India News | Press Trust of India | Saturday January 30, 2021

At least 10 people were killed and around a dozen were injured when a private bus collided with a truck on the Moradabad-Agra Highway in Uttar Pradesh this morning owing to poor visibility due to dense fog, an official said.

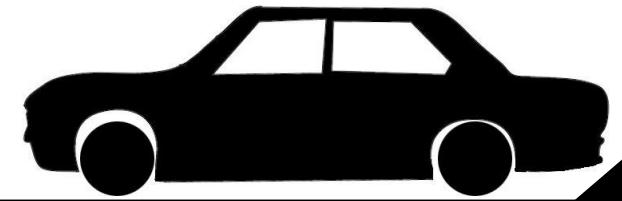
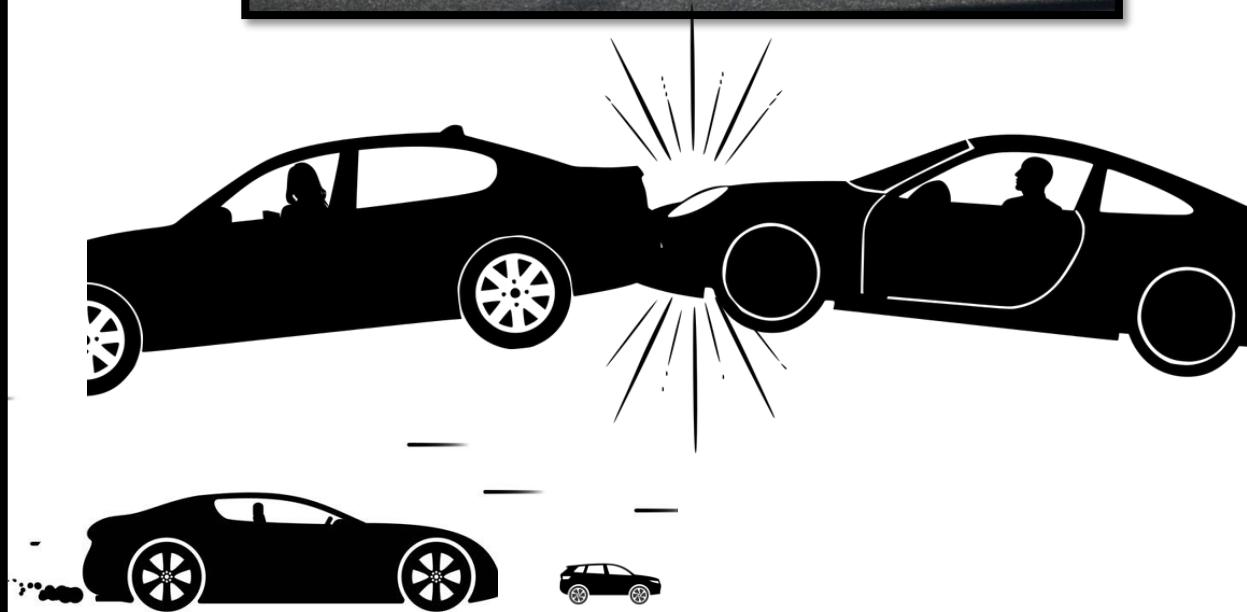
 www.ndtv.com





SCENARIO NO. 8

Rear End Collision

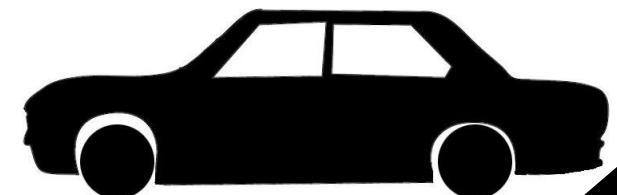
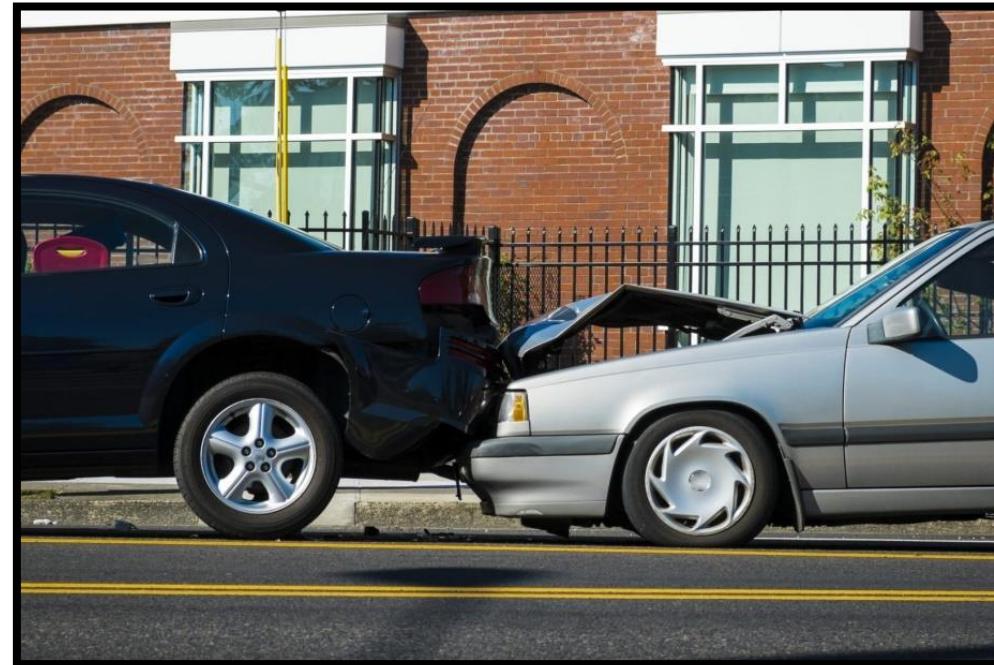


In this scenario, our vehicle (which is assumed to be a SAE level 3 car with ACC) was following the car in front of it while maintaining a safe distance between themselves.

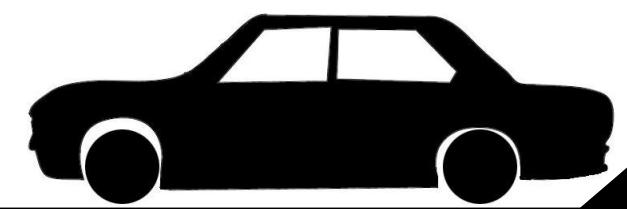
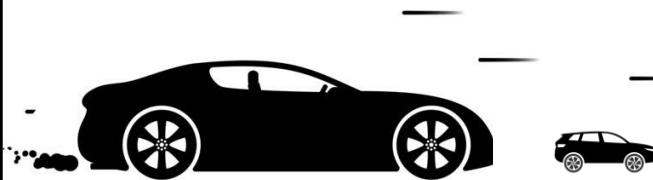
Suddenly a pedestrian starts crossing the road.

To avoid the accident, the first car applies the brakes.

The rear driver does not have time to apply breaks and thus collides with it.



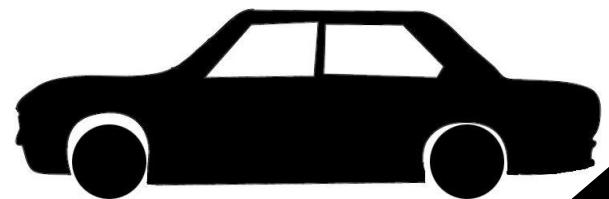
- According to [a report from the National Highway Transportation Safety Administration](#), rear-end crashes are the most frequently occurring type of collision.
- About 29 percent of all [car crashes](#) are rear-end collisions.
- These crashes result in a substantial number of injuries and fatalities each year.
- In fact, roughly [1.7 million rear-end collisions](#) take place in India each year. Rear end accidents are incredibly common. Of these nearly 2 million accidents, about 1,700 people die and another 500,000 are [injured in the crashes](#).
- These numbers constitute a significant portion of highway accidents, injuries, and fatalities.



**Table 20. Disposition of Lead Vehicle Across Rear-End Events
(Crashes, Near-Crashes, and Incidents).**

	Severity Level of Rear-End Event							
	Crash		Near-Crash		Incident		Total	
	N	%	N	%	N	%	N	%
Lead Vehicle Stopped	22	81%	145	32%	2514	38%	2,681	38%
< 2 seconds	10	37%	101	22%	1,135	17%	1246	18%
> 2 seconds	12	44%	44	10%	1,379	21%	1,435	20%
Lead Vehicle Decelerating	4	15%	194	43%	2947	45%	3145	45%
Light (<.25g)	0	0%	20	4%	301	5%	321	5%
Moderate (.25-.55g)	0	0%	43	10%	1,460	22%	1,503	21%
Heavy (>.55g)	2	7%	109	24%	975	15%	1,086	15%
Missing	2	7%	22	5%	211	3%	235	3%
LV Moving Slower, Constant Speed	0	0%	6	1%	149	2%	155	2%
Other	1	4%	105	23%	937	14%	1,043	15%
Total	27	0.4%	450	6%	6,547	93%	7,024	100%

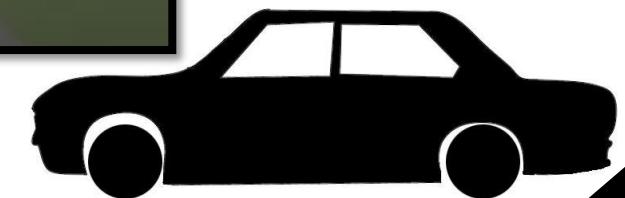
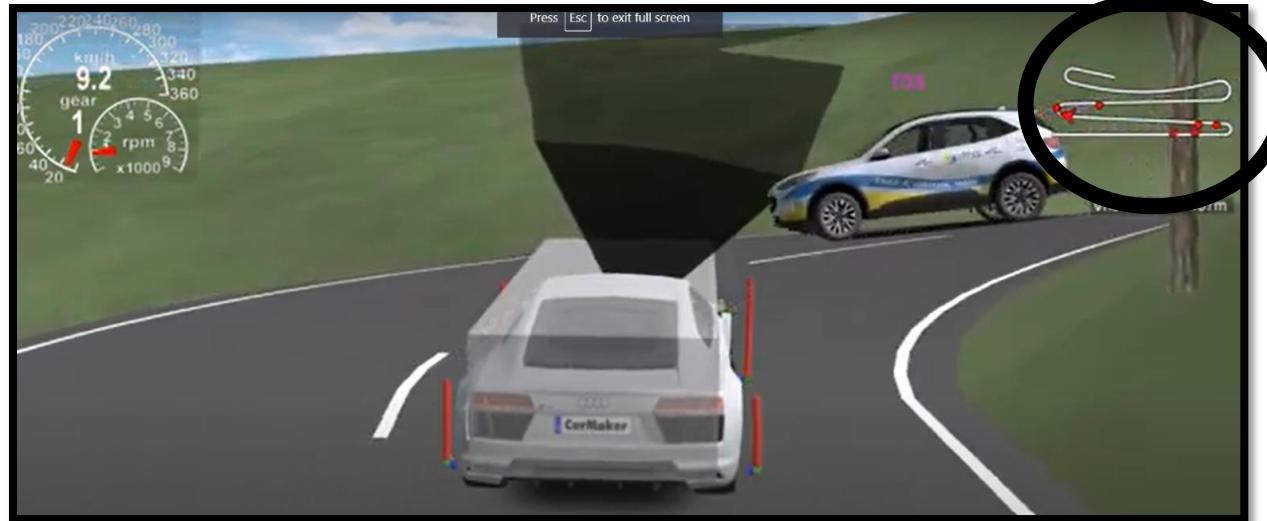
Of the 7,024 observed rear-end events, 45 percent involved a decelerating lead vehicle, 38 percent involved a stopped lead vehicle, 2 percent involved a slower moving lead vehicle, and 15 percent occurred under various other situations. Table 20 presents these rear-end events (crashes, near-crashes, and incidents) as a function of the status of the lead vehicle. Crashes were predominately characterized by situations in which the lead vehicle was stopped, whereas near-crashes and incidents were more evenly distributed across instances of both stopped and decelerating lead vehicles. Events triggered by a decelerating lead vehicle tended to involve moderate to heavy braking by the lead vehicle. In near-crash situations where the lead vehicle is decelerating, for example, approximately 56 percent of the lead-vehicle peak decelerations (109 out of 194) were above 0.55g, and 22 percent involved moderate braking (peak deceleration between 0.25 and 0.55g).



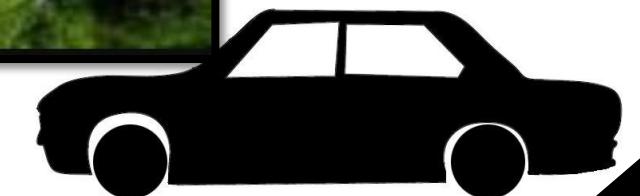


SCENARIO NO. 9

Hair Pin Head



A hairpin turn is a bend with a very acute inner angle, making it necessary for an oncoming vehicle to turn almost 180° to continue on the road. They are often built when a route climbs up or down a steep slope. The minimum speed limit in the hair pin bend is 20 Kmph if it doesn't at this pace it can't climb up, and if you are too fast and exceeds a certain limit according to the bends acuteness there may be a chance of overturning.



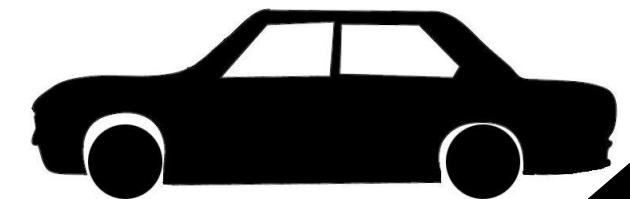


Kolli Hills

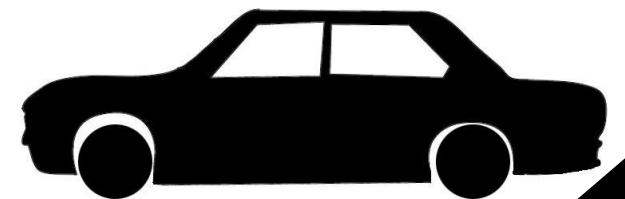


Wayanad

- When traveling on Kalka Shimla highway their was a hairpin bend which we can say a absolute check of driving skills of a person.
- Where you can't drive to slow or too fast.
- The situation being that worse for a manual vehicle, so it could be really difficult for a fully advanced autonomous vehicle to deal with this kind of situation.



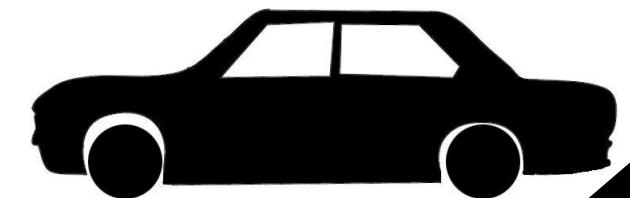
- At least 35 people were killed and 17 others were injured when an overloaded mini bus veered off the road and fell into a deep gorge in Kishtwar district of Jammu and Kashmir on the morning of July 1, 2019
- 11 schoolchildren had died when the bus in which they were travelling fell into a gorge on Mughal Road in Shopian district of south Kashmir
- In both the accidents (Kishtwar and Shopian) over-speeding was the cause,” an official of the Jammu and Kashmir transport department said on the condition of anonymity
- On June 20, 45 people died when a private bus fell into a deep gorge in Banjar in Kull district.
- A 2017 survey by Social Welfare Council of India, a Himachal Pradesh-based non-government organisation, found that 80% of the accidents involving heavy vehicles were caused by over-speeding and negligence of drivers; 5% because of technical fault and remaining 15% because of ill-maintained roads.
- In Uttarakhand, 364 persons died in road accidents in 528 road accidents till May this year. In July 2018, 50 people had died when a bus fell into a 100-metre deep gorge in Pauri Garhwal in one of the worst accidents in recent past.

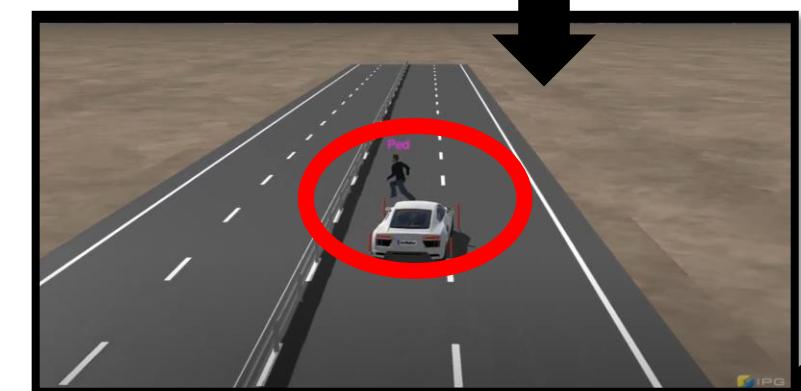
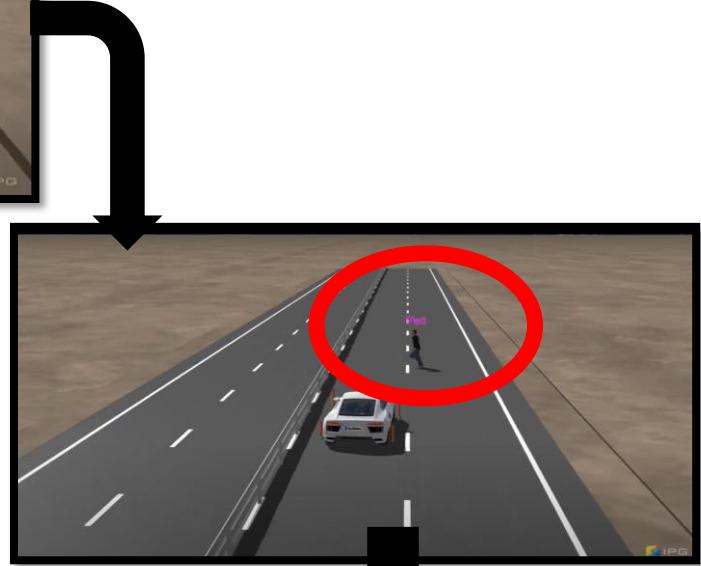
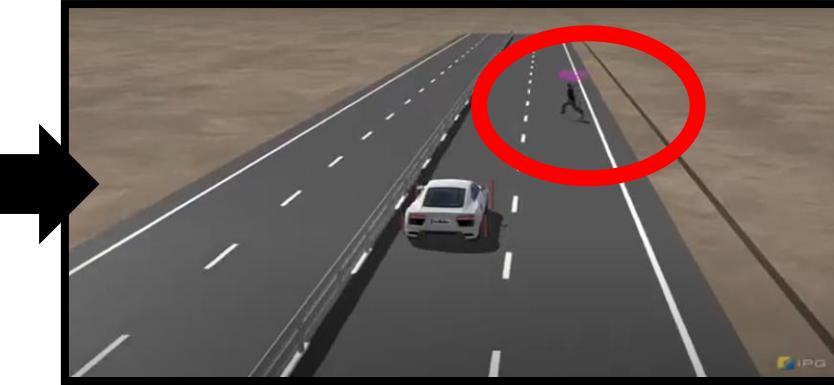
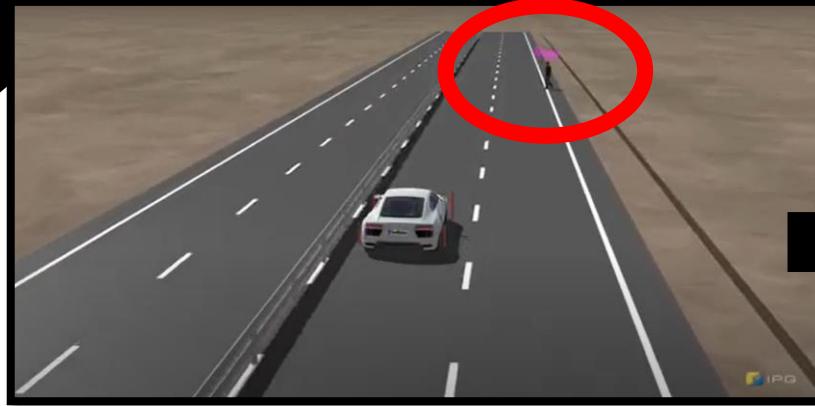




SCENARIO NO. 10

Pedestrian Starts to Run Suddenly





- The depiction of scenario is shown by the images
- Here the host vehicle (white) is moving on a straight road and has no idea about the pedestrian as he/ she haven't given any response.
- As the car comes closer the person suddenly starts to run.
- The situation is so critical that either the car has to apply sudden brakes or change the lane suddenly.
- Both of which are very tedious task in terms of response time of the sensors even with modern technology.



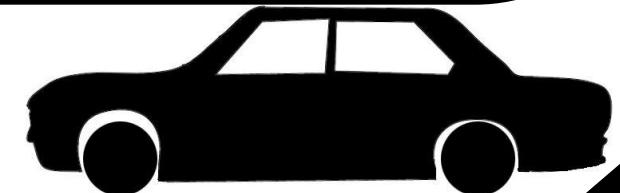


This is one of those problems which is unique and prominent on Indian Roads.

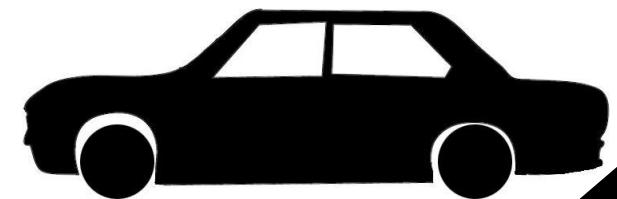
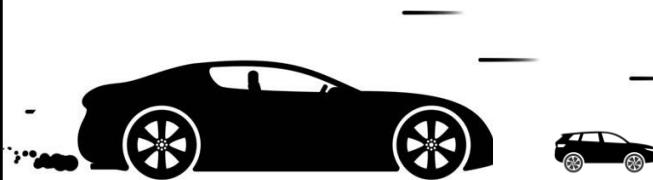
As seen in daily lives a person comes suddenly in front of eyes and we have to apply sudden brakes which is very difficult for us driving manually.

This sometimes causes disastrous situation as the vehicle just behind us have to apply sudden brakes and so on to avoid collision.

A significant number of pedestrians are willing to take risk while crossing the road at all type of crosswalks. Signal free movement for motorized vehicles with the construction of free left turn, flyovers and grade separators exposing pedestrians to the greater risk



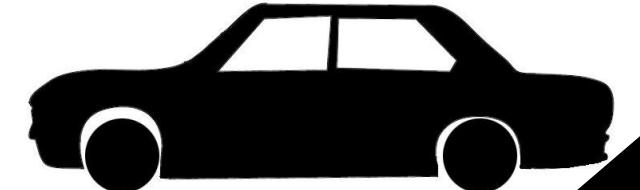
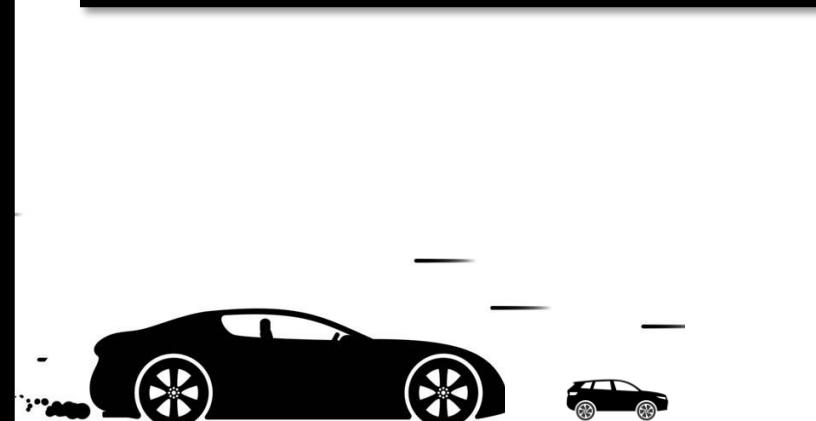
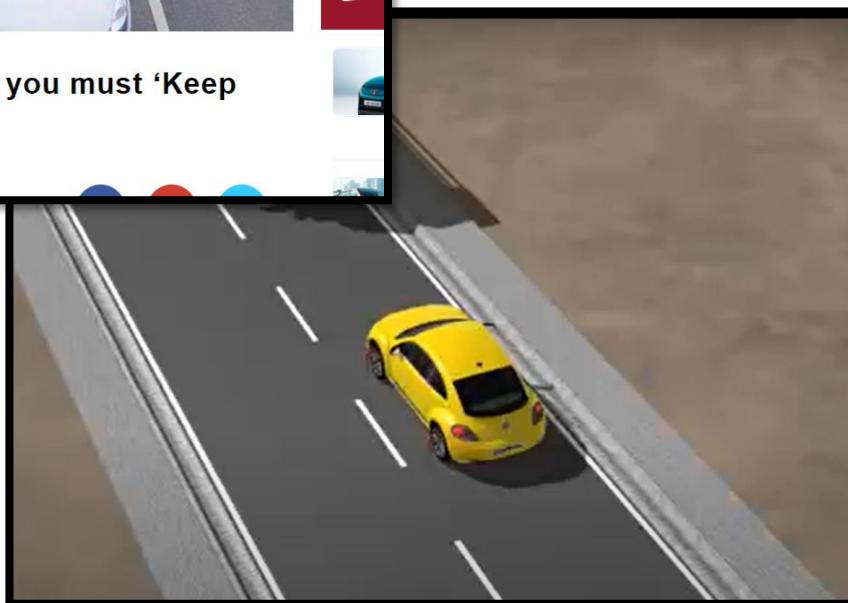
- Pedestrian crashes are a major safety concern worldwide, especially in India. About one of every ten traffic-related fatalities in the country is a pedestrian.
- In 2016 nearly 15,800 pedestrians were killed in India. They were mainly exposed to risk when crossing and walking on the road and sudden starts run on the middle of the road in urban and rural areas.
- Pedestrian crossed half way and stopped in middle of road and then suddenly runs.
- Nearly 10% of pedestrians are fatal each year involving in 5% of overall accidents in India,
- The number of deaths due to road accidents in the last calendar year was down from 2019 when 25,858 pedestrians were killed in road accidents across India.
- Also the total number of deaths in road accidents across India in the last calendar year was 131,714, down from 151,113 recorded in 2019.

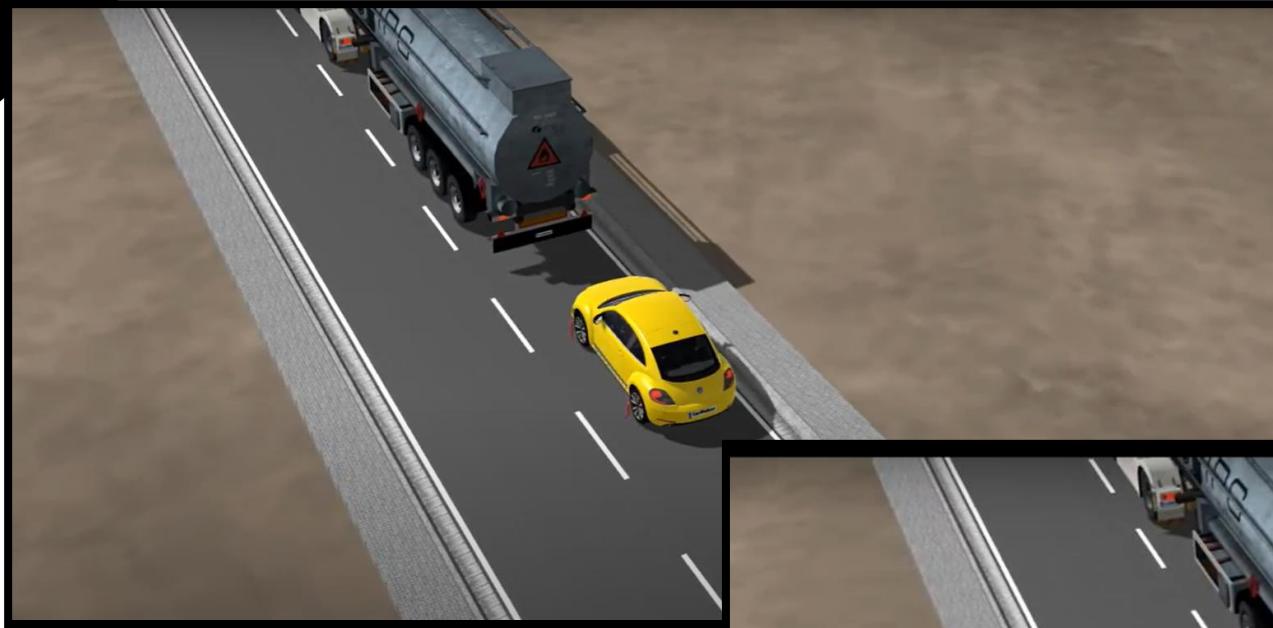




SCENARIO NO. 11

Tailgating Potholes



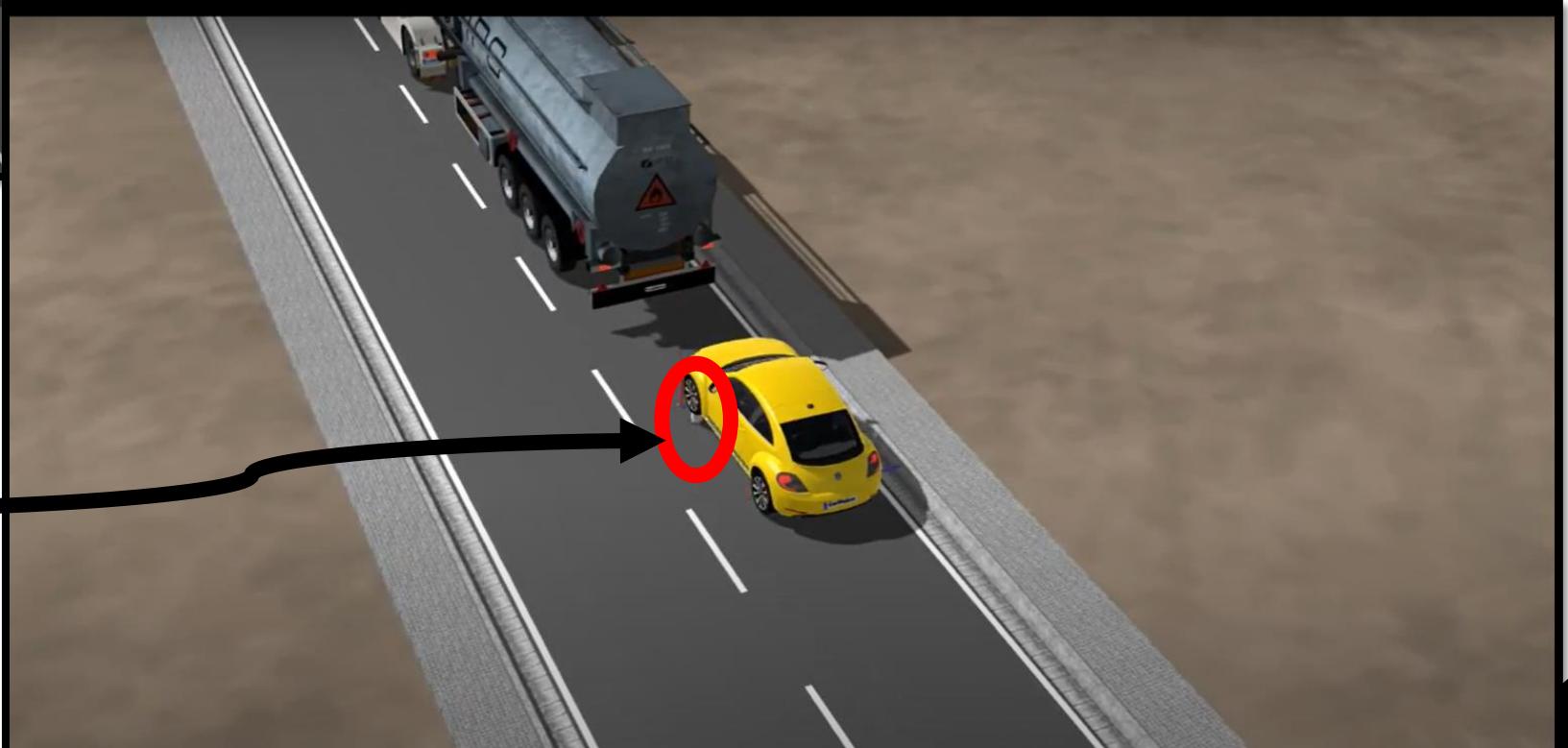


The scenario represents the situation in which the host vehicle (in yellow) is moving behind the big truck.

Since the truck has wider wheel base, it was easy for it to avoid the pothole.

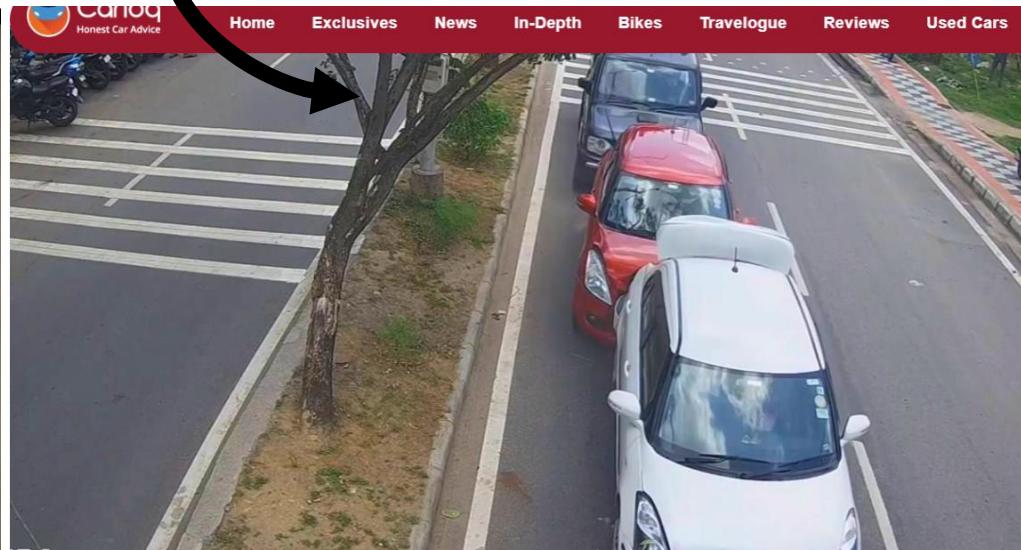
Which is indeed difficult for small car if it is unaware of it.

The situation when the pothole(in white below car's tyre) is suddenly in front of car may lead to a disbalance and becomes unavoidable.



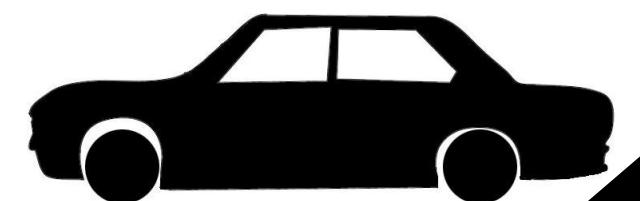
Therefore the situation arises two major problem:

1. Avoiding pothole and
2. Avoiding rear end collision



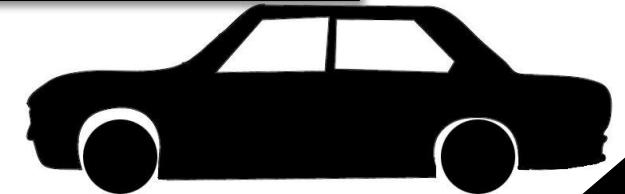
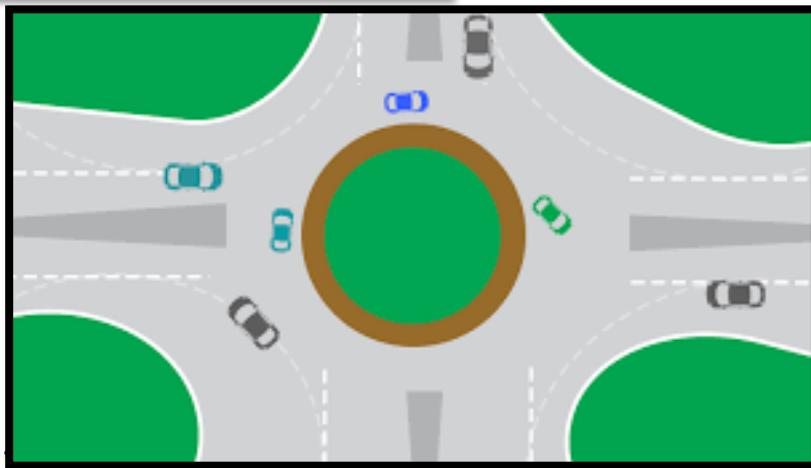
Hyderabad police releases video explaining why you must 'Keep Distance' while driving

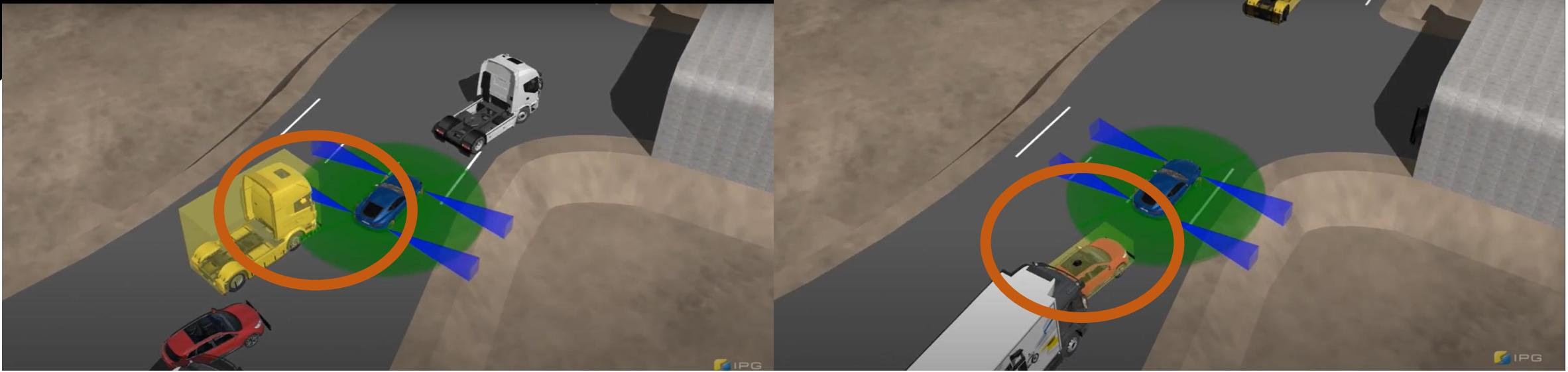
By Paarth Khatri



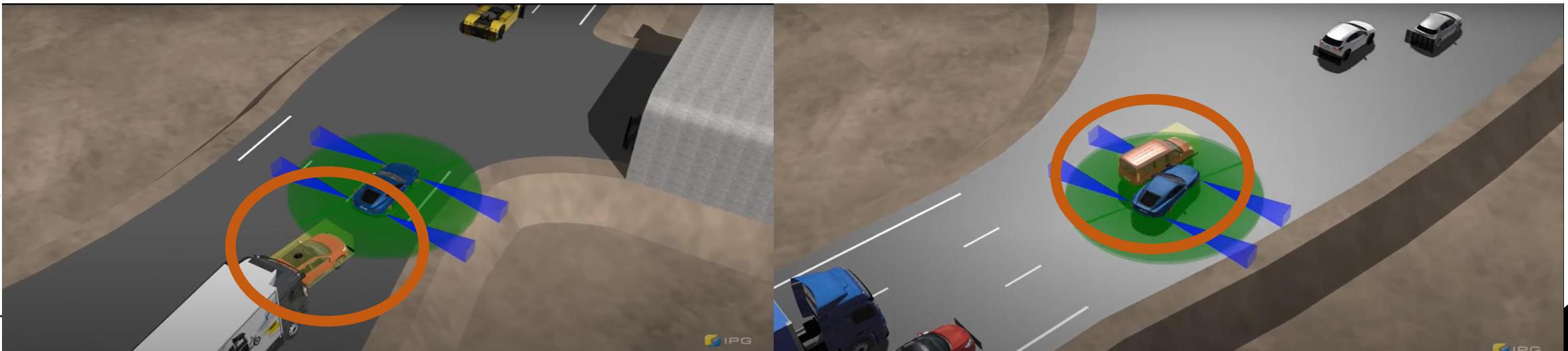
SCENARIO NO. 12

Circular Intersection

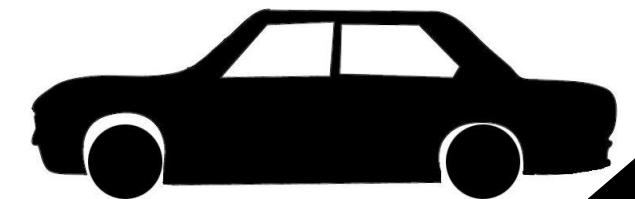




This scenario explains different types of collision possible in a circular intersection. The scenario being absolute common in Indian Cities and found almost everywhere independent of number of lanes and traffic on the road



A roundabout is a type of circular intersection or junction in which road traffic is permitted to flow in one direction around a central island, and priority is typically given to traffic already in the junction.



- Roundabout collisions are common due to the fact that vehicles can be emerging and exiting from various junctions and in various lane .
- However, Roundabouts reduce accidents and traffic congestion.
- There are 35% fewer accidents in traffic circles than traditional intersections which has resulted in a 90% decrease in fatalities and a 75% decrease in injuries nationwide.
- With 4,173 accidents and 813 deaths, roundabout junctions are least dangerous.
- As per the Union Ministry of Road Transport data, Statistically, modern roundabouts are safer for drivers and pedestrians than both older-style traffic circles and traditional intersections. Compared with these other forms of intersections, modern roundabouts experience 39% fewer vehicle collisions, 76% fewer injuries and 90% fewer serious injuries and fatalities

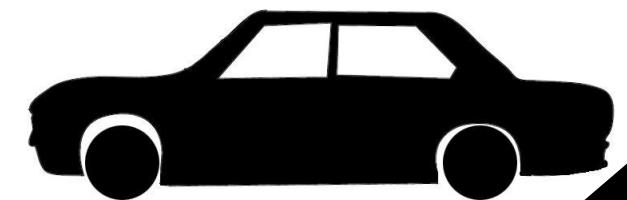
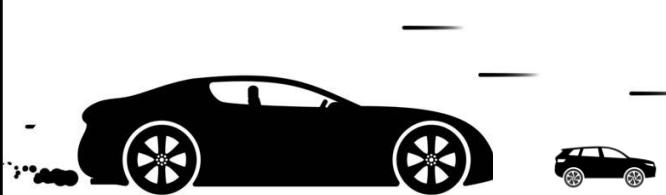
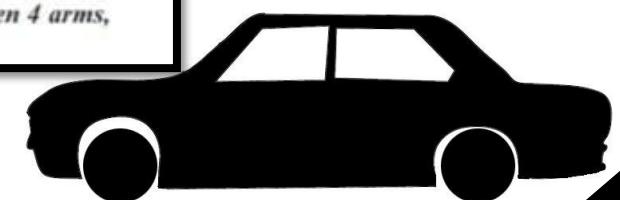


Table 4.6: Accident by type of road junction at the All India level for 2018- 2019

Junction type	Number of accidents			Persons killed			Persons injured		
	2018	2019	%age change in 2019 over 2018	2018	2019	%age change in 2019 over 2018	2018	2019	%age change in 2019 over 2018
T-Junction	57,652	43,864	-24	15,608	13,219	-15	55,589	41,587	-25
Share in Total	12	10		10	9		12	9	
Y-Junction	26,220	21,046	-20	7,866	6,725	-15	24,003	19,384	-19
Share in Total	6	5		5	5		5	4	
Four arm Junction	28,125	23,490	-17	7,652	6,769	-12	26,178	20,631	-21
Share in Total	6	5		5	5		6	5	
Staggered Junction	22,557	22,098	-2	7,921	8,018	1	21,411	20,792	-3
Share in Total	5	5		5	5		5	5	
Round about Junction	20,515	15,000	-27	6,765	4,997	-26	19,193	14,191	-26
Share in Total	4	3		5	3		4	3	
Others*	3,11,975	3,23,504	4	1,05,605	1,11,385	6	3,23,044	3,34,776	4
Share in Total	67	72		70	74		69	74	
Total	4,67,044	4,49,002	-4	1,51,417	1,51,113	0	4,69,418	4,51,361	-4

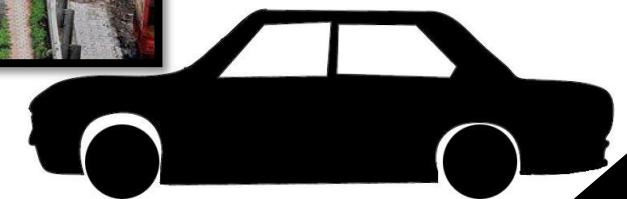
(*) any other type not covered by the specified road junctions given above such as junction with greater than 4 arms, manned and un-manned crossings, Expressways.

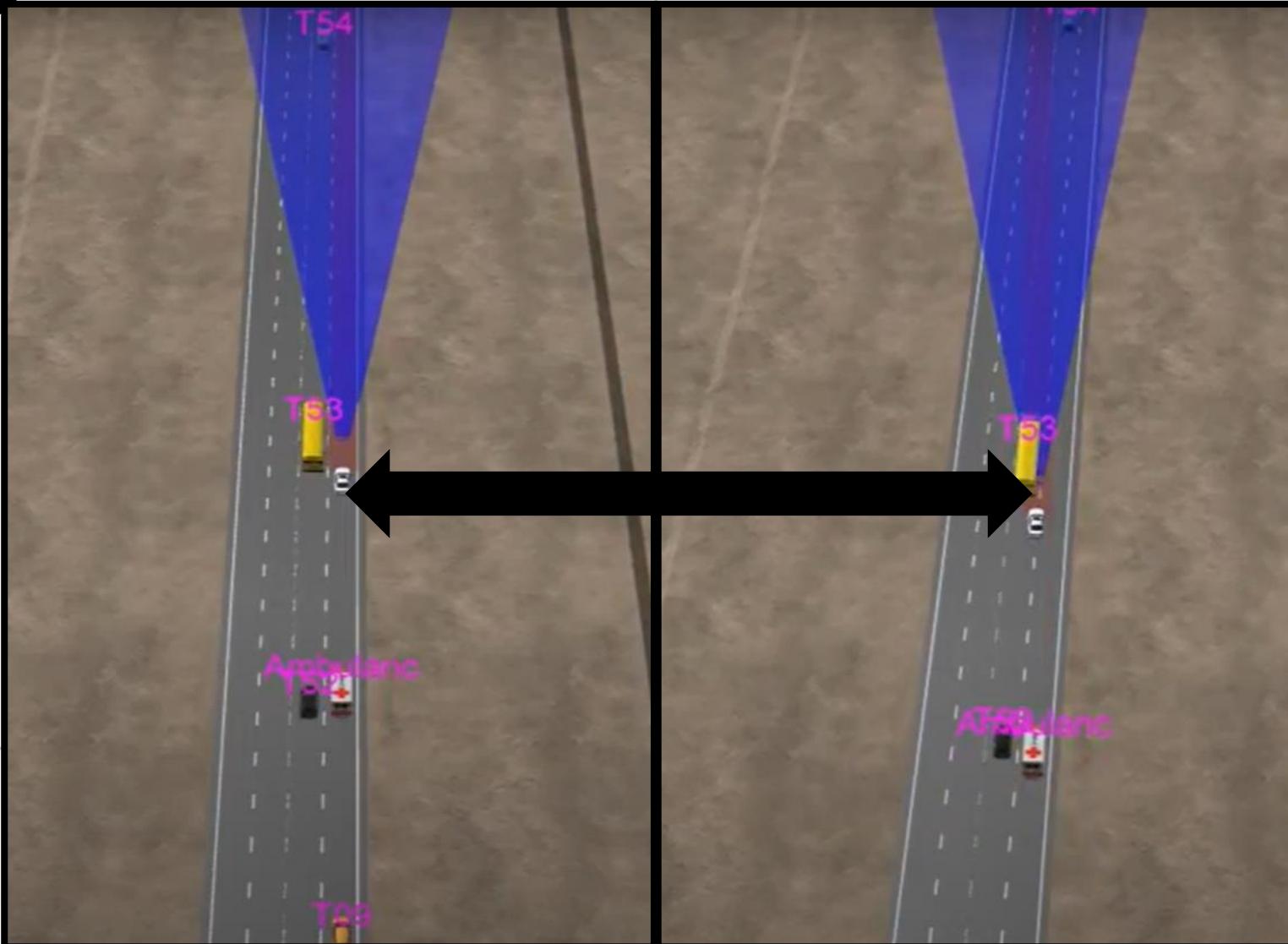




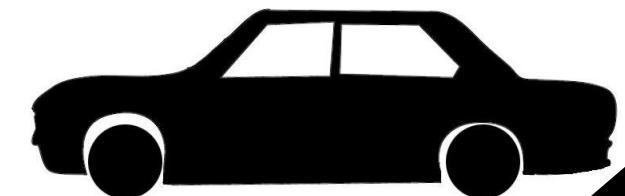
SCENARIO NO. 13

Ambulance



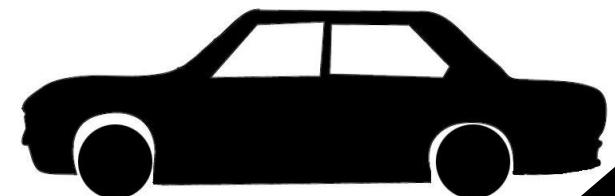


- Look at the two images.
- The images represent a scenario that as soon as you see an ambulance coming from behind you are required to change the lane as soon as possible.
- Which the small car in white have done.





- Since Human Safety is one of the top priority thing that is need to be taken into account.
- People walking around the road can be easily seen but the person in danger in the ambulance needs to be saved.
- The role of vehicles moving on the road becomes equally important to make a way for the ambulance so that it can save that person as soon as possible.
- The ambulance should not be made to stuck in traffic for long.





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MUST READ

Changes to IAS rules will affect states, says Mamata



Home / Cities / Ludhiana / Infant dies as ambulance gets stuck in traffic amid protest by contractual employees

Infant dies as ambulance gets stuck in traffic amid protest by contractual employees

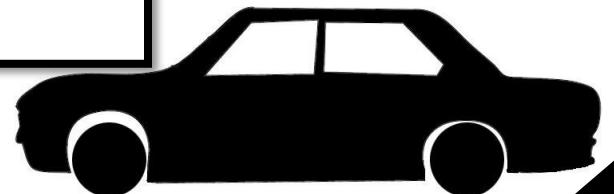
Authorities, however, denied that the death happened due to traffic jam and said that the ambulance was given the way by the protesters.

These statistics are not great to be seen.

So while making an autonomous vehicle this the problem which is a must that needs to be encountered and solved.

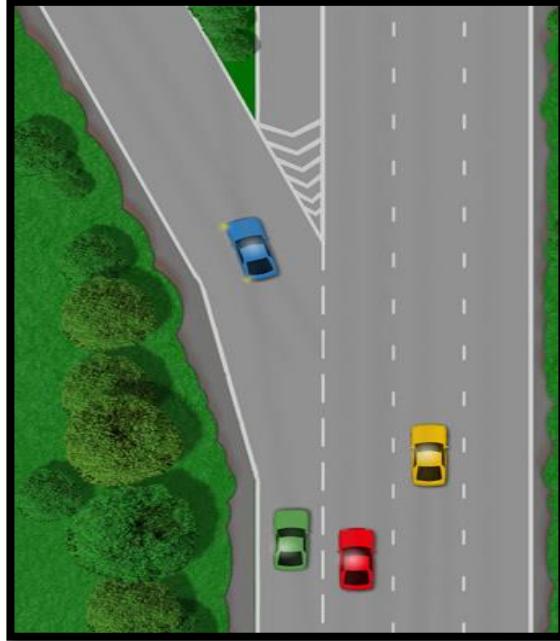


Lets talk about few statistics, According to a report published by Times of India about 146,133 people were killed in road accidents in India in the year 2016. Unfortunately about 30% of deaths are caused due to delayed ambulance. Another Indian government data shows .. more than 50% of heart attack cases reach hospital late , which can constitute unavailability of ambulances too but majority of it is due to patients stuck in traffic. What can as a responsible society we can do about it. What infrastructure is required to not let these lives getting over on the road when they deserve a last minute assistance from doctors. You definitely don't want this to happen with any of your loved ones .. but still you are being the part of this problem ..you .. me and all of us who are worried about getting late in office by few minutes which may result to a loss in pay(maybe) but lets evaluate the cost you are paying for a lives which just got ended on that moving vehicle when all they asked for was an emergency medical assistant.



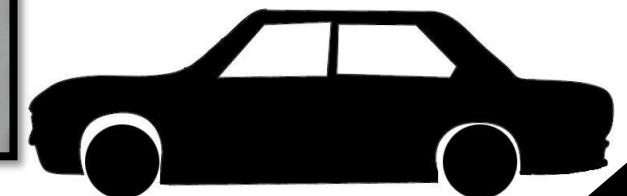
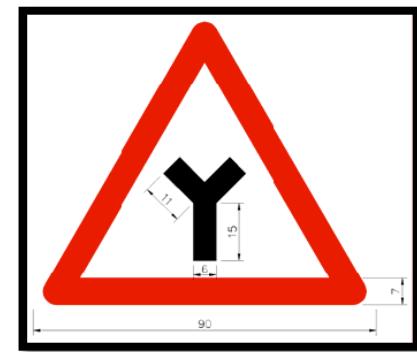
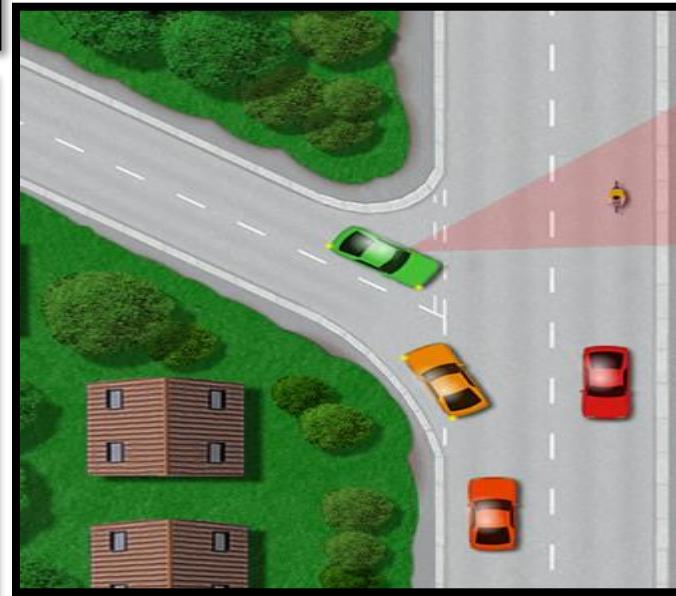
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SCENARIO NO. 14

Diverging Lane (Y- Junction)



A typical Y-junction will see the major road going straight ahead which has priority, with a joining minor road exiting entering to the left or right at an acute angle, forming the letter 'Y'.

Most commonly this scenario is where green vehicle is waiting to emerge out of a side road and looking to their right they see orange vehicle traveling along the major road indicating to pull into the side road. Upon reliance of the signal turning left by, orange vehicle emerges but green vehicle continues straight on and a collision occurs.

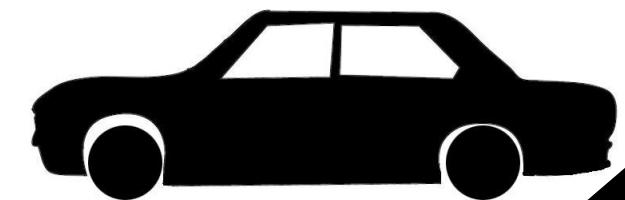
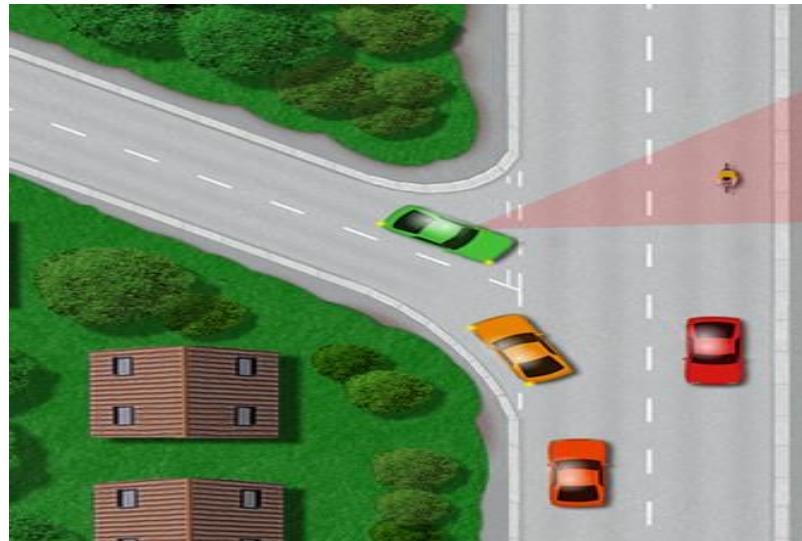
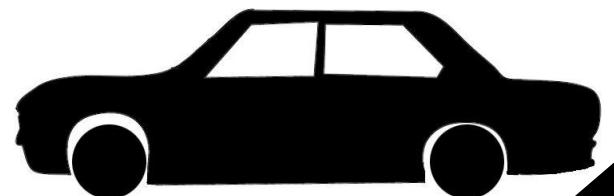
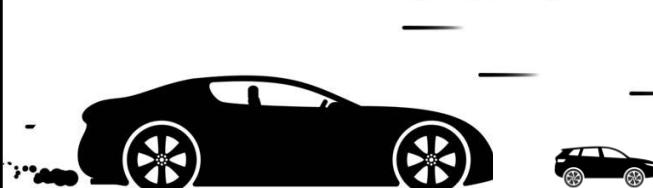
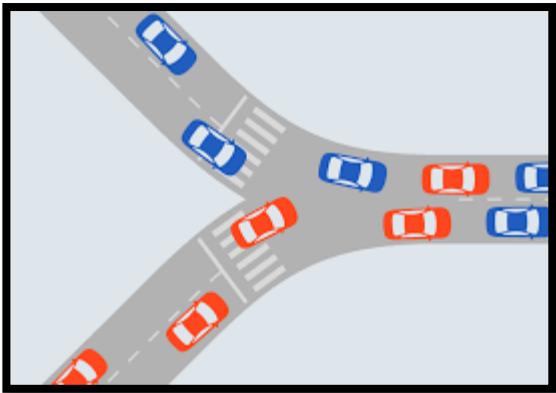


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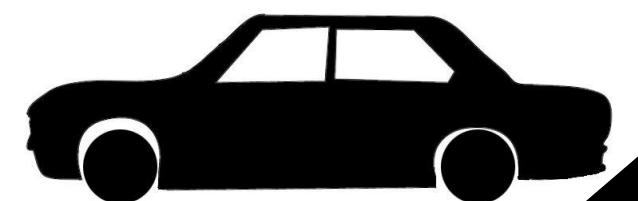
SCENARIO NO. 15

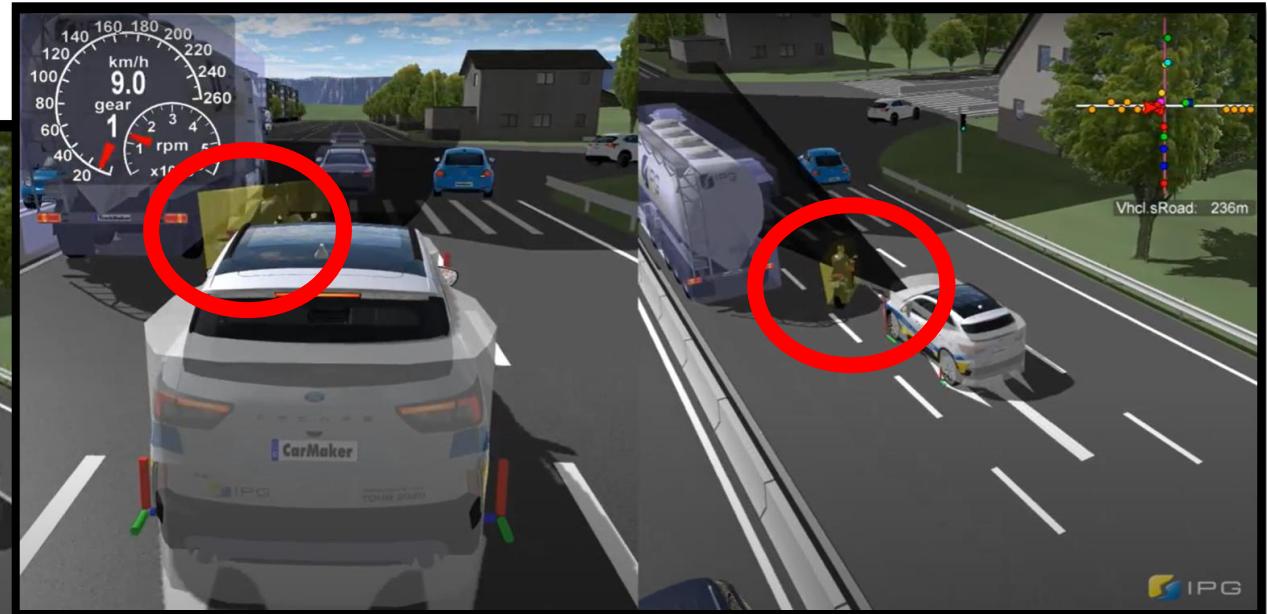
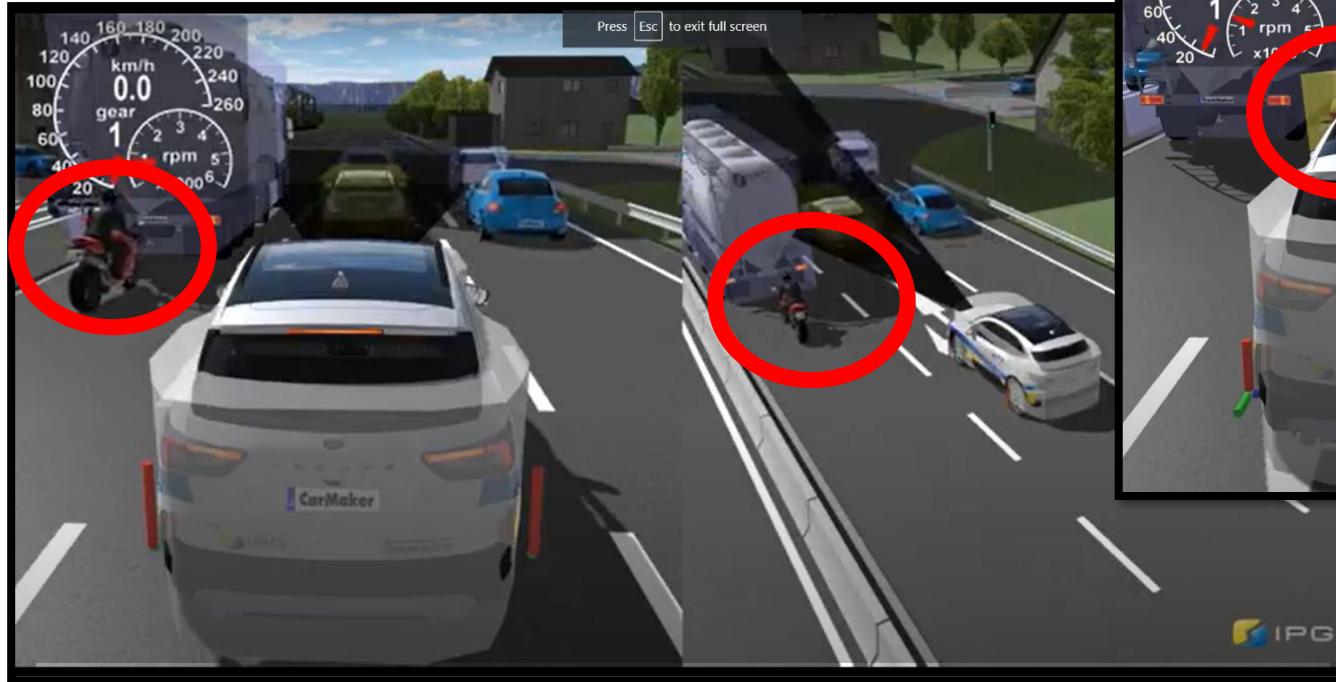


Bike Traffic



FIGURE 2 Motorcycle Behavior at a Signalized Intersection in Chennai city, India



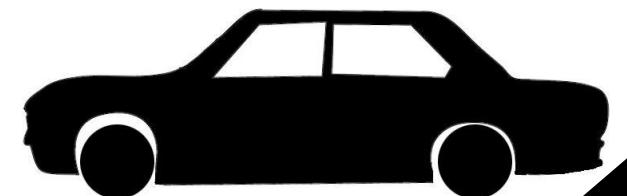


1. The two wheeler on left of host vehicle(in white) and the traffic is in stop condition.



2. When traffic starts to move the bike rider suddenly changes the lane.

3. To avoid the vehicle have to be instructed to stop immediately otherwise the collision is certain.



- Motorcycles are relatively small in size, have greater manoeuvrability, flexibility and have freedom to park practically anywhere.
- Motorcycles have the agility and the capability to weave through queues in congested areas.
- They will not follow the “First In First Out” rule at intersections with queues. They will often attempt to get in between queuing vehicles to get to the front of the queue and reach the stop line.
- As a result, many motorcycles will depart together within a very short period of time once the traffic signal turns green.
- This phenomenon will generate a motorcycle wave at the beginning of green phase.
- Two wheelers account for 35% of total road accident deaths on National Highways falling under NHAI, followed by cars, taxis, Vans & LMVs (18.6%) and pedestrians(14%) followed by share of Trucks of (10.7%) and share of buses of (4.9%) and share of bicycles at (2.9%)



FIGURE 2 Motorcycle Behavior at a Signalized Intersection in Chennai city, India

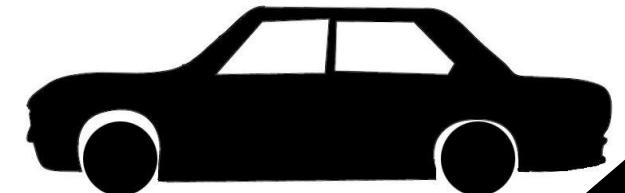
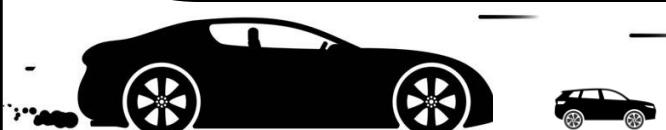


Table 3.4: Persons killed in Accidents Classified by the type of impacting vehicles (Crime Vehicle by Victim vehicle) during 2019

Crime Vehicle ➡	1. Bicycles	2. Two Wheelers	3. Auto Rickshaws	4. Cars, Taxis, Vans & LMV	5. Trucks/ Lorries	6. Buses	7. Other Non-motorized vehicle (Erickshaw etc.)	8. Others	9. Total
Victim/Victim Vehicle ➡									
1. Pedestrian	195	6,934	1,312	6,458	4,318	2,050	487	4,104	25,858
% share	0.8	26.8	5.1	25.0	16.7	7.9	1.9	15.9	17
2. Bicycles	128	941	280	954	802	623	140	328	4,196
% share	3.1	22.4	6.7	22.7	19.1	14.8	3.3	7.8	3
3.Two Wheelers	968	19,190	2,520	12,480	10,723	4,080	1,386	4,789	56,136
% share	1.7	34.2	4.5	22.2	19.1	7.3	2.5	8.5	37
4.Auto Rickshaws	88	694	1,370	1,651	1,393	709	269	481	6,655
% share	1.3	10.4	20.6	24.8	20.9	10.7	4.0	7.2	4
5.Cars, Taxis, Vans & LMV	269	3,015	778	10,267	4,833	2,181	617	1,940	23,900
% share	1.1	12.6	3.3	43.0	20.2	9.1	2.6	8.1	16
6.Trucks/ Lorries	151	1,757	401	1,765	6,103	1,893	342	1,120	13,532
% share	1.1	13.0	3.0	13.0	45.1	14.0	2.5	8.3	9
7.Buses	83	953	266	822	1,868	1,616	280	641	6,529
%share	1.3	14.6	4.1	12.6	28.6	24.8	4.3	9.8	4
8. Other Non-motorized vehicle (Erickshaw etc.)	87	624	198	508	391	278	628	351	3,065
	2.8	20.4	6.5	16.6	12.8	9.1	20.5	11.5	2
9. Others	83	2,105	535	1,674	1,546	1,364	1,064	2,871	11,242
	0.7	18.7	4.8	14.9	13.8	12.1	9.5	25.5	7
Total	2,052	36,213	7,660	36,579	31,977	14,794	5,213	16,625	1,51,113
%share	1	24	5	24	21	10	3	11	100

[Home](#) > [Engineering](#) > [Transportation Engineering](#) > [Automotive Engineering](#) > [Civil Engineering](#) > [Motorcycles](#)

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Microscopic Simulation for Modeling Exclusive Stopping Space for Motorcycles under Non-lane Based Mixed Traffic Conditions

May 2015, European Transport Transporti Europei

Project: [Simulation of Mixed Traffic Flow](#)

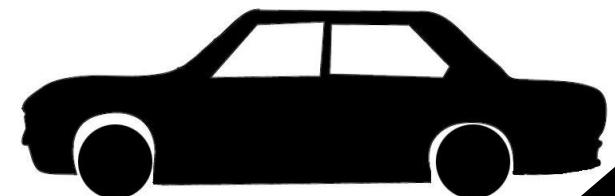
Authors:

 **Gowri Asaithambi**
Indian Institute of Technology Tirupati

 **R. Sivanandan**
Indian Institute of Technology Madras

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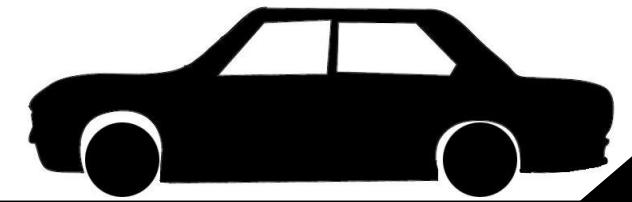
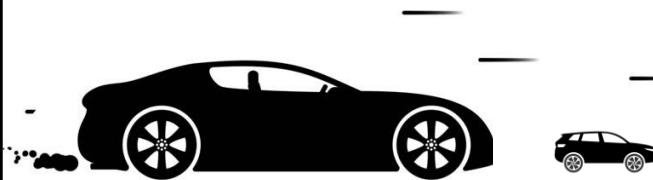
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SCENARIO NO. 16

Blind Turn

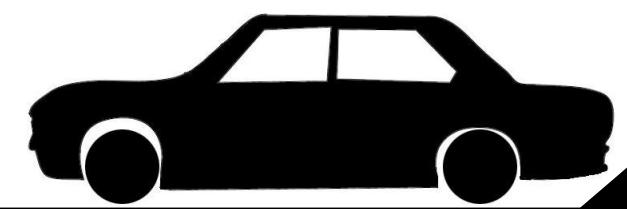
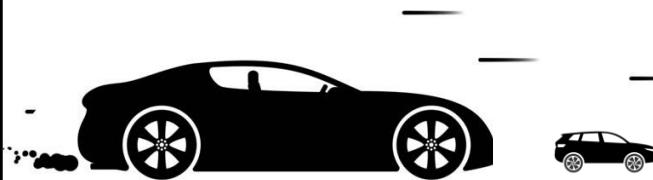


Blind corner is a turn on a road where the view of what is behind the corner is obstructed by a building or a tree.



This scenario has a dangerous blind turn which witnesses frequent vehicular accidents.

The stretch of the road takes a steep right turn and the turn which is unfortunately too long and curvy, completely blinds a car driver. The driver could not anticipate the approaching vehicle from the other side and met with an accident.

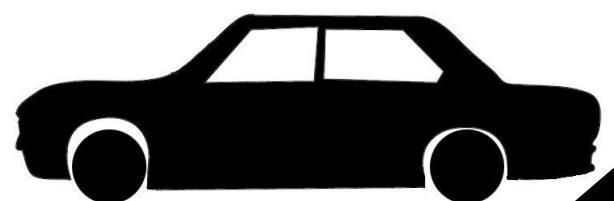


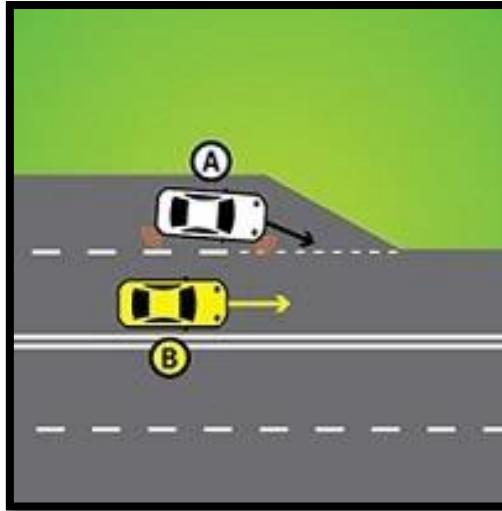
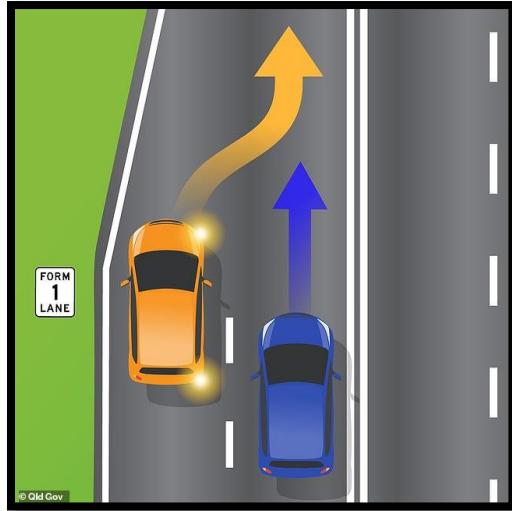


This was a case of a fatal accident due to Blind Turn which happened in Chandigarh.

The turn was too long and curvy which completely blinds a car driver and led to an accident.

Reference: [Blind turn often proves fatal: Sector 38 residents | Chandigarh News - Times of India \(indiatimes.com\)](http://www.indiatimes.com)





SCENARIO NO. 17

Merging of Lane

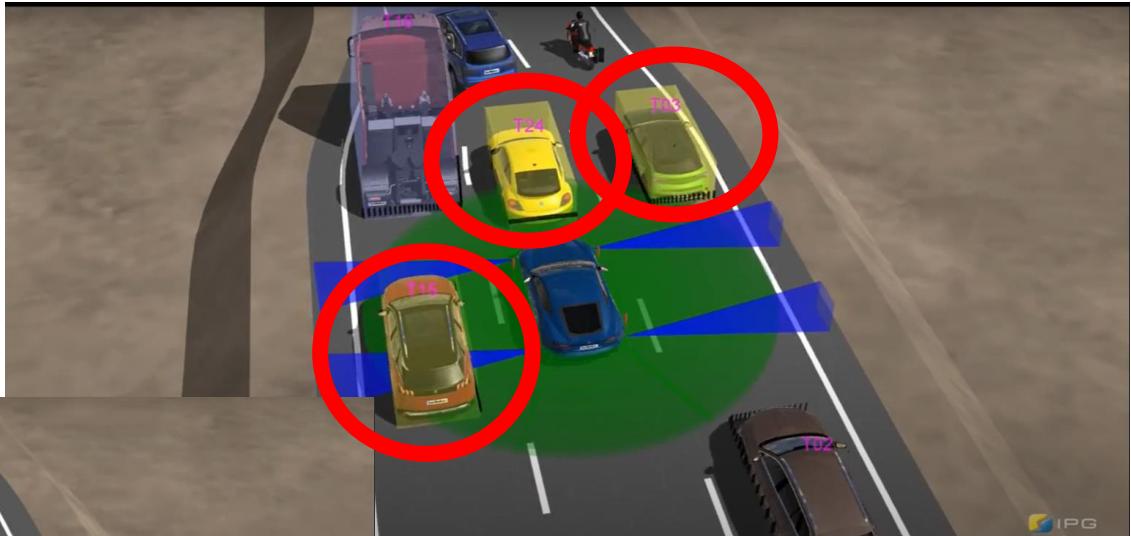


Merging of lane is a very critical scenario in terms of sensing the vehicles in the proximity and taking decision accordingly.

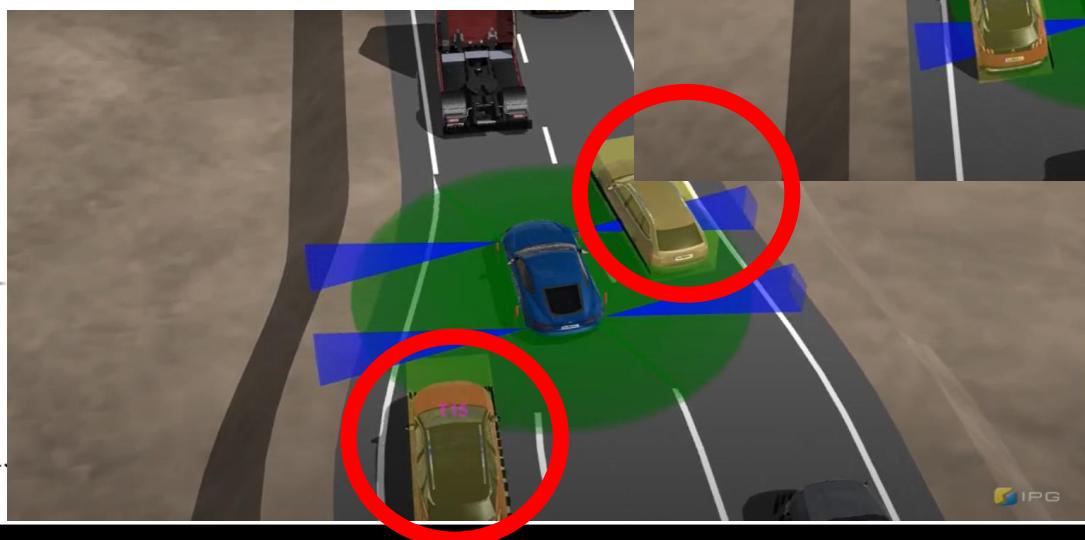
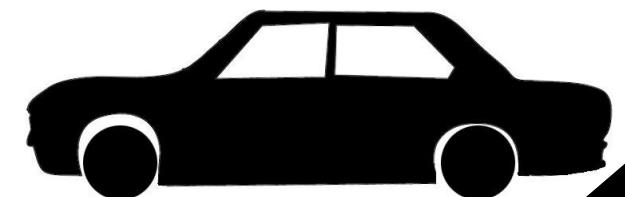
The scenario represents the case when the host vehicle(in blue) in moving in a path where lane is merging.



Finally when passing through the section have to sense the nearby vehicle and respond accordingly in the path



Since the 3 vehicles detected in the first image stopped so the host vehicle had to stop. Now in second the vehicle ahead of the host vehicle are moving in the lane so have to wait a little more.





Rash overtaking led to 30,000 deaths last year

Dipak K Dash / TNN / Updated: Jun 7, 2016, 03:08 IST

[f](#) [t](#) [in](#) [e](#) 34 PTS

ARTICLES

- Rash overtaking led to 30,000 deaths last year
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How to cut out Mumbai traffic? Take a boat

Two examples of countries not letting China walk over them

SEE ALL >

(Representative photo)

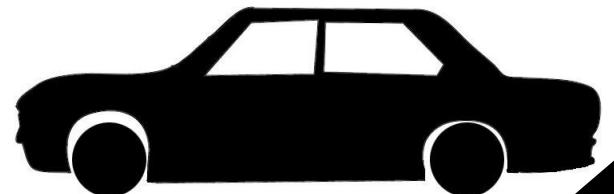
NEW DELHI: It is better to be very alert when overtaking or letting any other vehicle to overtake you on the road. Numbers show how dangerous and risky overtaking is on Indian roads. Last year, over 30,000 lives were lost in road crashes caused due to overtaking, according to the recent road traffic accident report by transport ministry.

It also shows how diverging and merging resulted in nearly 32,000 fatalities on roads while stationary and other parked vehicles were involved in nearly 26,000 crashes that claimed 7,280 lives last year.

*Overtaking is a menace across all roads simply because neither the road users

Multiple roads or in multiple lanes on the same road are required to merge into a single lane. India witness 32000 casualties along in one year in 2016, while the data the mild crashes and damages remain uncovered inside the blanket of under-reporting the reason for traffic jams are decidedly varied, but perhaps one of the most common cause of traffic congestion on Indian roads are merging lanes.

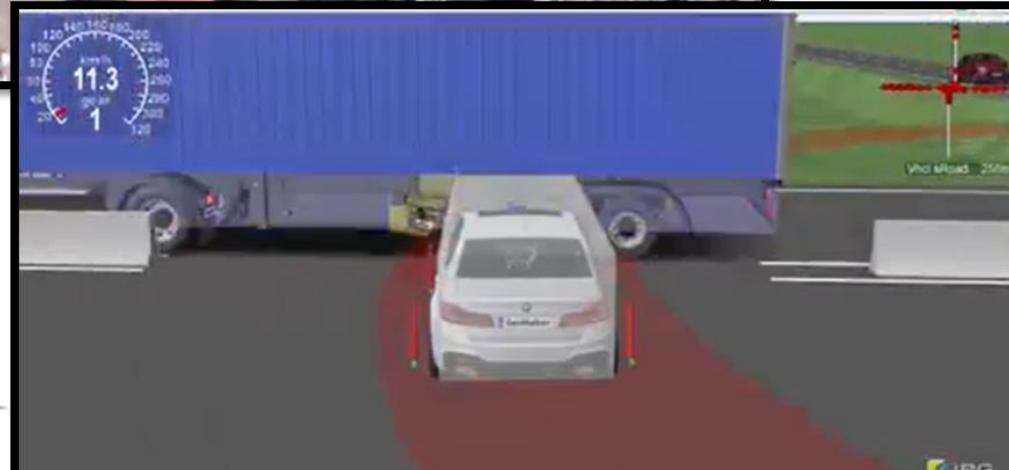
— Perhaps the lane is closed for construction or may be it is an interchange; nonetheless, rarely ever will you see traffic moving smoothly in such a situation.





SCENARIO NO. 18

Staggered Junction



A staggered junction is where a minor road meets a major road, but unlike a crossroads where the minor road continues directly opposite the major road, the points that the minor road meet the major road are slightly offset (out of line) by a short distance.

Staggered junctions provide many benefits. They are safer as they force a motorist to slow down or stop before continuing to cross, visually they provide a distinct T-junction style on approach instead of a continuation of road making it safer.

But sometime it forces people to go reverse direction which increase the chances of collision plus it also increase the changes of T-bones collision as majority of them are unsignalized junction.

In this scenario we have tried to explain the different sorts of collision that may happen in case of a staggered junction.

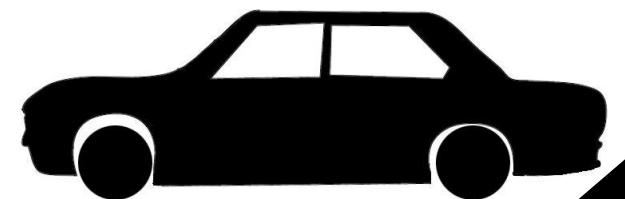
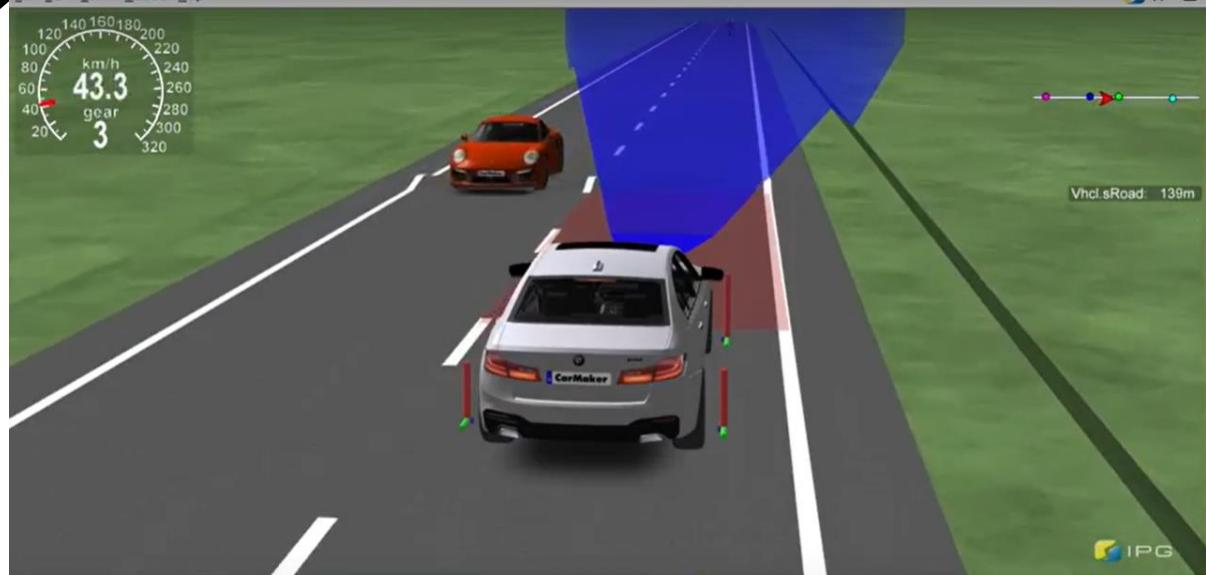


Table 4.6: Accident by type of road junction at the All India level for 2018- 2019

Junction type	Number of accidents			Persons killed			Persons injured		
	2018	2019	%age change in 2019 over 2018	2018	2019	%age change in 2019 over 2018	2018	2019	%age change in 2019 over 2018
T-Junction	57,652	43,864	-24	15,608	13,219	-15	55,589	41,587	-25
Share in Total	12	10		10	9		12	9	
Y-Junction	26,220	21,046	-20	7,866	6,725	-15	24,003	19,384	-19
Share in Total	6	5		5	5		5	4	
Four arm Junction	28,125	23,490	-17	7,652	6,769	-12	26,178	20,631	-21
Total	6	5		5	5		6	5	
Staggered Junction	22,557	22,098	-2	7,921	8,018	1	21,411	20,792	-3
Share in Total	5	5		5	5		5	5	
Round about Junction	20,515	15,000	-27	6,765	4,997	-26	19,193	14,191	-26
Share in Total	4	3		5	3		4	3	
Others*	3,11,975	3,23,504	4	1,05,605	1,11,385	6	3,23,044	3,34,776	4
Share in Total	67	72		70	74		69	74	
Total	4,67,044	4,49,002	-4	1,51,417	1,51,113	0	4,69,418	4,51,361	-4

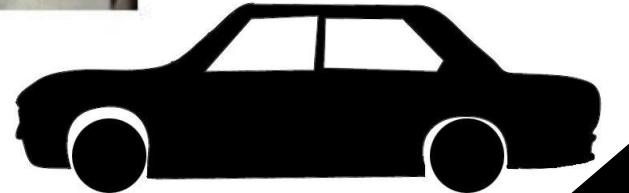
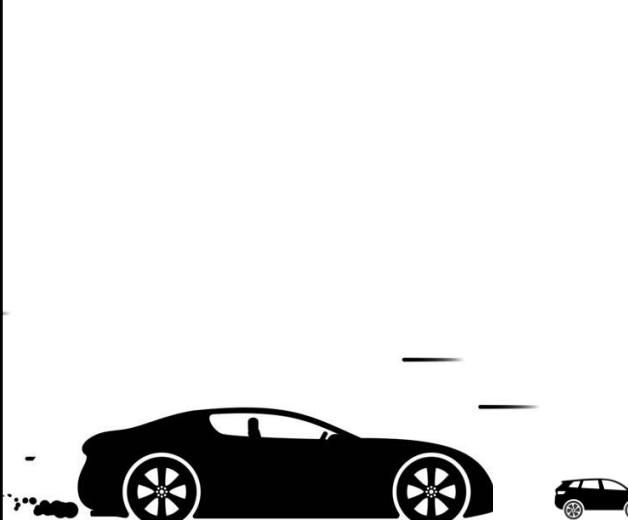
(*) any other type not covered by the specified road junctions given above such as junction with greater than 4 arms, manned and un-manned crossings, Expressways.

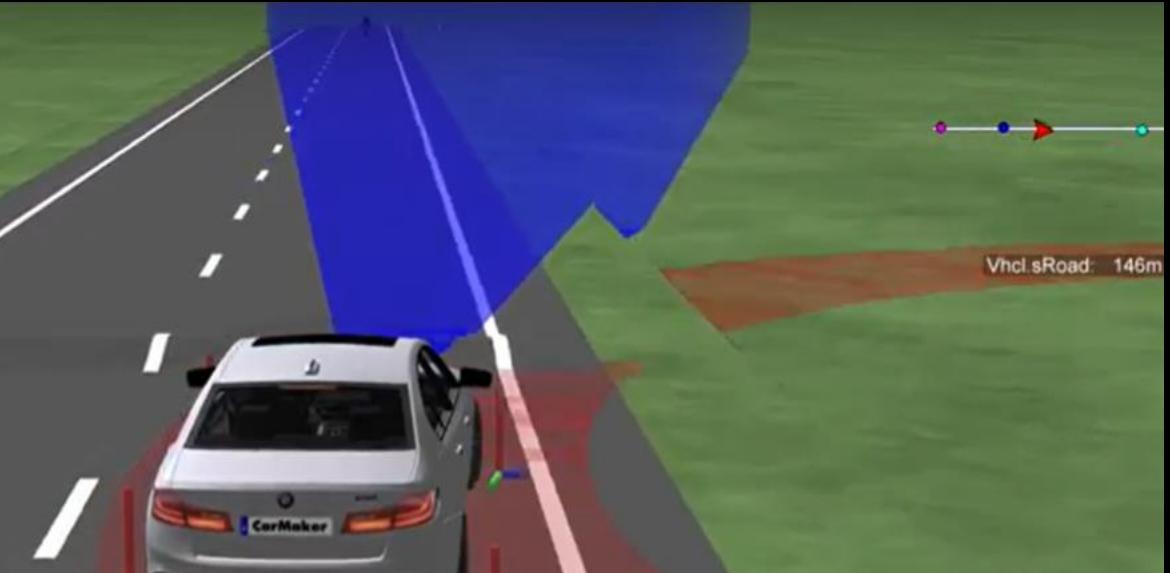
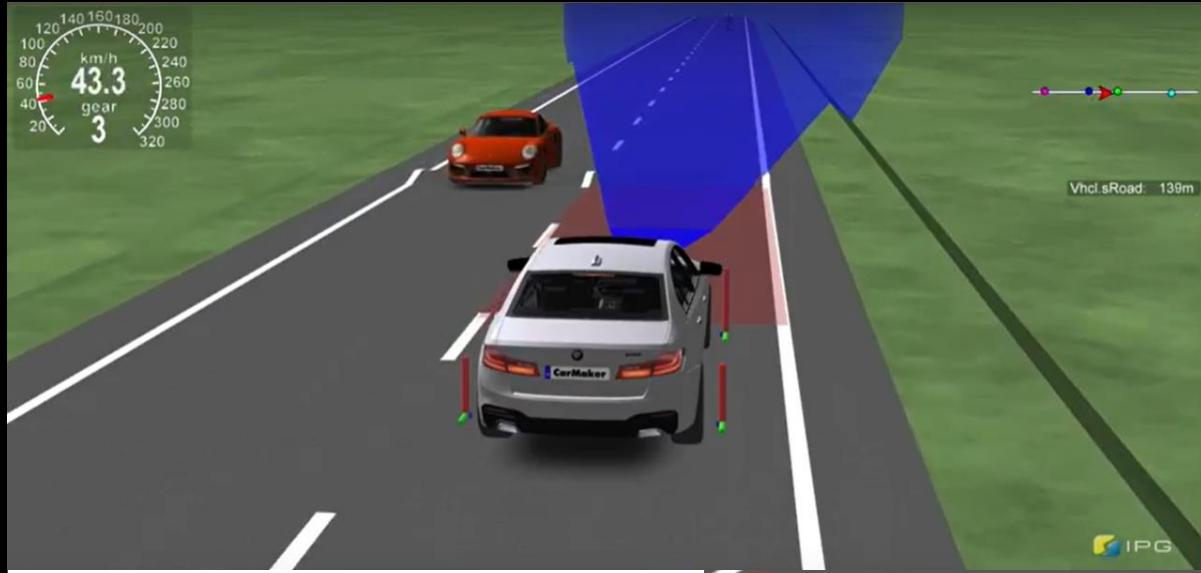




SCENARIO NO. 19

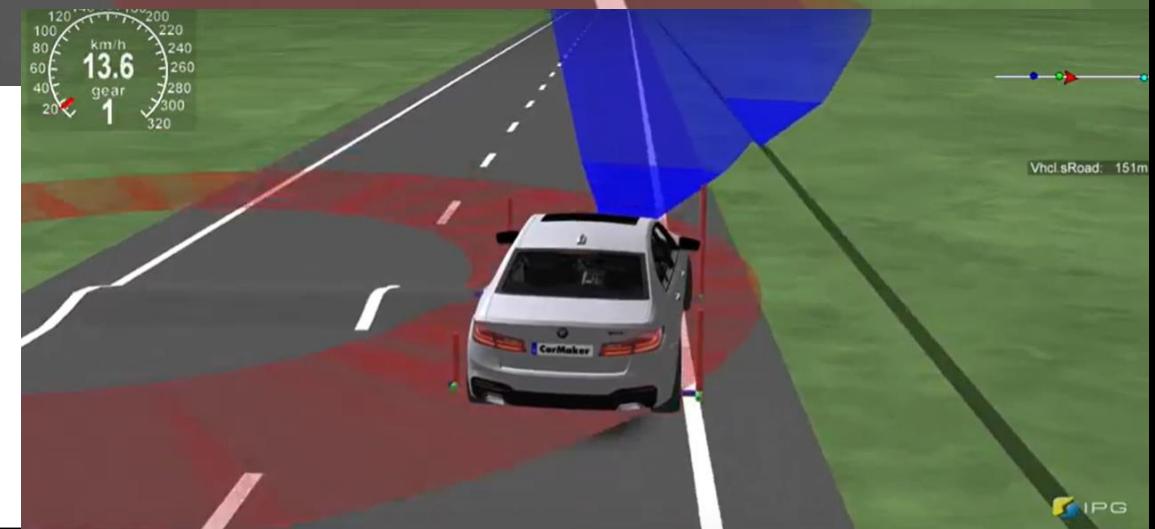
Low chassis height and Bump





The scenario represents the case when the height of the chassis is low and we have a bump/ speed breaker of greater height.

In that situation to make sure that the vehicle's chassis doesn't hit the bump we have to take the vehicle in a different way. First a turn to right and when one wheel passes half then allowing the second one to pass by. This to be understood by the autonomous vehicle is required for Indian Roads.

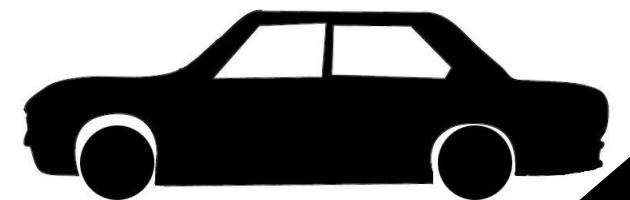


While speed-breakers in India are set to safeguard lives and reduce risks of accidents. But, poor material used, lack of distinctive markings, faulty designs and badly lit roads are to blame for making them more dangerous to users on the road.

Union Minister for Road Transport, Mr. Nitin Gadkari has taken up the matter of building speed-breakers according to stringent laid down norms. Gadkari states that speed-breakers are built randomly with least attention to height, width and without proper markings.

These cause manifold constraints to drivers damaging the vehicle and increasing incidents of accidents.

Data on record with the Ministry of Road Transport reveals that speed-breakers in India cause 30 crashes every day. Yes, every single day, there are 30 accidents in India, just because of the speed breakers. And this is not it. This data does not show how many cars are damaged due to large speed but can be expected in thousands yearly. Also the car with low ground clearance face issue to cross the speed breaker .Solution: Not to go straight to speed break but with an inclined angle so that both front wheel do not cross the speed breaker simultaneously.



THIS STORY IS FROM JANUARY 4, 2021

Speed breakers violate norms, cause accidents, damage vehicles in Chennai

KRISHNA SUDHAKAR / TNN / JAN 4, 2021 / 10:51 IST



AA

ARTICLES



Speed breakers violate norms, cause accidents, damage vehicles



[Home](#) > [Everything Else](#) > India registers highest no of deaths due to speed-breaker related accidents

India registers highest no of deaths due to speed-breaker related accidents



PEARL DANIELS / JUNE 19, 2017

Data on record with the Ministry of Road Transport reveals that [speed-breakers in India](#) cause 30 crashes every day. Yes, every single day, there are 30 accidents in India, just because of the speed breakers. And this is not it.

These accidents also kill people. On an average, 9 people die everyday in India just because of speed breaker related accidents. In 2015, 3,409 deaths were reported due to speed-breakers. This means, deaths due to speed breakers in India, is higher than the total [road related deaths](#) registered in UK and Australia combined!

In Images - Bugatti Veyron rides over a speed bump in Hyderabad

20/12/2011 - 10:08 | Bugatti Veyron | Shrawan Raju

Admit it! You've secretly wished to witness the ultimate showdown featuring the low-riding Bugatti Veyron and an unruly, star-reaching speed bump.



A Super Cars, Exotics and Imports in Hyderabad/Facebook Exclusive

So here we have it, thanks to *Supercars, Exotic*. 16 crore rupees a pop may put up with irritating traffic and the curious motorists driving too close edges them out to take the crown as its biggest negotiator the speed hump!

BUMPY RIDE Rules regarding speed breakers and how illegal speed breakers are dangerous



What the Indian Road Congress specify

- A cautionary board should be placed 40m ahead of the speed breaker

► It should have black and white bands of luminary paint

Violations

- Most speed breakers are 1-2m wide
- Height is more than 10cm
- Placed in every junction and all

Problems

- Causes accidents
- Vehicle parts are damaged
- Roads cannot be swept by machines

interior roads in the city

- Damaged and has potholes around it
- Not painted
- No cautionary boards placed

SCENARIO NO. 21

Fog (Unable to Detect Signs)

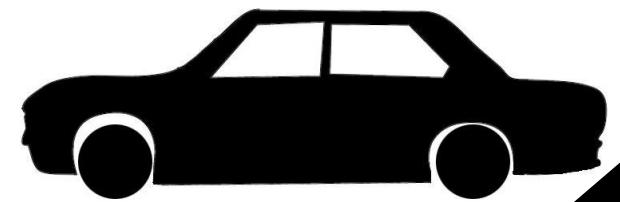
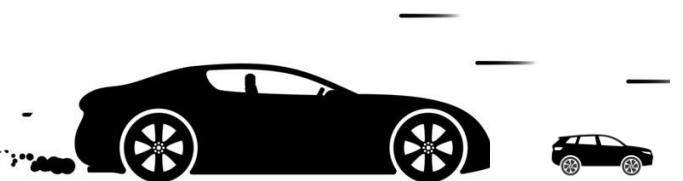
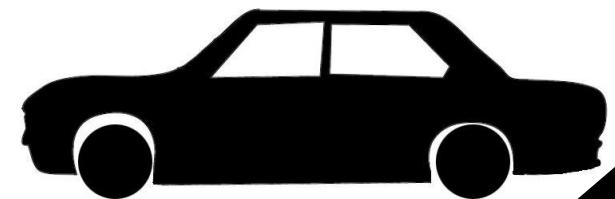
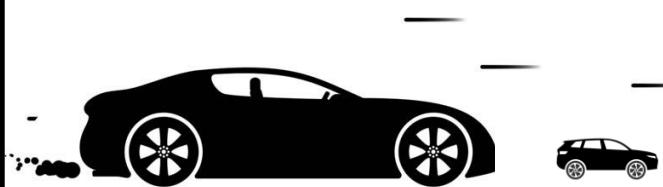
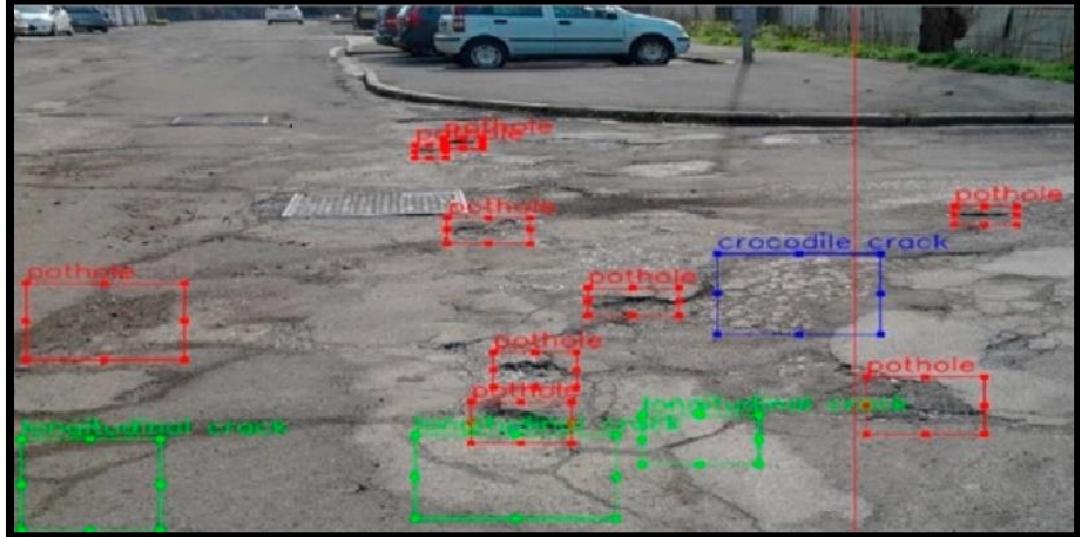


Table 4.8: Road accidents by weather condition – 2018- 2019

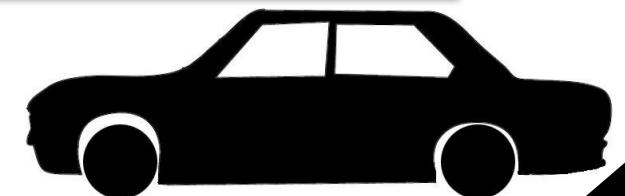
Weather condition	No of accidents			Persons killed			Persons injured		
	2018	2019	%age change	2018	2019	%age change	2018	2019	%age change
Sunny/clear	3,48,137	3,30,295	-5.1	1,04,883	1,03,765	-1.1	3,56,594	3,39,636	-4.8
Share in Total	74.5	73.6		69.3	68.7		76.0	75.2	
Rainy	44,011	39,825	-9.5	14,590	14,240	-2.4	45,010	39,573	-12.1
Share in Total	9.4	8.9		9.6	9.4		9.6	8.8	
Foggy & misty	28,026	33,602	19.9	11,841	13,405	13.2	25,265	30,776	21.8
Share in Total	6.0	7.5		7.8	8.9		5.4	6.8	
Hail/ sleet	4,114	4,043	-1.7	2,123	2,036	-4.1	4,080	3,945	-3.3
Share in Total	0.9	0.9		1.4	1.3		0.9	0.9	
Others	42,756	41,237	-3.6	17,980	17,667	-1.7	38,469	37,431	-2.7
Share in Total	9.2	9.2		11.9	11.7		8.2	8.3	
Total	4,67,044	4,49,002	-3.9	1,51,417	1,51,113	-0.2	4,69,418	4,51,361	-3.8





SCENARIO NO. 22

Multiple Potholes

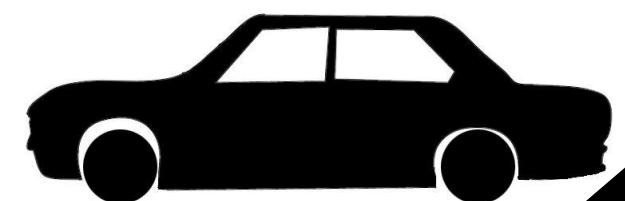


A pothole is a depression in a road surface, usually asphalt pavement, where traffic has removed broken pieces of the pavement.

It was estimated that in the five years prior to 2016 that 16 million drivers in India have suffered damage from potholes to their vehicle including tire punctures, bent wheels, and damaged suspensions with a cost of \$3 billion a year. In India, 3,000 people per year are killed in accidents involving potholes. This situation has engendered citizen movement to address the problem.

Image from
ipg

The scenario describes the situation in which the car have detected that the road has multiple potholes, so either it stops or the vehicle is handed over to manual driver (level 4 or above not possible). Even if the car drives then it would be pretty unpleasant for autonomous driving.





HIGHLIGHTS

- Right in the heart of the tech corridor is a gaping hole. A hole of shame that keeps expanding as we speak, swallowing commuters. And they call it a road
- Man in ICU after negotiating bad stretch

"Quite often, we ourselves have lost balance on this road while riding on our way to work. Despite raising this issue several times with the authorities concerned, no action has been taken. We avoid using the road during rainy weather and at night as there are no proper streetlights. Our vehicles would often get stuck in the mud and hit the potholes, eventually trapping us," said one of the shopkeepers.



It presents a case where the road pavement ends and continues as a unpaved road containing both potholes and gravel. In this scenario, the 3D-LIDAR birds-eye-view shows a roughened surface on transition region of this street (the irregular rings in front the vehicle).

Some jurisdictions offer websites or mobile apps for pothole-reporting. These allow citizens to report potholes and other road hazards, optionally including a photograph and GPS coordinates. It is estimated there are 55 million potholes in India.

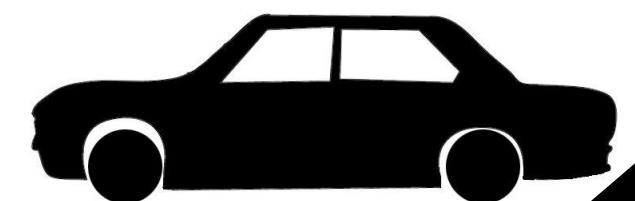


Table 11. Accident distribution by location

	Straight road	T – Junction	Y – Junction	4 - Way intersection	Traffic round about
1996	211	10	30	21	21
1997	198	7	39	26	28
1998	195	7	17	19	15
1999	193	6	23	28	24
2000	183	3	25	20	19
	72%	3%	10%	7%	7%
1997	66%	2%	13%	9%	9%
1998	77%	3%	7%	8%	6%
1999	70%	2%	8%	10%	9%
2000	73%	1%	10%	8%	8%

The Ministry of Roads Transport and Highways (MoRTH) of India has conducted numerous surveys that highlight the concerns associated with blind spots. There are over 700 blind spots identified in India.

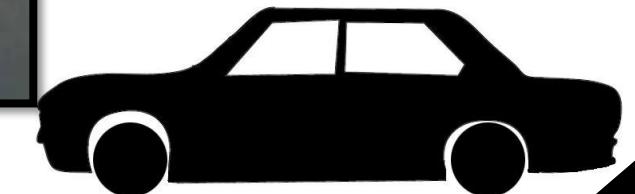
India has the dubious distinction of witnessing around 5 lakh road accidents and 1.5 lakh deaths from them every year.



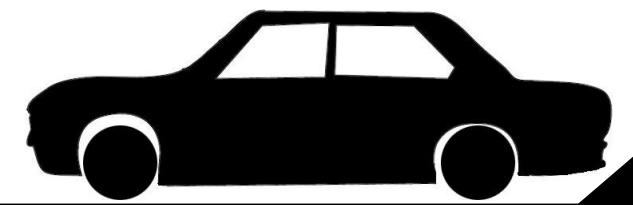


SCENARIO NO. 23

No lane Marking



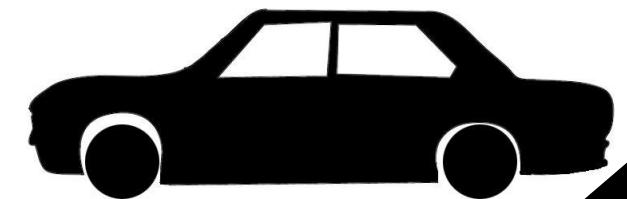
Explanation of the scenario using IPG CM video





The technology of lane keep assist and lane departure work on lane marking.

Nearly 95% of road markings and mandatory signages in the city are not up to the mark, contributing to the rise in traffic rule violations, at times inadvertently, leading to accidents. Faulty traffic signals and timers too lead to thousands of violations without motorists being at fault. This was revealed by a study carried out by volunteers of Janakrosh, a city-based NGO



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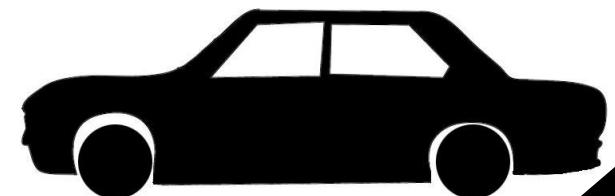
NAGPUR NEWS

/ 95% Of Road Signages Missing In City: Study

⌚ THIS STORY IS FROM FEBRUARY 20, 2019

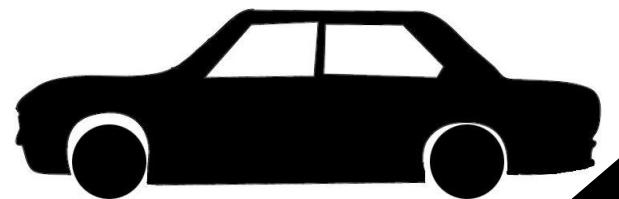
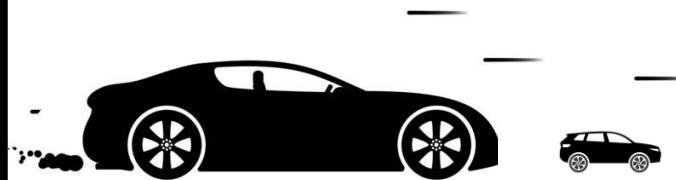
95% of road signages missing in city: Study

Proshun Chakraborty / TNN / Feb 20, 2019, 02:29 IST



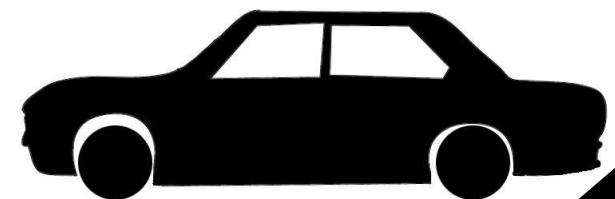
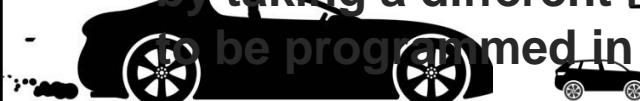
SCENARIO NO. 24

Diversion in Traffic



Being Indian we have a general ideology of beating the traffic in most of the cases. The scenario represents a situation in which the vehicle is stuck in a traffic and then it decides to take a different route in order to beat the traffic.

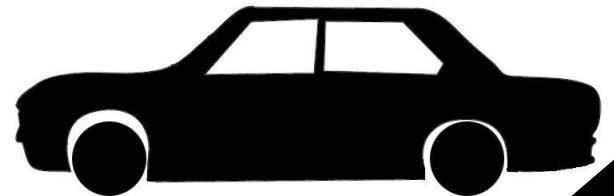
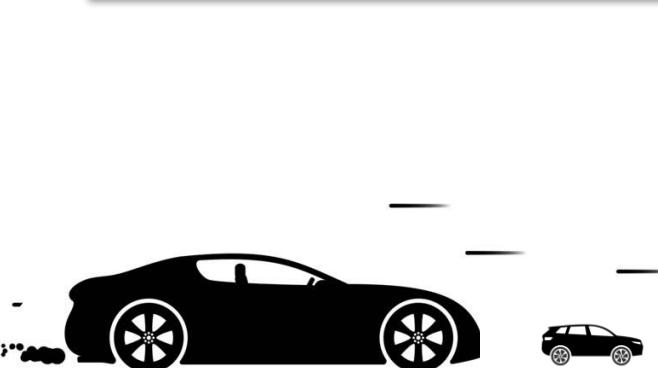
- The big cities in India are very much prone to such type of situation namely New Delhi, Chennai and Mumbai.
- The situation is so worse that when the vehicle is stuck in traffic sometimes it takes more than 8 hours to get out of it.
- Manually driven cars may think of beating the traffic by taking a different route but autonomous car have to be programmed in that way.





SCENARIO NO. 25

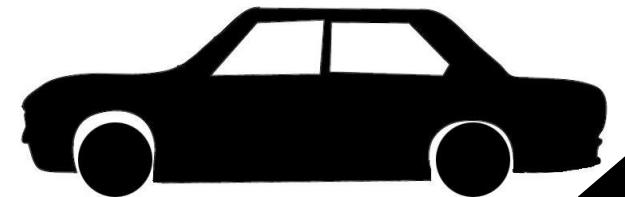
School Zone



Schools are the integral part of Indian Education system and pretty much found everywhere, in every city in every road, in every alley be it small or big. Handling the vehicle in such situation is very critical job.

The scenario represents the situation of a school nearby road and there is no sign board regarding that which generally happens in India. Also the students here are pretty much unorthodox relative to other countries.

Since to avoid accidents in such a case either the vehicle should stop and hand over it to the driver or move with extremely slow speeds.



The National Crime Records Bureau's (NCRB) report on Accidental Deaths and Suicides in India for the year 2016 reported 11,812 deaths in India due to road crashes near educational institutions.

One of the reasons attributed for the high fatalities in this age group is their lack of experience; they are prone to bad judgments i.e. risk-taking, thus getting involved in road traffic crashes.

The school management was contacted and short interviews were conducted to understand the road safety challenges faced by the school in Chennai from 8 school in different locality

Results:



And what did we find?



Footpath Infrastructure

- Only two out of eight schools had suitable walking spaces;
- They are encroached and damaged.



Pedestrian Crossing

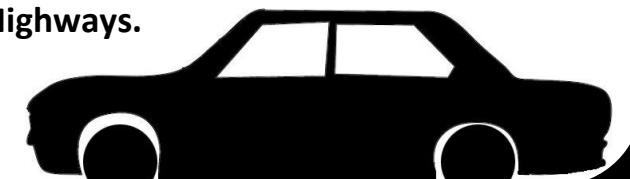
- Only one out of eight schools had a clearly marked zebra crossing;
- Lack of periodic restoration made the markings obscure in few schools.



Road Signs

- Only two out of eight schools had a road sign indicating school;
- Road signs are increasingly used to display ads that distract drivers.

Globally, schools fall under the vulnerable road user zone and according to statistics, road traffic injuries account for 37-38 per cent of deaths among 0-14-year-old category and 62-64 per cent among children in the age group of 14-18. In India, there has been a consistent increase in the fatalities of school children below the age of 18 -- 6.4 per cent in 2017, 6.6 per cent in 2018 and 7.4 per cent in 2019 -- as per official statistics of the Ministry of Road Transport and Highways.



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Business News > News > India > Road safety: Experts, corporates begin trials for 'Safe School Zones' in 5 cities

Road safety: Experts, corporates begin trials for 'Safe School Zones' in 5 cities

PTI

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Synopsis

A Safe School Zone includes designated roadways located near a school where additional care is needed due to an increase in school-related pedestrian and vehicular traffic. The zone extends up to 300 feet from the border of the school property or at least 300 feet from a school crossing.



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The unsafe roads near schools

Sat, 15/02/2020 - 08:52

Author: Harish Baskar, Researcher, CAG

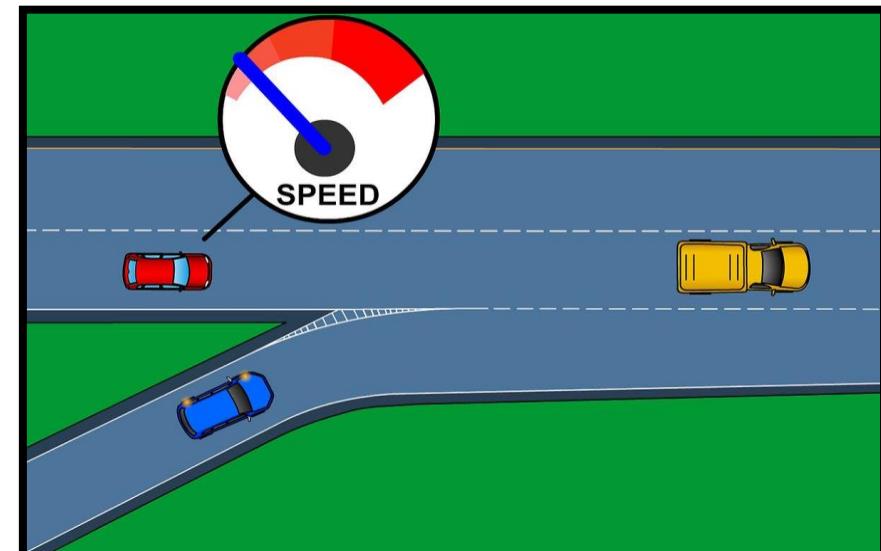
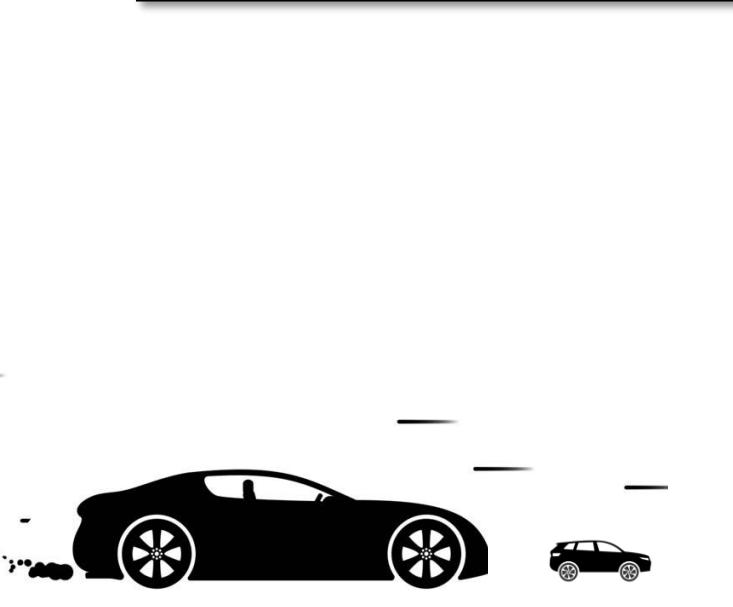
the footpath is an illustration of the perilous situation pedestrians experience every single day on India's roads. Pedestrian areas are gradually being taken over by vehicles. Also increased motorisation has led to a surge in road traffic crashes. The data provided by the Ministry of Road Transport and Highways is alarming. As per the Ministry's recently released, [Road Accidents in India 2018](#) report, 1,51,417 persons were killed in 2018 on Indian roads. This amounts to 415 deaths every single day. Vulnerable road users (two-wheelers, non-motorised vehicles, and pedestrians) constitute 53.9% of these fatalities of which pedestrians and cyclists account for 15% and 2.4% of deaths respectively. There is no data available on

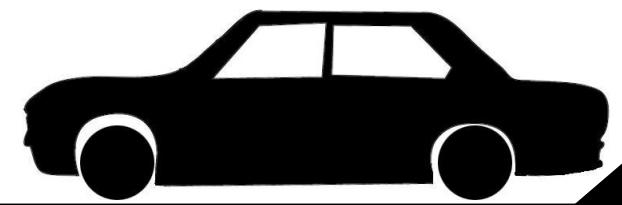
Unsafe Indian Roads for Schools

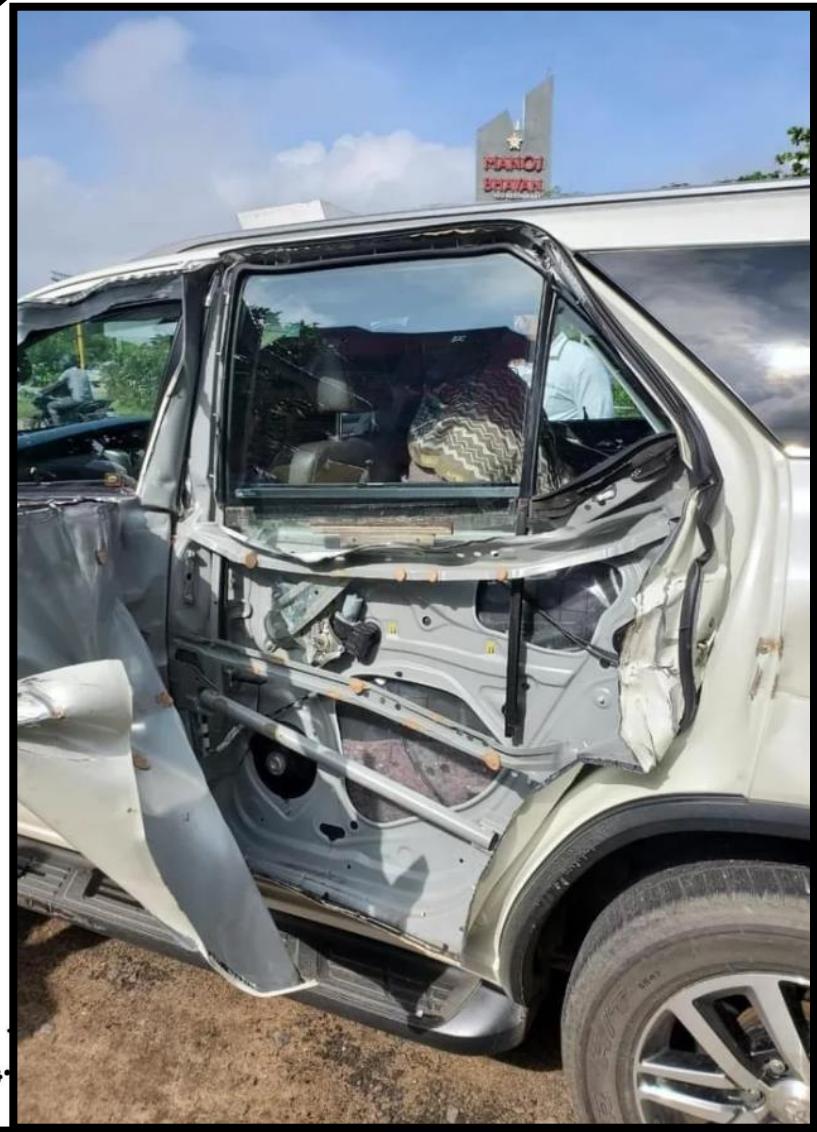


SCENARIO NO. 26

Highway Entry and Exit







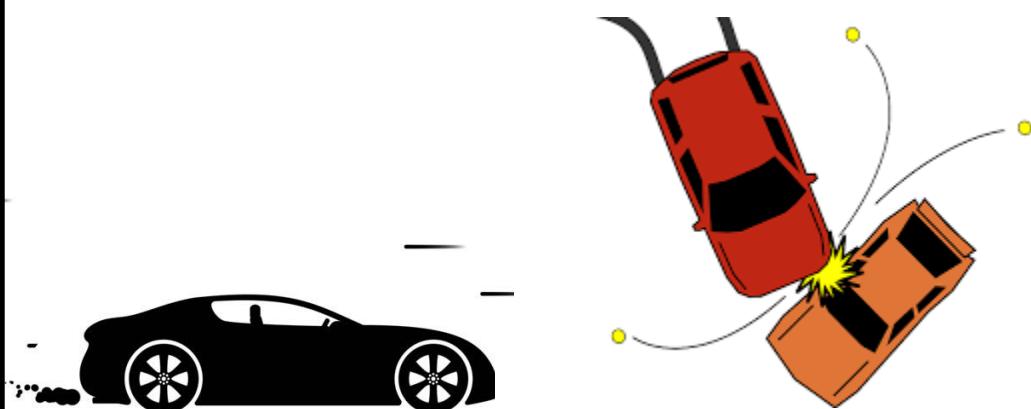
SCENARIO NO. 27

T- Bone Collision





A T-bone accident occurs when the front of one vehicle strikes the side of another, forming the shape of a "T" at the point of impact. They can happen at intersections when one driver disregards a stop sign or red light and drives through the intersection at the same time another vehicle traverses the intersection.



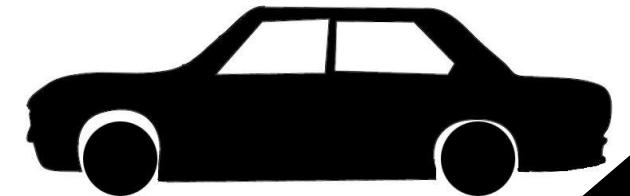
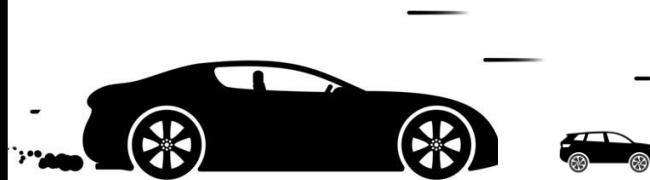
Even in country like USA where traffic rules are strictly followed, side-impact collisions on the road accounted for 22% of all deaths that occurred due to traffic collisions in the United States. In India, The problem is further aggravated because most vehicles do not have side-impact airbags. Side-impact airbags can absorb some of the force and reduce the chances of serious injuries. They will also reduce the chances of ejection from the vehicle. Side-impact airbags are made mandatory by some countries to increase occupant safety.



Tanker Rams Into A Toyota Fortuner From The Side – Impressive Safety!

By [Tarun Kochar](#)

Here is a recent accident that recently happened in Tamil Nadu. BJP MP Khushbu Sundar was travelling in her Toyota Fortuner on a highway when it was hit by a tanker from the side. The speed of the tanker was higher than what it should be and the driver could not apply the brakes in time.



In a typical front-end collision, the motorist has several feet of metal, engine parts and glass to absorb and disperse the impact. However, in a side impact collision, only several inches separate the driver's body from the point of impact, meaning there is less opportunity for the vehicle to absorb the energy of the crash. The side impact crash has the highest potential to cause life threatening injuries because these accidents typically occur on the driver or passenger side door and involve some sort of physical encroachment or intrusion into the passenger compartment of the vehicle.



These factors make serious and life threatening injuries more commonplace in side-impact wrecks. Most fatalities from a side-impact crash are due to serious injuries to the brain or head. Not only can this occur from the strength of the impact alone, but also from the difference in size and height of the two vehicles involved in the crash. For example, the height differential between a sport utility vehicle (SUV) and a sports car is markedly different. In a side impact crash, the bumper of the SUV may actually be at the same height as the head of the motorist in the other vehicle. In such a scenario, there is little to protect the head and brain from a potential traumatic and fatal injury.

It has been estimated that 25 percent of all car crashes involve a side impact collision. Of those collisions, roughly 27 percent involved passenger vehicle occupant deaths. Not surprisingly, automakers began in earnest to develop side impact air bags (SABs) in the late 1980s and early 1990s. The Insurance Institute for Highway Safety released a study in January of 2011 that showed vehicles equipped with side-impact air bags greatly reduced the risk of motorist death. INSERT <http://www.iihs.org/news/rss/pr011911.html> Further, SABs—which include head protection—can decrease fatalities by as much as 45 percent.

Side impact crashes typically occur as the result of the failure to yield or obey a traffic control device. There are several scenarios that are common in the failure to yield category. Typically, side impact crashes occur as the

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Message

SUBMIT

PRACTICE AREA

Auto Collision
Front Impact Car Accidents
Hit and Run Car Accidents
COLLISIONS.

Key Words: IIHS, Euro NCAP, BNVSAP, SI beam, BIW, RSM model, UTS results, FEA, MSC PATRAN, NASTRAN, OPS, and LWA.

1. INTRODUCTION

A side effect collision takes place when a vehicle is hit on its side at an approximately ninety-degree angle. Another term for those injuries is "T-bone" injuries. Among the potential reasons for a side impact accident are distracted driving, drunk driving, and failure to yield. For example, a driver who fails to follow the road rules related to the right of way at a four-way stop sign may enter the intersection almost at the same time as the car to its right and crash into that car.

Driver and passengers involved in side impact collisions mostly get severely injured as compared to another type of collisions. The reason behind this is the availability of very low survival space. Due to the fewer space available, the occupant affected by severe injuries such as head injuries

suive side impact collisions to have more severe injuries than frontal impacts. To prevent disabling injuries to be reduced the neck and legs need better protection; as regards life-threatening injuries, chest injuries become up to four times more frequent with advancing age. Injuries were twice as common on the struck side as on the opposite side. [1]

When fatalities alone are considered, multiple body regions are frequently injured as head (64%), chest (85%) and abdomen (26%) predominated injuries in the struck side occupant. On the opposite side, the head was most frequently injured (85%) followed by the chest (73%) and abdomen (49%). In both positions, in this series, the occupants had more neck injuries than in the non-fatal series. Dalmatia found that, with regard to occupants restrained by seat belts, there was more injury to the shoulder, chest, pelvis, and legs among impact-side occupants, whereas there was more injury to the neck, abdomen and arms in far-side occupants. [1]

T Bone Traffic Collisions - The Worst Kind

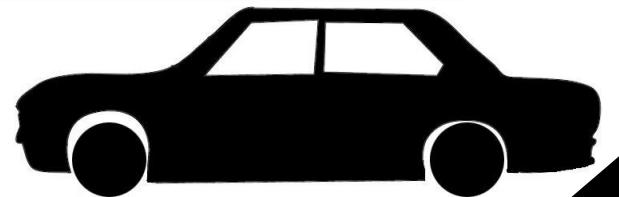
Sponsored Content Jul 10, 2021 Updated Jul 12, 2021 0

Side-impact collisions on the road accounted for 22% of all deaths that occurred due to traffic collisions in the United States. They are the deadliest kind of accidents because the impact occurs from the side. T bone car accident injuries can be life-altering because they can cause permanent physical disabilities and leave you bedridden.

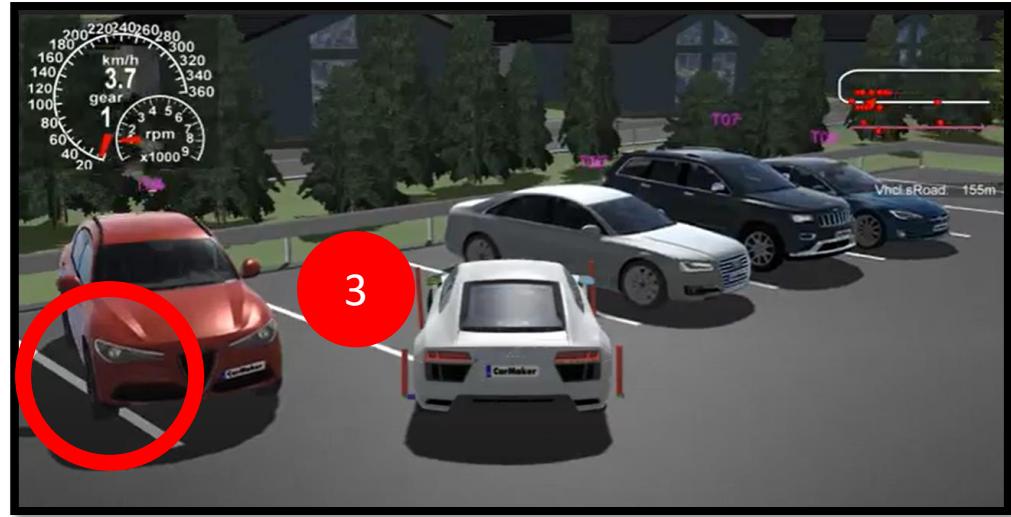
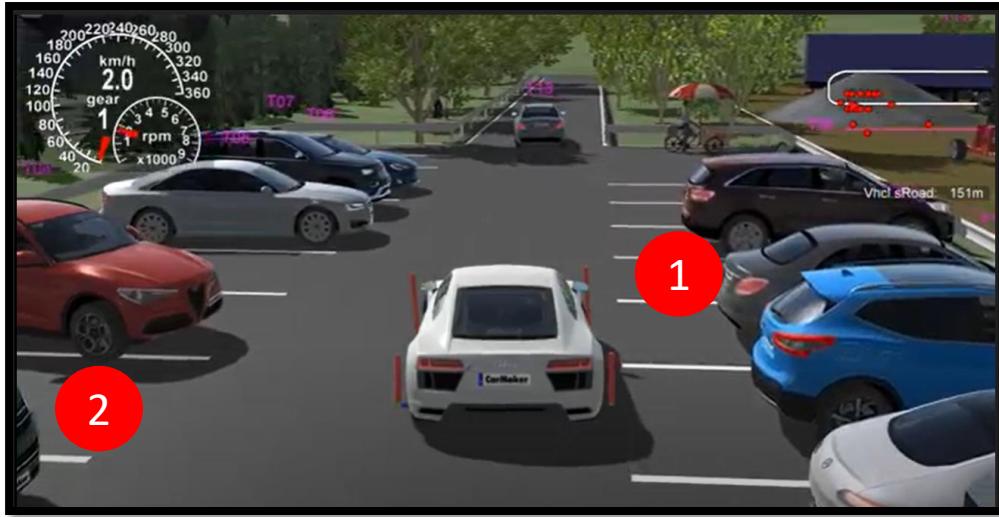


SCENARIO NO. 28

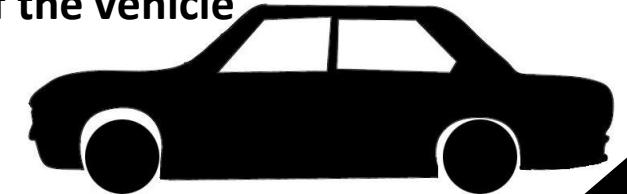
Parking In and Parking Out



Parking In



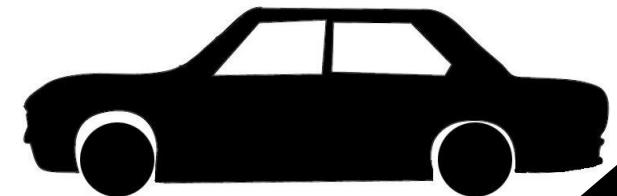
- The major problem in India while parking the vehicle, especially arrives when the vehicle is not parked on the center of the two marked lines.
- The host vehicle has 3 spots, 1 spot has less space (in right @image 1), 2 spot is just rejected because the red car (@ image 2) have parked over marking line so is unable to detect (right of red car @image 1).
- Finally it decides to park on spot 3 (left of red car @image 2)
- Had it been a manual driven it would have adjusted to the case even if the red car has parked over the marking lines. Building that sort of intelligence in the autonomous car is very important if the vehicle has to be successful in Indian Road condition.



Parking Out



- Another major problem in Indian Parking condition is the amount of space available which is depicted here.
- The host vehicle (in white) has to be taken out from the parking arena.
- The space available between the car and the car behind it (in red) is very small.
- The collision in these kind of scenario is very common.
- Taking out the vehicle along with avoiding collision in such kind of scenario will be a very difficult job for an autonomous car



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Business News - industry: Two Indian cities New Delhi, Bangalore have most parking woes in the world: Survey

Two Indian cities New Delhi, Bangalore have most parking woes in the world: Survey

ET Bureau • Last Updated: Sep 30, 2011, 02:15 AM IST

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Synopsis
The first parking survey by IBM found that drivers in 20 international cities face a daily struggle in finding a parking space.

Horn OK Please. And no arguments about this either. Drivers in Bangalore and Delhi argue most over parking spaces in the world, says a new survey. The two Indian cities are closely followed in raising decibels by those in Nairobi.

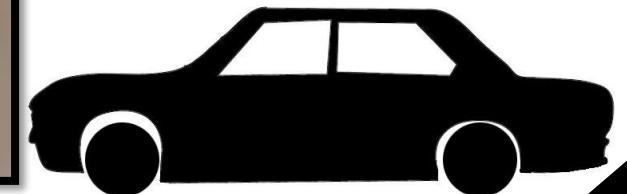


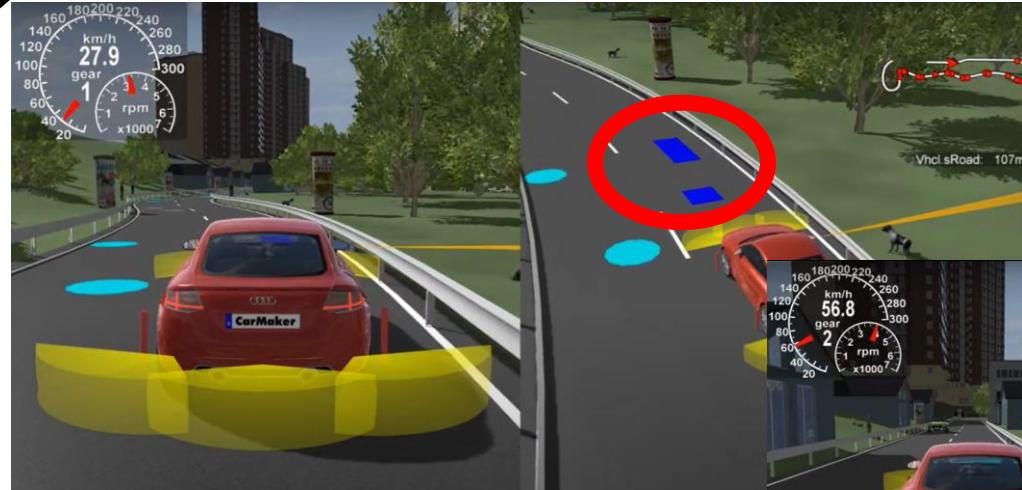
Scenes of
Delhi
Parking



SCENARIO NO. 30

Water Log





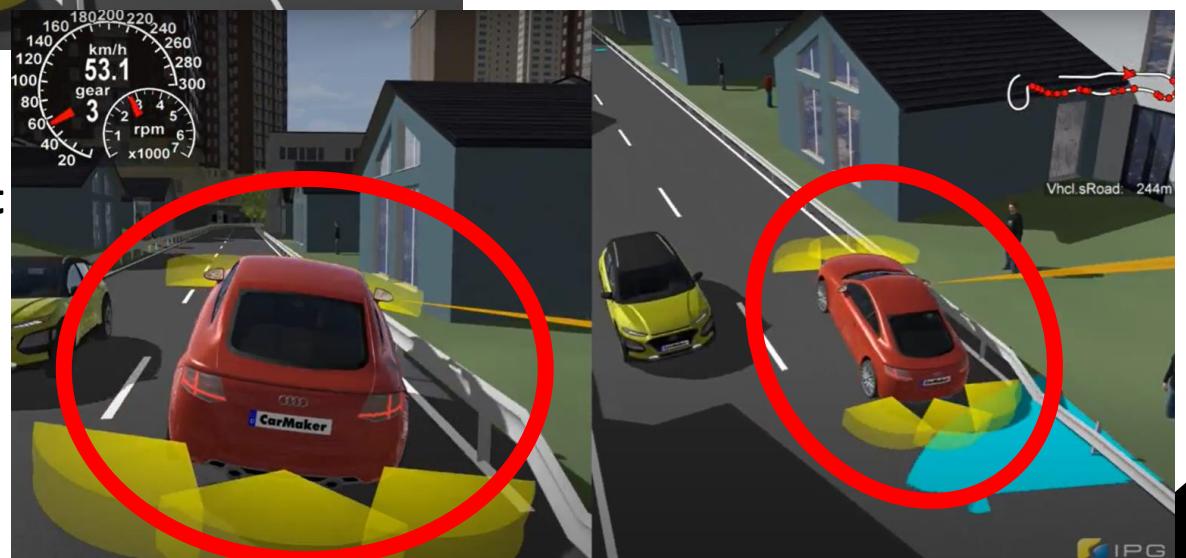
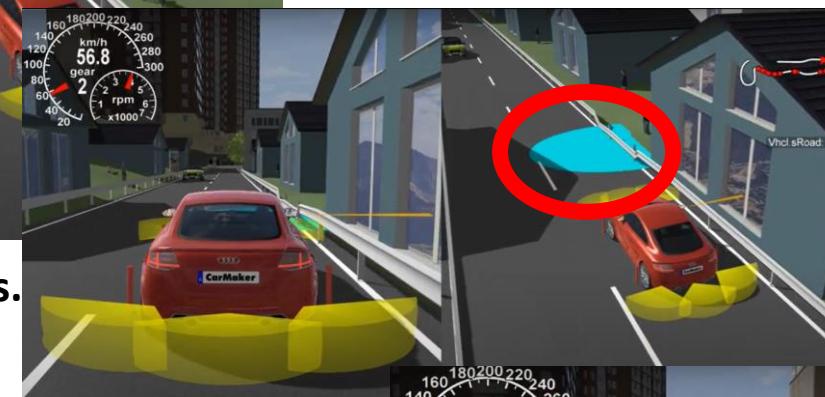
This scenario represents the situation when the vehicle is not able to detect the depth of the pothole.

The vehicle in such cases may suddenly get stuck or if decides to move fast can lead to complete disbalancing.

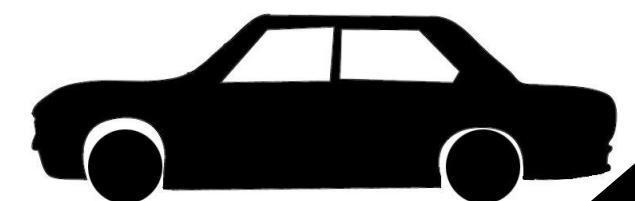
A similar thing is explained through images.

In both the cases, of a dark blue pothole (less deep) and Light blue pothole (more deep).

In first case when the vehicle is not able to detect the height of the hole because it is filled with water, it does not cause much damage, but in second case the car loses complete contact of the road when it comes out.



- Water logging is common issue on Indian roads every rainfall.
- The water log increase the accidents on roads have potholes and bumps.
- Its not possible to detect potholes in waterlog road even with naked eye.
- Some holes are also got even large enough that it swallow whole cars.
- Driving on Indian road due rainfall witness more than 39825 accident according ministry of road in 2019.





This Article is From Jun 13, 2021

Video: Car Swallowed By Sinkhole At Mumbai Parking Lot After Rain

A video of the bizarre incident in Mumbai's Ghatkopar shows the whole car disappearing into the well within seconds.

Mumbai | Reported by Sunil Kumar Singh, Edited by Saikat Kumar Bose | Updated: June 13, 2021 7:14 pm IST

TRENDING

Days After Viral Abuse Video, BharatPe Founder Goes On Long Leave

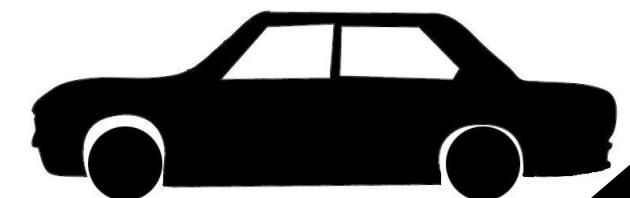
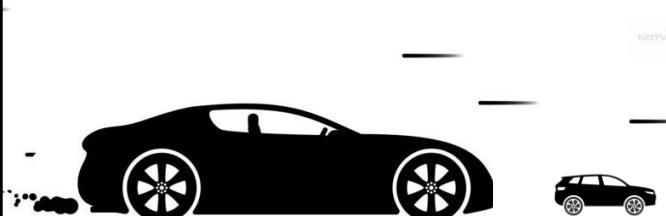
1st ODI Highlights: South Africa Beat India By 31 Runs, Take 1-0 Lead

Not Getting Many Offers, Tired Of Being Home: CID Star Shivaji Satam

Beauty Kiara Advani's Natural Beauty



The other vehicles parked near the car, including one right next to it, were not affected.



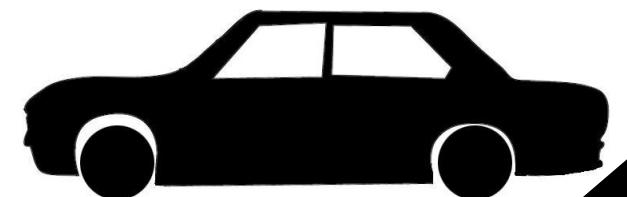


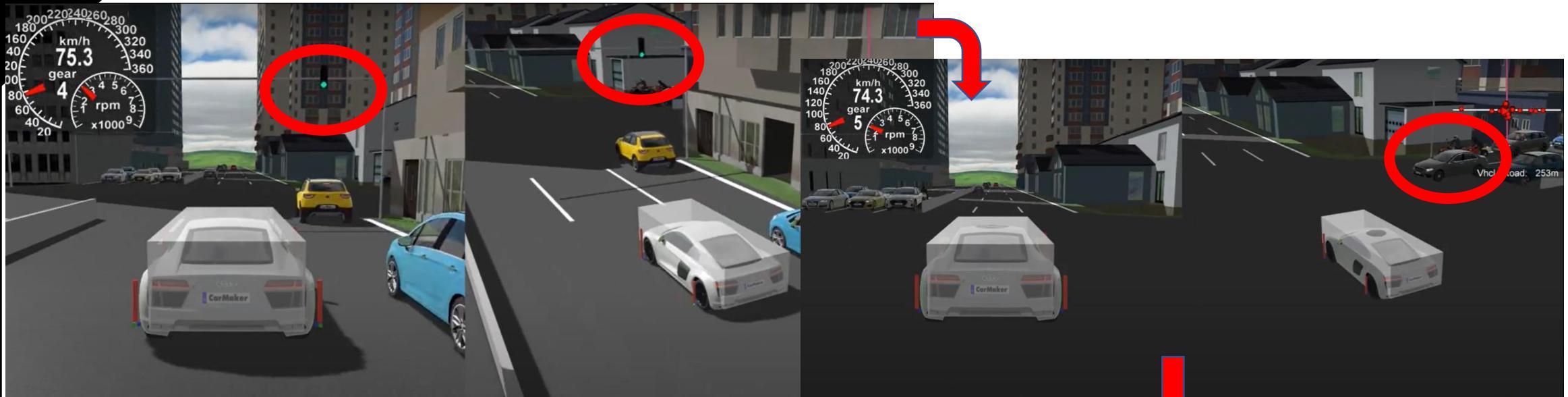
SCENARIO NO. 31

Red Light Jump



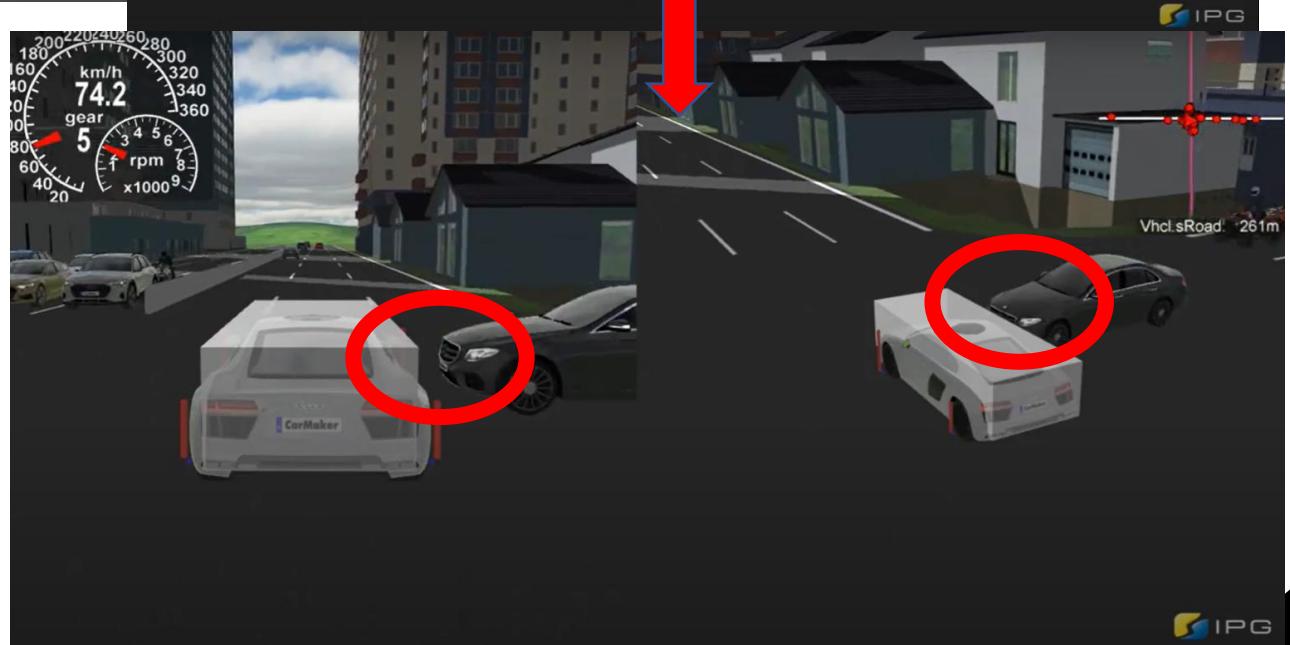
- Signals are not something which are meant to be followed.
- Indians take a whole lot of pride violating the traffic rules.
- Out of which Red Light Jump is pretty common.
- As clear by the definition that the vehicles jump even if the red light is shown which makes the host (autonomous) vehicle to make sure it adjusts the situation and takes decision accordingly.
- There is one more case in the scenario, that is of useless signals.
- India have hundredths of useless signals in the alleys which have been declared “Not to follow” but still the autonomous vehicle will tend to follow the rules and won’t cross that.





The host vehicle detects the green light and moves further. It is as expected on a 4 way junction that there would be a red light on Right to Left Direction.

A car (in black) jumps off the red light and the host vehicle will be unaware of it and could cause a possible collision.



Four arm junction are most suspectable place where the jumping red light can cause accidents. As per ministry data in 2019 along , over 23490 four arm junction accident reports out of which 6769 people killed. Indian have tendency to jump the red light due to various reason:

- 1. Lack of awareness**
- 2. Some are always in hurry**
- 3. No automatic challan creation facility on rules break, promote people**

The most vulnerable person of accident is not only who jump the red light but also the people with it collides.

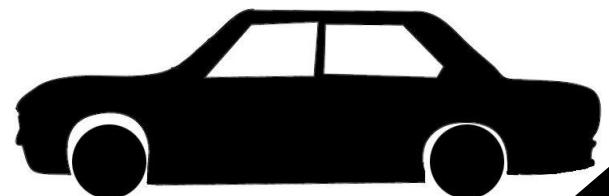
Home / Fact Check

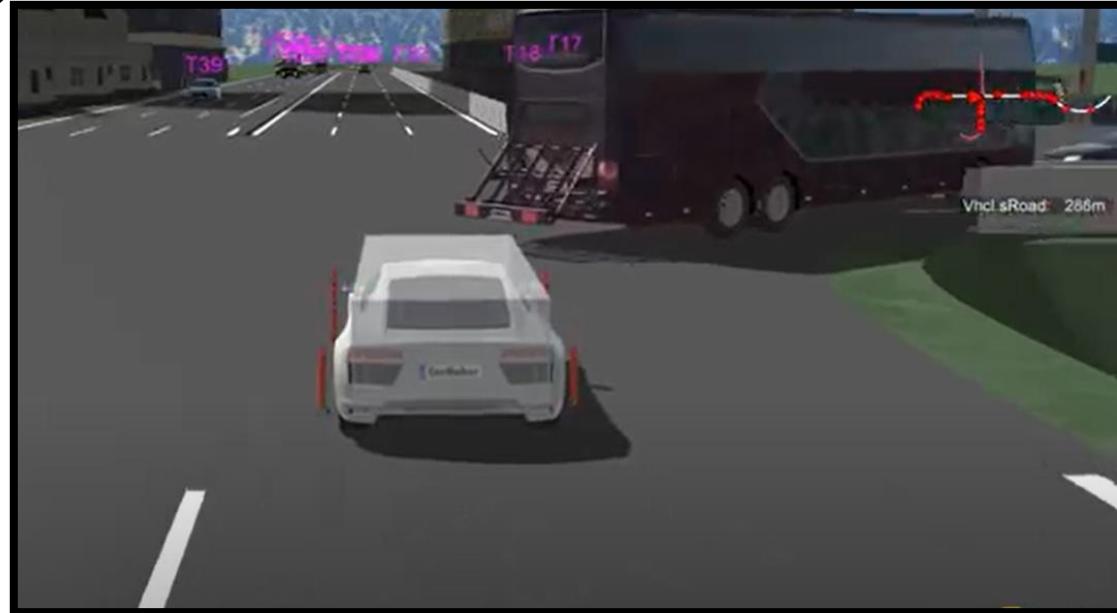
Traffic Violations Caused 323 Deaths Every Day In 2017, Yet Fines Alone Not A Solution

By Factchecker Team | 24 Sep 2019 6:00 AM



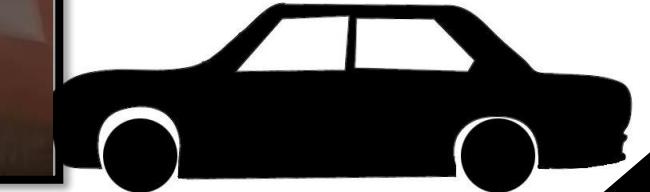
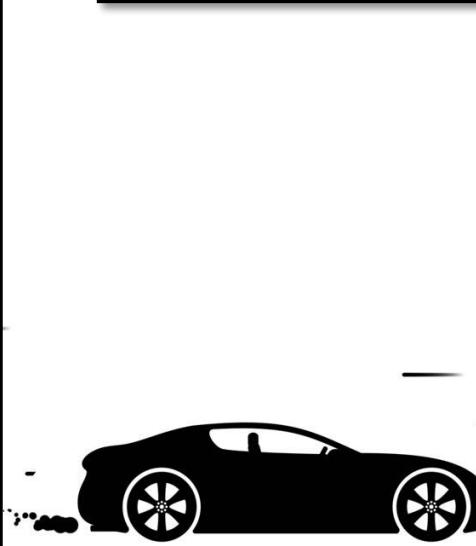
Mumbai: Violation of traffic rules such as over-speeding, driving on the wrong side, drink driving, use of mobile phones and jumping a red light caused 80% (117,914) of all road accident deaths (147,913) in 2017, or 323 deaths every day, according to the transport ministry's [Road Accidents In India-2017](#) data, the latest available.





SCENARIO NO. 32

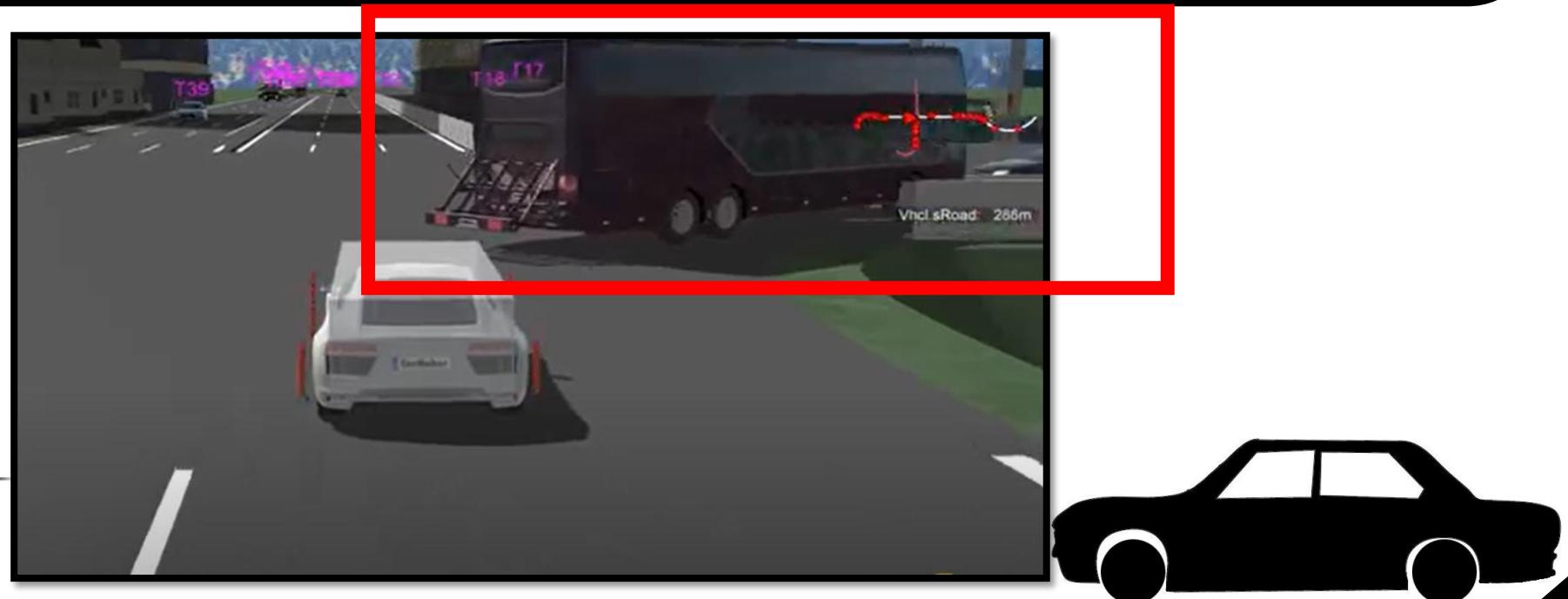
Blind Spot



This scenario depicts the situation where two vehicles met with an accident due to sudden occurrence of a blind spot which was a bus in this particular case.

The vehicle was travelling on a four way intersection and the bus which was ahead of that vehicle took a right turn while simultaneously another vehicle was approaching from the same direction.

Due to the great size of the bus, that approaching vehicle couldn't be noticed and collided with another one.

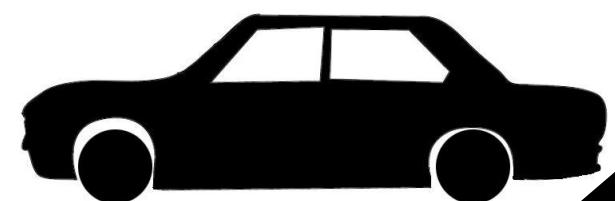


In many cases, these crashes involve large trucks. Truck drivers have a challenging time managing their blind spots because of the sheer size of their vehicle. A truck's blind spot, also called the "No Zone," is one of the commonest causes of blind spot accidents. But it's not just big rigs—any auto vehicle is susceptible to these types of accidents if the driver isn't careful or merely unlucky.



Blind spot accidents occur when one or multiple drivers changes direction while driving, fails to notice another vehicle in their blind spot, and collides with the other vehicle on the road. Car accidents like this often occur when changing lanes.

As I explained in the introduction, truck drivers have to be extremely mindful of their blindspots. After all, the greater the size of the truck, the bigger the blind spots. Indeed, truckers have to be very careful when changing lanes to not sideswipe or cut off another vehicle in a blind spot accident.



AN ANALYSIS ON THE OCCURRENCES OF BLIND SPOTS AND ASSOCIATED DANGERS

According to the Ministry of Road Transport and Highways of India, a death occurs every four minutes due to road accidents. A lethal combination of errors in our roadway system is responsible for this unfortunate scenario.

Apart from the obvious causes like over speeding, drunken driving, potholes etc., there is a more subtle evil of blind spots. Blind spots are areas on a road that are obstructed from the visual range of a driver. Most of the unfortunate accidents occur because of these blind spots. So, having a good health insurance takes care of accident related expenses.

The Ministry of Roads Transport and Highways (MoRTH) of India has conducted numerous surveys that highlight the concerns associated with blind spots. There are over 700 blind spots identified in India.

• State-wise Blind Spot Analysis

Statistics by MoRTH show that Tamil Nadu has the most number of blind spots in the country, followed by Uttar Pradesh, Karnataka and Telangana. This coincides with the fact that south Indian states have higher mortality rates due to mishaps on the road.

States	Number Of Blind Spots
Tamil Nadu	100
Uttar Pradesh	99
Karnataka	86
Telangana	71
Rajasthan	58
Maharashtra	34
Haryana	33
West Bengal	31
Kerala	29
Chhattisgarh	29

