# Research Paper on Accident Black Spot Analysis on Pune Solapur National Highway by Using Infrawork 360

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*Abstract- The distinguishing proof of street segments portrayed by high hazard mishaps is the initial step for any fruitful street wellbeing the executives procedure, thinking about the restricted accessible assets. Although researchers started to study black spot decades ago, there are many un-clarified questions in this field. In the recognizable proof procedure of dark spots three fundamental techniques can be utilized: screening strategies, bunching strategies and crash expectation strategies. Numerous literary works and contextual investigations were composed depicting every technique professionals or cons. These writings focus for the most part on one sort of street each time, in spite of the fact that street attributes (for example speed, ADT) can exceptionally influence the achievement and accuracy of the connected strategy. Therefore, the most important question to be answered is which method for which road?. This question can be answered by comparing different applied methods for different road types. However the comparison of different methods is still not adequately explored areas. This article plans to analyze distinctive techniques utilized in distinguishing dark recognize; the sliding window and the spatial autocorrelation for two sorts of streets contrast in their normal speed, where speed is one of the significant street qualities which is as yet not sufficiently investigated. The result shows a preference to use the sliding window for identifying black spot in high speed roads and the lack of preference to use it in low speed streets, and the other way around for spatial autocorrelation technique, following mishaps dissemination design. Furthermore, an aftereffect of a shortcoming in applying Empirical Bayesian in Fast Street is additionally included.*

*Keywords- Black spot analysis, No of acccidents, Inffrawork 360*

## I. INTRODUCTION

Road network of a country is one of the most important factor responsible for the economic and social development of that country. India has a high population and requires a large amount of transportation services like air, land and water transportation. Road network is the only means of transportation which has deep penetration in all areas and responsible for door to door service. Hence it is very important to increase and maintain the road network of our country.Maharashtra is one of the fastest growing states in India. The main reason for its development is its wide road network which facilitates a better and faster transportation which helps in its overall development. With increase in population the number of vehicles is also increasing which are responsiblefor occurrence of more number of accidents. This causes an obstruction is the economic and social development. To avoid this accident prone zones on the highways must be studied, identified and rectified to reduce the accidents.A unintentional dark spot is a term utilized in street wellbeing the board to mean a spot where street auto collisions have generally been concentrated. It has been observed that almost 13 people die in road accidents all around the world every hour. According to World Health Organization (WHO) road accidents are the leading cause of death amongst people aged between 15-29.

At the time of designing of national highway, vision is to construct accident free highway for that purpose normal causes of accidents are taken into consideration. For present study accidental data collected from National Highway Authority of India NHAI is analyzed by Ranking Method and black spot on national highway was found out.
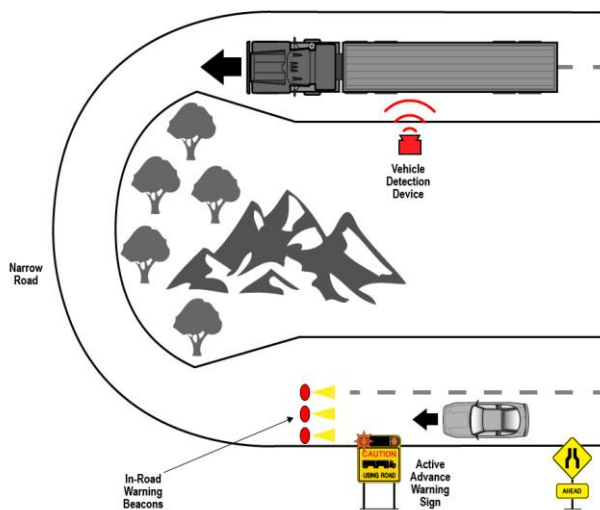
Fig 1 Black Spot of the Road(**https://www.ijert.org/**)

**A. What Is Black Spot**

A mishap dark spot is a term utilized in street security the board to signify a spot where street auto collisions have verifiably been concentrated. Black spot methods are designed to identify the prone spots in particular stretch and reduce the crash risk in that area by providing remedial measures. Identification of locations for safety improvement is the starting point of all the processes. The process is sometimes known as black spot identification or hazardous identification location. Generally black spot are termed to define the location where many accidents have occurred and risk (severe, major, and minor) is involved in that accident

**B. Objective**

The objectives of this study are specifically given as following.

- To find out traffic problem on Pune-Solapur highway by using implementation of Infrawork 360.
- To find out most vulnerable accident stretches onPune Solapur Highway.
- To identify various traffic and road related factors causing accidents and suggestion of possible improvements.

**C. Causes of black spots and their remedial measures**

Insufficient law enforcing agencies, improper road infrastructure, lack of proper warning signs, inadequate illumination on footpaths and cycle tracks, poor emergency response capability and injustice in the implementation of traffic laws are the main causes of road accidents. Transporters do not care for the fitness of their vehicles and

keep on modifying the frame of their vehicles without engineering specifications. They equip their vehicles with illegal and inappropriate manner and engage such drivers who are alcoholics and drug users on low wages. Lack of proper driving school also leads to accidents

While conducting black spot study in an urban area, after collecting the accident's information from respective agencies, police stations, analysis of the location should be made using spot speed studies, vehicles classification and driver studies, cost benefits and other relevant set of studies. Further steps adopted for analysis of black spots are: recording the accidents and data entering onto computer; finding sites with high number of accidents and commonly known as black spots; weight sites for severity and exposure. Initial accident investigation and site visits; rank sites for in depth investigation; collection of further data from accident site studies; analysis of data; more detective work; human factors; select and check packages of counter measures; rank sites for treatment, implementation and construction; monitor behavior during first days and months; evaluate the effects on accidents and cost-benefit analysis.

1. Visibility Effects
2. Geometric Effects
3. Over Speeding And Reckless Driving
4. Human Errors
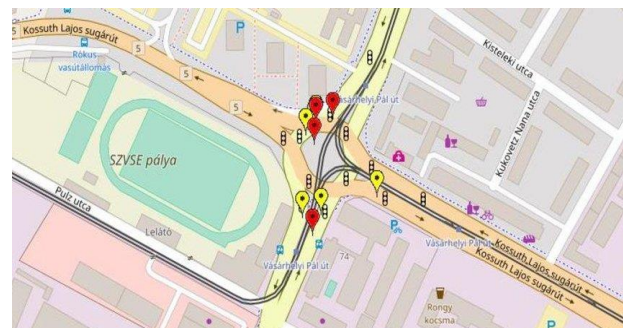5. Vehicular Conditions
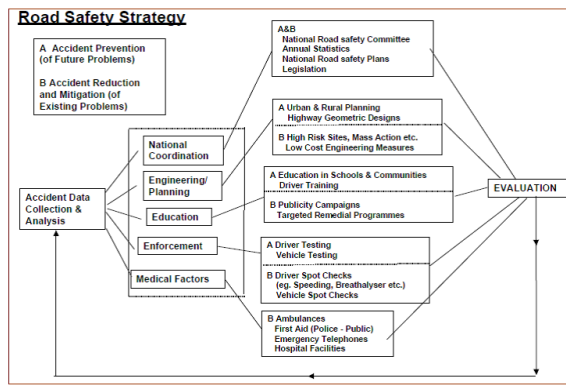6. Time of Day



Fig 2 Black Spot of the Road (https://www.ijert.org/)

Fig 3 Road Safety Strategy ([https://www.ijert.org/](https://www.ijert.org/))

## II. LITERATURE REVIEW

As described by Virtisen (2002), locations were ranked at first according to their reported number of accidents. This strategy is delicate to irregular variety in mishap checks and to the relapse to the mean issue (see for e.g. 1999) proposed utilizing an exact Bayes gauge rather than the mishap include in PAR . utilized a Poisson-gamma summed up straight model with qualities, for example, traffic stream and different geometric factors. The errand of focusing on dark spots might be seen as a positioning and determination issue (see e.g. Dudewicz and Koo (1987) and parallel with the PAR-method, Gupta and Hsu (1980) introduced the so-called probability of correct selection (PCS). In Van den Bossche et al (2002) investigation is done on the question whether a ranking alone can give enough evidence for the selection of dangerous sites. More specifically, Bayesian hierarchical modelling techniques are used to identify and rank hazardous intersections for bicycles in Leuven, a small university town in Belgium. Any achieved positive effects of safety measures at accident hot spots are denoted the benefits of the implemented measures. Therefore, it is necessary to prioritise between sites and safety measures in order to utilize the limited funds as effectively as possible. This model can give assessments of the quantity of vehicle associations on street segments by locale, street type, vehicle type and mishap area. The model is able to provide occupant specific injury profiled by region, road type, accident type and vehicle type. The most appropriate level of spatial aggregation for road accidents is the road section, but in most studies its length is not justified and not controlled (see Thomas, 1996 for a review). Okamoto and Koshi (1989) propose seven different ways of characterizing street fragments some depend on fixed lengths and other on factor length. Stern and Zehavi (1990) isolate the street examined into 1-km-long areas, with no specific defense for this length. No attempt is made to find out which factors explain the occurrence of accidents, or which countermeasures should be taken to reduce their number. The examination centers around

an exploratory spatial information investigation issue: characterizing the area and the length of dark zones. Two techniques are looked at the utilization of nearby spatial autocorrelation lists (a decay of the worldwide Moran record) and bit estimation. Favorable circumstances and disadvantages are talked about in connection to network and traffic qualities. Direct spatial grouping methods seem, by all accounts, to be more qualified when traffic streams can be unmistakably distinguished along specific courses. In Vistisen (2002) also a new method for estimating the effect of hot spot treatment work is proposed. The proposed method is found to give better estimates of the effect of treatment than the method currently used in Denmark.

## III. METHODOLOGY

The process of eliminating or improving accident black spots in a road network is composed of several activities, as illustrated in the following figure.

- **Identification of black spots** is the procedure to locate those spots in the road network that is particularly dangerous, that is, the black spots.
- **Diagnosis** is the process to study what are the problems, the accident contributing factors and the deficiencies for each of the identified black spots.
- **Finding countermeasures** implies a methodical analysis to design suitable countermeasures for each black spot, based on actual problems and deficiencies.
- **Estimating effects** is the process to estimate the safety effects (and if necessary also other effects) and costs of suitable countermeasures.
- **Prioritizing** implies finding the best action plan (or investment program), according to some defined criteria, and based on estimated effects and costs as well as budget restrictions.
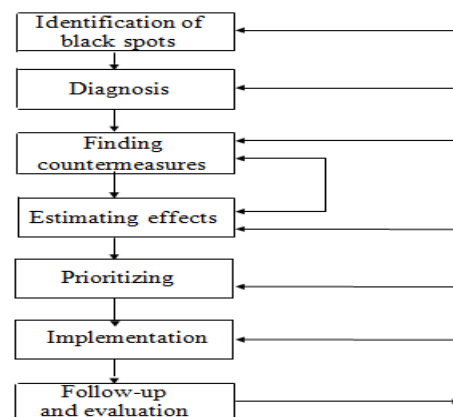
- **Implementation** is the actual realization of the prioritized measures included in the action plan (or investment program).
- **Follow-up and evaluation** is the last and very important step, which aim is to assess the actual results (effects and costs).

The methodology suggested for study includes

- To collect accident data on Pune Solapur National Highway from National Highway Authority of India.
- Detailed analysis of the identified black spots.
- To find out different methods to prioritize hazardous locations.
- To identify various traffic and road related factors causing accidents.
- The reading taken on Pune-Solapur National Highway then analyzed by method of ranking. According to importance of the parameter.
- The most important parameter because of which more number of accidents is occurred had given top rank and maximum weight age.
- Analysis of the top ranked accidental spots.

The percentages after giving rank and weightage were calculated and on the basis of value of percentage the accidental black spots were identified

## IV. RESULT AND DISCUSSION

### A. Traffic Survey

- NAME OF ROAD = Pune – Solapur Highway
- ROAD NO= NH65
- DIRECTION FROM Pune To Solapur

| Hours counted | Heavy truck | Medium truck | Small truck | Large bus | Mini bus | Motor cycle | Utility | Car | Auto rickshaw | Bicycle |
|---|---|---|---|---|---|---|---|---|---|---|
| 8.00 to 8.30 | 8 | 13 | 17 | 19 | 27 | 33 | 11 | 28 | 27 | 8 |
| 8.30 to 9.00 | 9 | 15 | 11 | 14 | 29 | 39 | 4 | 27 | 18 | 6 |
| 9.00 to 9.30 | 6 | 4 | 12 | 15 | 7 | 28 | 6 | 19 | 14 | 3 |
| 9.30 to 10.00 | 8 | 3 | 7 | 13 | 8 | 24 | 3 | 16 | 16 | 7 |
| 10.00 to 10.30 | 4 | 6 | 8 | 14 | 9 | 17 | 2 | 18 | 8 | 2 |
| 10.30 to 11.00 | 2 | 3 | 6 | 13 | 11 | 21 | 4 | 12 | 5 | 3 |
| Total | 37 | 44 | 61 | 88 | 91 | 162 | 30 | 120 | 88 | 29 |

**Total= 750**

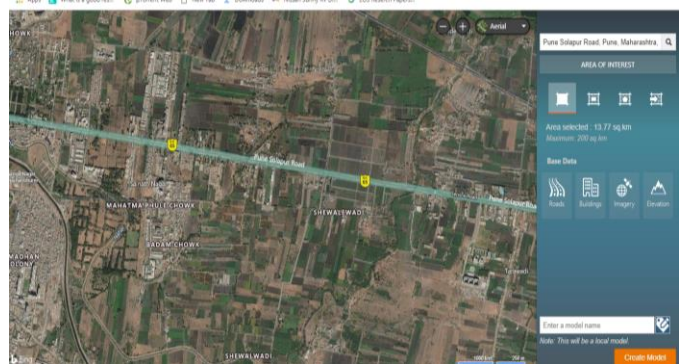### B. InfraWork Modeling At Black Spot



Fig 4 Modeling in Infrawork 360



Fig 5. Black spot identification

## V. CONCLUSION

- Major causes behind the high accident rate in Pakistan are the lack of proper system to record and control accident black spots. In each accident, rate of death is 30%. Accidents never happened due to single cause, but it involves many factors that have to investigate thoroughly before concluding the results.
- Systematic accident reporting and recording centres must be established with the help of different highways agencies, so that regular monitoring and identification of black spot can be possible. Deficiency in Geometric design play a significant rule towards accident, which should be checked and counter measured with engineering concepts.
- Most of the accidents are not merely due to some serious causes, but ignorance of some minor causes may results major accidents. It also emphasizes the need to understand the importance of minor weakness and flaws in the road traffic system and their low cost remedial measures.
- Lack of proper warning signs, road markings, signals, inadequate illumination on footpaths and cycle tracks, poor emergency response capability and injustice in the implementation of traffic laws are the main causes of road accidents.
- Traffic accidents are rich with spatial information. But in general, the location of traffic accidents is described as an

address as text, so the spatiality is difficult to present. Aided by geocoding technology, spatial coordinates of traffic accidents are generated. They are consistant with the coordinate system of the road network and can display on the urban road network visually.

- Traffic accidents have a close spatial relationship with the road network elements. It is easy to utilize GIS to determine the road network element one which each traffic accident occurred, and how many accidents occurred on each road network element. Thus, it is not only the traffic accidents that attribute the spatial information, but also road net-work elements and traffic accident objects are recorded with their subordinate relations and quantity relationship in non-spatial attributes.

- Black spot identification is demanding significant attention in traffic safety analysis. The paper adopts the method that takes the potential of reducing accidents as an index to extract the black spots. Based on the methods of the GIS data storage, the association relationships between black spots and the attributes of road network elements are illustrated in graph diagram. By analyzing the relationship, the main inducing causes for traffic accidents are identified, which provides a basis for improving the conditions of traffic facilities and enhancing traffic safety.

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## REFERENCES

[1] Liyamol Isen "Evaluation and treatment of accident black spots using Geographic Information System" ISSN: 2319-8753 Vol. 2, Issue 8, August 2013

[2] M Mohammed Fayaz "Black Spot Identification Using Accident Severity Index Method"ISSN VOLUME-5, ISSUE-3, 2018

[3] Arun Kumar "Black Spot Analysis on NH-21A" Vol 9(44), DOI: 10.17485/ijst/2016/v9i44/105250, November 2016

[4] A.N.Dehury "Black Spot Analysis on National Highways" Vol. 3, Issue 3, May-Jun 2013, pp.402-408

[5] Myriam Marie Delcasse "Black Spot Study" Research Article Volume 7 Issue No.10

[6] Naidu.V.M. "Identification and Analysis of Black Spots On Nh5 - Visakhapatnam (India)" ISSN 2249-2631 (2011)

[7] Apparao. G "Identification of Accident Black Spots For National Highway Using GIS" Volume 2, Issue 2, February 2013

[8] Athira Mohan "Identification of Accident Black Spots on National Highway" (IJCIET) Volume 8, Issue 4, April 2017

[9] Shah Dhruvit "Road Accident Analysis and Identify the black spot location On State Highway-5 (Halol-Godhra Section)" 2016 IJEDR | Volume 4, Issue 2 | ISSN

[10] McGuigan (1981) suggested ranking sites according to their potential for accident reduction (PAR)

[11] Gupta and Hsu (1980) introduced the so-called probability of correct selection (PCS)

[12] Van den Bossche et al (2002) investigation is done on the question whether a ranking alone can give enough evidence for the selection of dangerous sites.

[13] Virtisen (2002) describes that high-risk sites are targeted with the aim of improving safety on the road network

[14] Nassar (1996) an integrated Accident Risk Model (ARM) for policy decisions is developed using risk factors affecting both accident involvements

[15] Deacon et al (1975) make a distinction between 'short' and 'large' highway segments, respectively called spots and sections.

[16] Flahaut et al (2002) the concept of black zone is used to tackle the problem of the length as well as the location of road sections.

[17] Steenberghen et al (2002) show the usefulness of GIS and point pattern techniques for defining road accident black zones within urban agglomerations.

[18] http://en.wikipedia.org

[19] http://www.wikipedia.org

[20] http://en.m.wikipedia.org