# Identify Hazardous Road Location for Road User Using GIS - Case Study of Rajkot

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*Abstract -- India's share of road accidents in the world is an area of serious concern. Road traffic accidents have been recognized as one of those adverse elements which contribute to the suffocation of economic growth in the developing countries, due to the heavy loss related to them, hence causing social and economic concern. Traffic safety is an important key and plays an integral role in sustainable transportation development areas. Nowa days, the main negative impact of modern road transportation systems are loss of property injuries and deaths in road accidents. The success of traffic safety and highway improvement programs hinges on the analysis of accurate and reliable traffic accident data. Thesis applied the combination of geo-information technology and spatial-statistical analysis to bring-out the influence of spatial factors in their formation. With advancement in technology, new and sophisticated models of vehicle are available and their numbers are increasing day by day. Development of a model for traffic accident density estimation explained by GIS data can enable the determination of dangerous areas objectively and easily, indicating where area-wide traffic calming can be implemented preferentially .A traffic accident has multi-facet characteristics associated with it. For proper traffic accident analysis use of GIS technique has become an inevitable tool. This Study examined the relations between traffic accidents and city characteristics, such as population, road factors, and spatial factors. A model was developed to estimate traffic accident density. Kernel density estimation (KDE) techniques were used to assess the relations efficiently. In general, the location of traffic accidents is described as an address with text, so they are difficult to display on the map. Thesis concern with how to utilize the GIS to work-out on Spatial Analyst to record the traffic accidents. Thesis workout in presenting the method which takes the potential of reducing accidents as an index to extract the black spots*

*Index Terms -- ArcGIS, Kernel Density Analysis, Hotspot, Traffic Accident Severity.*

## I.     INTRODUCTION

India is the seventh biggest nation by range. India is the second most crowded nation on the planet, with more than 2.5 billion individuals. Transportation offices are the main necessity of any country for the foundation advancement.

India has a street system of more than 5,472,144 kilometers as on 31 March 2015, the second biggest street organize in the world.it is a moment biggest street arrange on the planet. Balanced for its vast populace, India has under 3.8 kilometers of streets for every 1000 individuals, including all its cleared and unpaved streets. As far as quality, all season, at least 4 path parkways, India has under 0.07 kilometers of roadways per 1000 individuals, starting at 2010.These are some of the lowest road and highway densities in the world.

Road protection is a primary subject inside the present scenario. It has been anticipated that nearly 1.2 million humans die and 50 million men and women are injured in each single 12 months in street injuries all through the world in step with the World health Organization (WHO). Detailed analysis of worldwide accident information imply that fatality rate in line with licensed automobile in developing international locations are very excessive in comparisons with the industrialized international locations. In developing nations, broadly speaking street visitors accidents came about amongst pedestrians, passengers, bike owner, motorized wheeler and busses. According to the World fitness Organization, road traffic accidents are the sixth main purpose of dying in India among younger people and street accidents have been proven to value round 1% of annual gross countrywide merchandise. Increased space of vehicular movement in all components of the city consisting of neighborhoods, faculty areas and most important arteries have brought about elevated accidents and reduced safety to the pedestrians and bike owner. Pedestrians and bike owner are exposed to chance due to battle with the vehicular, and due to the bad infrastructure facilities. However vulnerable street customers are regularly omitted by means of coverage makers, planner and engineer. Therefore no policy plans for pedestrians in India towns.

Locating of traffic accident black spots in the Rajkot city reveals that maximum numbers of accidents are at between name all roads with higher road accident.

This might be because of absence of geometrics and insufficient flag control framework and progressing development activities. For person on foot to exacerbate circumstance, there nonappearance of most important passerby offices like foot over scaffold, trails, cycle tracks, Zebra intersection and select walker motion at busiest intersection in the Rajkot and at whatever point they gave, generally are used or underutilized. The city organization is additionally not engaged with the mindfulness battles to show overall population about the principles and directions related with auto collisions wellbeing.

## II. LITERATURE REVIEW

The following are literature which review before Carry out thesis work, details of paper and author are enlisted below:

A. Identification of Hotspot of Traffic Accidents Using GIS: Anitha Selvasofia.S.D, Prince Arulraj

B. Traffic Analysis and Road Accidents: A Case Study of Hyderabad using GIS: M. Bhagyaiah, B. Shrinagesh

C. Estimating Traffic Crash Risk to Users in Urban Areas and its Impact on Mode Choice: Case Study Vadodara City, India: Prajapati Pankaj Shankarlal, Geetam Tiwari

D. Identification of Accident black spots for national highway using GIS: Apparao. G, P.Mallikarjunaredy Dr. SSSV Gopala Raju

E. Pedestrian accident analysis in Delhi using GIS: Shalini Rankavat, Geetam Tiwari

F. GIS-based spatial analysis of urban traffic Accidents: Case study in Mashhad, Iran: Gholam Ali Shafabakhsh, Afshin Famili, Mohammad Sadegh Bahadori

G. Using spatial network analysis to model pedal cycle flows, risk and mode choice: Crispin H.V. Cooper.

H. Estimating Traffic Crash Risk to Users in Urban Areas and its Impact on Mode Choice: Case Study Vadodara City, India: Pankaj Prajapati, Geetam Tiwari.

I. Identifications and investigations of hazardous road locations on Dhaka Aricha Highway: S.M. Sohel Mahmud, Anindyadev Sarker, Md. Mazharul Hoque

J. Accident and traffic analysis using GIS, Biomedical Research: Anitha SD Selvasofia, Prince G Arulraj

K. Intra – urban location and clustering of road accident using GIS: T. Steenberghen, T. Dufay's, I. Thomas & B.Flahaut

L. Evaluation of road accident black spot treatment: A case of the iron law of evaluation studies. Accident Anal. And Prev.: Rune Elvik Norway.

## III. STUDY AREA

A Rajkot city is divided in mainly 3 zones i.e. West zone, Central zone, East zone. These 3 zone are also divided into 18 wards of RMC.This study area has been selected on the basis of main parameter of transportation which population and traffic condition and road networking of that particular area.

Selected Stretch: Madhapur Chowk to Gondal Chowk.

Length of Stretch:  10.5 km

## IV. METHODOLOGY OF STUDY
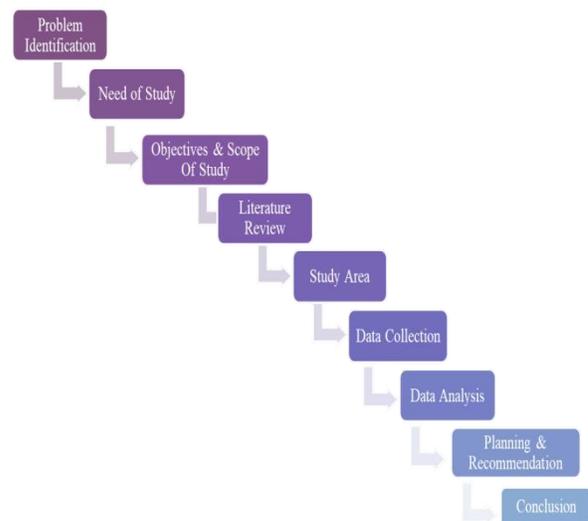


## V. BASICS CONCEPT OF GIS

The term Geographical Information System (GIS) is applied to system that perform the computational treatment of geographical data and that store the geometry and the attributes of data are dereference.

A GIS can be effectively used to identify accident black spots on roads. The results can be displayed graphically with the help of GIS which can be used for planning and decision making.

GIS benefits organizations of all sizes and in almost every industry. There is a growing awareness of the economic and strategic value of GIS. The benefits of GIS generally fall into five basic categories.

- Cost saving and increased efficiency
- Better decision making
- Improved communication
- Better record keeping
- Managing Geographically

## VI.     DATA COLLECTION & ANALYSIS

The survey of accident is carried out & CVC survey is needed to identify spot of traffic density.

Geo encoded work is needed to publish data of accident on geography location.

The figure shows encoded road of Rajkot city:
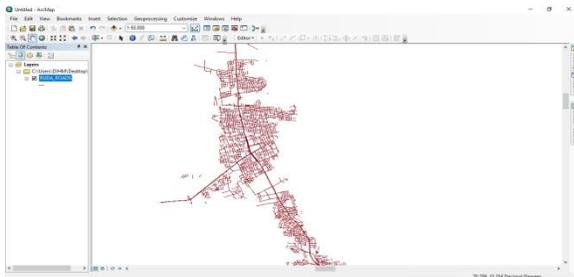


Analysis work by KDE tools in ArcGIS software:



## VII.     CONCLUSION

GIS effectively helps in the visualization of problem of road accidents and processing of accident data for performing complex spatial analysis.

It is for two year comparison 2016 & 2017 year road traffic accidents data. The total road traffic accidents. In Rajkot city in 2016 was as follow: - Fatal 52 Grievous 286 & Minor 427 Where as in 2017 year Fatal 70 Grievous 465 & Minor 585.

The geographic distribution of all accidents locations indicates accidents density is higher on Mid-Block of 150 ft. Ring Road, which shown in KDE of Accident spot at different Mid-Block within study area.

For road user crash density is higher near KKV circle, Mavdi circle, Raiya circle, West zone Circle, Balaji Circle, nana vati circle & ramapir circle. According to current scenario accident spot found more on this all mid-block connecting different main plus point which rest on 150 ft ring road. As per spatial analyst done by spatial analyst tool it is shown in figure 7.1

The total fatal rate of accident rest on above mention mid-block in Rajkot city. This reveals that 150 ft. ring road is highly potential for fatalities of road accidents. Some measures should be required especially for the

road safety at these particular location. As per spatial analyst done by spatial analyst tool it is shown in figure 7.1.

Most of accident occur due to LCV , 2 Wheeler & 4 Wheeler Over Speeding ,Wrong practice of overtaking ,Without giving signal change the Lane of road ,Wrong side travelling.

Condition prevailing for accident is breaking traffic rules, over speeding & Lane changing Without Signal within mid-Block. Overloading of LCV & Rough Driving pattern of LCV.

If the X and Y coordinate of locations using GPS were saved in police database then plotting of accidents points would have been easier and results of the analysis more reliable. This study was a preliminary on for identification and investigation of hazardous road location.

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