Road Accident Prediction and Prevention for Ghat Area in Nashik City

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ABSTRACT

There has been rapid increase in urbanization which has led to better life style of people. But these advancements has created burden on roads due to increase in vehicle ownerships due to which problems related to traffic have escalated to an alarming rate. The major issue with their occurrence, analyses their dependency on those causes and this increase is the increase in road fatalities which causes individual losses and economical losses, Hence, there is a basic requirement for assessing these accidents through identification of the various causes that are responsible for also to recommend various remedial measures to alleviate losses due to these accidents

Research in this paper includes important issues like road accident and their impacts, causes of this accident, effect of accident, prevention and control that we can improve this situation. Also it is not safe now days to cross the ghat while having any long journey. Percentage of accident in ghat area is increasing day by day. Severity of this accident is non-reparable. Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year. So it is first important to control this scenario and have some safety measures in ghat area. This paper includes some solutions and ideas to improve safety in ghat areas in Nashik city.

KEYWORDS: Road safety, Road accident, Ghat section, etc

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INTRODUCTION

Nashik, a city situated in the northern part of Maharashtra .The District has great mythological background. It has been declared one of the fastest developing city of India. Due to this many people are migrating towards Nashik. This ultimately affects the population density of the city. People are in search of better life style and hence increase the population of the city. The roads were constructed for lesser population, which has now be- come an issue. This leads to congestion in traffic, especially during the peak hours. In this project we shall select few major spot for traffic study survey. This will fetch us with the data of traffic at each spot.

The list of traffic collision records serious road crashes. Road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people. It enables increased access to jobs, economic markets, education, recreation and health care, which is turn have direct and indirect positive impacts on the health of population.

This project includes some solutions and ideas to improve safety in road accident. Specially in Ghat Aras Using IR Sensor, people will get the signal that another vehicle is coming from opposite side and thus by reducing the speed of vehicle, accidents will be minimized to great extent

A. Road Network In Nashik City

Nashik is actually a main road connection of main state highways, Nashik is also connected to Surat, Mumbai, and Aurangabad, Pune, Dhule, Ahmednagar and all other important cities of India. In the last, some years it has been developing large road infrastructure. A privately constructed expressway is going to complete between Nasik and Mumbai. The NH-3, national

highway is being changed intomulti-lane highway and this multi-

lane street has about six flyovers that will go through city of Nashik. The flyovers will begin from main garvare point and willreach at temple of Hanuman at Panchvati. One of the flyovers of them is around 6800 meter long and the flyover will begin from city Mumbai Naka and will reach at temple of Hanuman. Larsen. and tourbo company is constructing this important project that costing thousands of corers.

Nashik is on the intersection of two national highways the Mumbai-Agra highway NH- 3 and Nashik-Pune highway NH-50. Apart from these, other major cities like Aurangabad (200 km) are connected via state highway which is also four lane highway. Nashik is easily accessible by road from Gujarat state in Western India. There are other numerous state highways which offer very good road connectivity to Nashik. Nashik is well connected to Mumbai (190 km)through Mumbai-Nashik Expressway which is a part of Mumbai-Agra highway (NH-3) connect Dhule and Indore to the city on the other side of the highway. Pune (200 km) is connected through NH-50 which is to be upgradedinto four lane road soon. City offers best an modern road infrastructure. Nashik is on the central railway network. Manmad railway junction within district is about 95 km from Nashik.

B. Accidents According to the Types of Roads:-

Types of the roads are mainly concerned with the traffic volume and types of users. It was observed that the maximum intensity of accidents occurs on other roads (OR) (which includes district roads, village road and city road) as compare to state highway (SH) and national highway (NH). Accidents on ORs are much greater than SH and NH in year 2014 which is about 1393 as depicted in Fig. 7. Statistical

analysis shows that the accidents on OR are averagely 74 %. Averagely, 1166 accidents are observed on OR and 99 accidents are observed on the NHs. The accidents seem to

be more on the ORs as they constitute of the major part of the road network in Nashik region. Moreover, the number

of intersections, were found to be more on ORs as

compared to the SH and NHs. Pavement conditions are also of poor quality as compared to SH and NH. On the other

hand, accidents on the SH and NHs are less because of no more intersection are allowed in NH and SH, only one direction and straight traffic flow are moved on these ways

Table 1: Accidental data According to type of road for years 2009 to 2018

Sr. No	Type of Road	2011	2012	2013	2014	2015	2016	2017	2018
1	National Highways	333	461	486	290	468	372	358	392
2	State Highways	73	86	75	88	110	94	76	87
3	Other Road	1130	1180	646	1393	1283	1082	930	876
	TOTAL	1536	1727	1207	1771	1861	1548	1364	1355

C. Accidents at various Locations :-

In the location wise accident analysis, it is identified that about 30% accidents occurred in open areawhich is about 2880 comprising for last ten years. Further, accidents were found more near to the school and colleges that is about 14%. A residential area and market area accident compromises about12 % and 8 % which is mostly seen on peak hours. One of the reasons is due to crossing pedestrianson the road, and more number of vehicular traffic at such locations. Fig.8 shows the results of the average share of accidents at different locations.

## Table 2: Accidental data According to Location for years 2012 to 2018

LOCATION	2012	2013	2014	2015	2016	2017	2018
Near school or college	230	176	121	107	51	43	30
At pedestrian crossing	31	48	21	44	22	27	21
In Market Area	89	70	63	74	76	66	55
Near office complex	59	42	30	67	47	43	36
Near a religious place	32	38	66	61	30	36	35
Near hospital	26	25	32	53	21	28	24
Residential area	73	172	180	243	138	79	64
Affected by encroachments	21	32	31	56	12	14	27
Narrow bridge	39	28	13	45	11	24	29
Near petrol pump	14	36	21	41	34	17	20
Near bus stop	38	43	78	67	40	23	18

Near or on Road under construction	75	48	24	68	44	33	51
Open area	296	369	364	375	349	198	171
TOTAL	1023	1127	1044	1301	875	631	581

D. Nature of Accidents

Below figure, Shows the accidents according to the nature of occurring. Head on collision was found to be the main reason for most of the accidents. It comprises about 26.26 % of the total average accidents for last ten years. The percentage of persons killed while head on collisions anaverage of 52 %. Data shows that the most of the drivers are of trucks and small cars. It was alsofound that the overturning cases were more but considering fatalities the hit and run was at the second position. Mostly, drivers' fault was observed for hit and run case, as they found to over speed the limit of the roads and

drink and drive case. Also, most of the accidents were occurred at the speed breakers and for the new technology vehicles. It may be due to the air brake and disk brakes helps to stop the vehicle within a fraction of a second, thus affecting reaction time of thedriver, and hence driver may lose control and accident may cause.
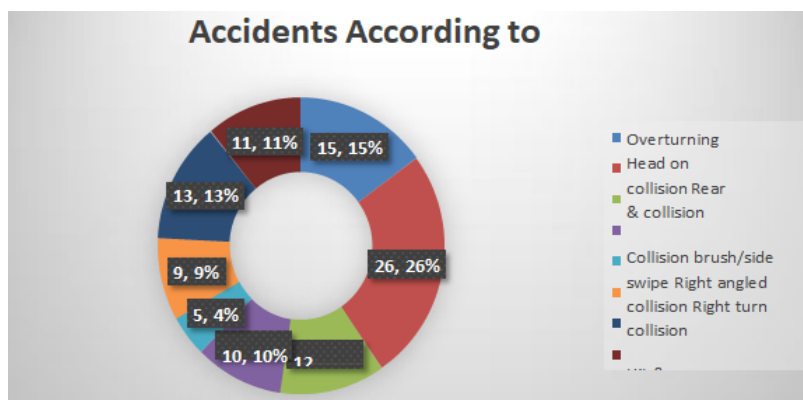
Figure 1: Graphical Representation of accident according to month

E. Accidents According to the Age of Vehicles:-

Below Fig, illustrates the accidents according to the vehicular age. It shows that the maximum accidents are seen for the vehicles whose age is less than five years. This may occur as new vehicles having innovative characteristics like disk brakes and air brake system, extra speed andrapid pickup and having extra CC engine to bringing up the speed of the vehicles. It is observedthat the number of accidents after 2015 goes on decreasing as traffic safety rules become stricteras compared to the previous years. After 2015 accident rate rapidly goes down because chargesand fine rules were applied strictly and create seriousness in public about rules and regulations.

Table 3: Accidental data According to month for years 2012 to 2018

Age ofVehicle (Year)	2012	2013	2014	2015	2016	2017	2018
Less than 5	550	613	504	647	461	285	257
5-10	407	420	308	581	285	182	147
10-15	33	56	42	73	27	73	86
15 & above	66	38	24	23	1	15	34
TOTAL	1056	1127	878	1301	774	631	581

CASE STUDY

A. What is Road Accident in Ghat section?

While driving on roads at ghat section many drivers faces accident which results them into serious injuries or even death the main reason behind this accident is curves and bends of roads while turning in Ghats. It becomes difficult to see vehicles coming from other lane and turning drivers usually have to assume a way for turning at such critical section this creates a great risk of life other reason for accident in Ghat section is that only one vehicle can turn at turnings at a time.

While driving on roads at ghats section many drivers faces accidents which result them into serious injuries or even death. The main reason behind this accidents is curves and bends of road while turning in ghats. It becomes difficult to see vehicle coming from other lane at turning. If two vehicles comes face to face while turning it creates a chance of accidents and it becomes difficult to handle. At night, due to no streetlights it becomes a difficult task of driving on ghats and especially while turning. It becomes more difficult at night to make a turn as vehicle coming

from another side of road is not visible due to obstruction and darkness

B. Some road conditions responsible for accident
➤ Road crossing
➤ Potholes
➤ Damaged road
➤ Diversions
➤ Illegal speed breakers
➤ Merging of rural road with highways
➤ Signal crossing
➤ Narrow width of road at bridge section
➤ Ghat section

## C. Causes of road accidents in ghat section
1. This happens while a vehicle tries to overtake other vehicle when entering village town and suddenly a road divider starts.
2. For increasing number of accident is overloading vehicle
3. So many times while driving drivers are drunk.
4. Lack of connectivity between villages Occur due to drivers losing control over the vehicle at sharp bends 25% of accident have occur because of drunken driving.
5. Also the enforcement of police is weak Topography nature of ground is another reason for spread in accident. It is observed that 50% accidents have occurred while negotiating the sharp bends.
6. A majority of drivers are not properly trained and many drivers not even have their licence.
7. Basic elements in accident on road user's vehicle road and its condition environmental factors etc.

D. Problems of curve roads
In some of the curve roads, the other end of the curve road cannot be seen by the driver because of the obstacles like trees or rocks etc present in the middle. In these type of roads thousands of people die because careless or presence of unexpected obstacles. According to Million Death Study (MDS) about 2.3 million people die in India per year. In that 137 thousand is because of road accidents. That is about 377 people per day. In that 3.7% because of failed to look the road. The problem in these curve roads is drivers can't able to see the vehicle or obstacles coming from]

other end of the curve. If the vehicle is in very speed then it is difficult to control and there are chances of falling to cliff. The solution for this problem is alerting the driver about the obstacle or vehicle. Usually horn is used for this purpose. But in the rainy seasons horn will not be heard. Some people will not use horn itself. So horn is not a good solution to solve this problem. These are the major reasons for accidents [4]. To avoid these problems in curve roads or T roads we are

introducing sensor based accident prevention system. That is we are keeping ultrasonic sensor in one side of the road before the curve and keeping a LED light after the curve [5]
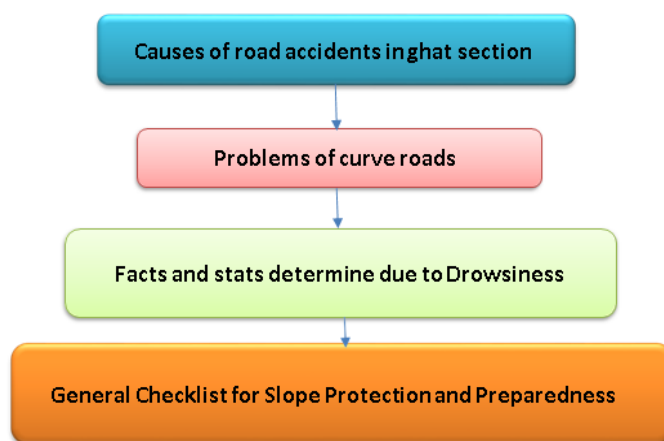
Figure 2: Flow chart of the present study

METHODOLOGY
A. Introduction of technique
"Speed Kills" but still people don't care enough to act safe while driving on road. Road traffic accidents and deaths caused by them are most critical issues now a days. It is also impacting the country's economy. Research includes important issues like road accident and their impacts, causes of this accident, effect of accident, prevention and control that we can improve this situation. Also it is not safe now a day to cross the ghat while having any long journey. Percentage of accident in ghat area is increasing day by day. Severities of these accidents are non-reparable. Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year. So it is first important to control this scenario and have some safety measures in ghat or hilly areas. This project includes some solutions and ideas to improve safety in ghat areas. Using IR Sensor, people will get the signal that another vehicle is coming from opposite side and thus by reducing the speed of vehicle, accidents will be minimized to great extent. Another major contribution will be use of rolling barriers.

B. Existing System
In the past, lot of devices to detect rash driving has been made. Most of the approaches require human concentration and involve a lot of effort, which is difficult to implement. Present day automobiles do not have effective lighting system. Due to this many accidents are taking place during night times especially in ghat sections. Conventional Head lights tend to illuminate the side of the road while cornering or shine off the road entirely, which can lead to unsafe condition.

C. Working of Proposed System
The design of this system mainly consists of hardware including IR Sensor, Comparator IC, LEDs and

Buzzer. IR sensor works on +5V DC supply. It covers the range from 2 cm to 10 cm. When the vehicle is sensed before the curve point using IR sensor, Red LED will be ON at opposite side of the curve and Buzzer will be ON same time. So that,

driver at another end will reduced his vehicle speed, thus avoiding the accident caused at the curve. Operating system that we used is windows 8. When there is no vehicle at the curve crossing, Green LED will be ON. Comparator IC is used to continuously compare the reference voltage and IR sensor voltage so as to monitor the LEDs and Buzzer. Along with this, we will be providing Rolling barriers to decrease crash fatalities. When a vehicle hits the barriers, they rotate. This reduces the impact of accidents as they keep cars from tumbling off the road
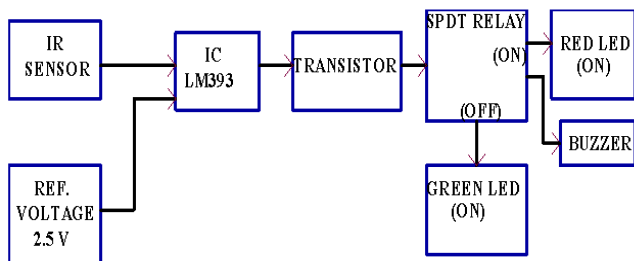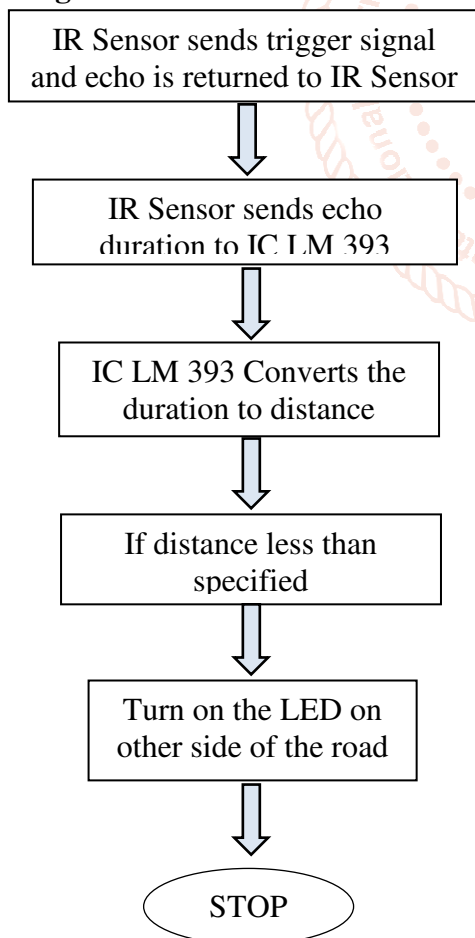

Figure 3: Working of Sensor

D. Working

E. Experimentation

It involves the physical setup of the model. Those are two IR sensors kept at a particular distance. The two sensors are used because the intention to show that vehicle is at safe distance means far from the curve but which ensures the vehicle is coming, this can be done by glowing the green LED light and when the vehicle approaches very near the curve then it will glow red LED light, by this one can alert at the other side .Which helps to avoid the accident.

Figure 4 : Project Model

F. Advantages
➢ Avoid accidents in curve roads, mountains roads and hill roads.
➢ Saves thousands of lives.
➢ Fully automated (No person is required to operate).
➢ Installation cost is very less as easily implementable to the existing roads.
➢ Vehicle monitoring systems can be implemented easily.
➢ Speed of the vehicle is controlled and accident is prevented.
➢ In Foggy weather, even if driver is unable to see the signal. Buzzer alert will be easily identified and thus helps avoiding accidents
➢ Rolling barriers will help vehicles to give a direction on the road and avoid vehicles from tumbling off the road.

G. Applications
➢ Highways
➢ Ghats section
➢ Road sides

Result and Discussion
The purpose of this technique is to decrease the number of accidents in curve roads. This is done by alerting the driver by means of LED light which glows when vehicle comes from the other side of the curve. The vehicle is detected by the help of IR sensor which is interfaced to the microcontroller IC LM393. By this we can save thousands of lives in the curve roads

CONCLUSION

In this study, we got to know about the accident which occurs the road at Ghat section. We understand the causes and effect of accidents and then founded out a solution introducing a new technique to avoid such accident. The new technique consists of two IR Sensor and two LED screen which displays the coming vehicles from another side. This help in reducing the accidents and to enjoy the safer ride Life is important than any other thing, once gone cannot be regained. So, to save this valuable life, this method have important role. It can help Road users at Ghats from being killed in a serious injury.

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