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Statical Analysis of Road Accident in Indapur City

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Abstract: ***Accident analysis studies aim at the identification of high rate accident location, safety deficient areas and the accidents prone zones. For this purpose the road accident data for seven consecutive years, pertaining for a city has to be used. The road geometry will be measured in accident prone location to find out the cause of accident, based on these result, suggestion are to be provided to reduce the frequency of accidents at that particular place. Accidents prediction is done by regressing traffic volume with accident data to obtain an equation which could apprehend the forth coming accidents in the future. Preventive measures regarding the improvement of traffic condition for minimizing accidents rate are suggested***
Keywords: Data collection, PCU, Highway capacity, Traffic volume,

I. INTRODUCTION

In countries as India we usually can easily get a diverse traffic i.e. a traffic flow constituting of all the kind of vehicles as cycle, car, rickshaw, bus etc. In Indian cities the share of non-motorized transport (NMT) at peak hours is just about more than fifty per cent. This figure is actually greater in small-sized cities and medium-. Various cities have diverse patterns of NMT use. Every public transportation mode of transportation involves access trips by NMT at every end. So, no motorized form of heavy traffic plays a really crucial part in meeting travel demand in nations as India.

The flow of heterogeneous or mixed traffic is pretty difficult. This diverse flow of cars causes numerous issues as disputes at intersections when amount of non-motorized vehicle increases, when number of non-motorized vehicles boosts it impacts the speed and also flow of some other automobiles. It considerably lowers or lessens the capability too results in different security issues. Therefore there ought to be a standalone track for flow of non-motorized traffic as widely used in different evolved counties as Usa, in lands as India this practically not possible. Really in that situation a good research of non-motorized vehicle attributes must be accomplished along with research of exactly how these NMV adversely affects the diverse traffic

II. OBJECTIVES

The main aim of the study is to examine the credibility of signal less traffic junction given in IRC for the present roadway and traffic condition. In view of the main aim of the study, the following objectives are

1) To study the causes of accidents and suggest corrective measures at potential location.
2) To evaluate existing design.
3) To compute the financial losses incurred.

III. RESULT

The increase in traffic across the globe has resulted in the increase in the number of accidents on roads. This has resulted in the study of the reasons for accidents and also the factors which cause them. the factors affecting the accident rate have been studied and also how much they contribute to the accident rate has been found out using regression analysis and analysis of variance. he accident rate has been found out by regression analysis for various geometric features of road such as horizontal radius, super elevation, K-value, vertical grade, visibility, and vertical arc length, rate of change of super elevation and accident rate.

The findings show that the accident rate is highly influenced by the factors such as super elevation, horizontal radius, in case of plain and rolling terrain.

IV. GEOMETRIC FACTORS OF ROADS

Terrain is classified as the following depending on the slope of the land.

Terrain Classification	Slope of location (%)
Plain	Less than 10
Rolling	Greater than 10 up to 25
Mountainous	Greater than 25 up to 60
Steep	Greater than 60

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A. Accident Rate

It is the ratio between number of accidents in a year and number of vehicles with length of study corridor in that year. It is expressed as crashes per million vehiclekms of travel.

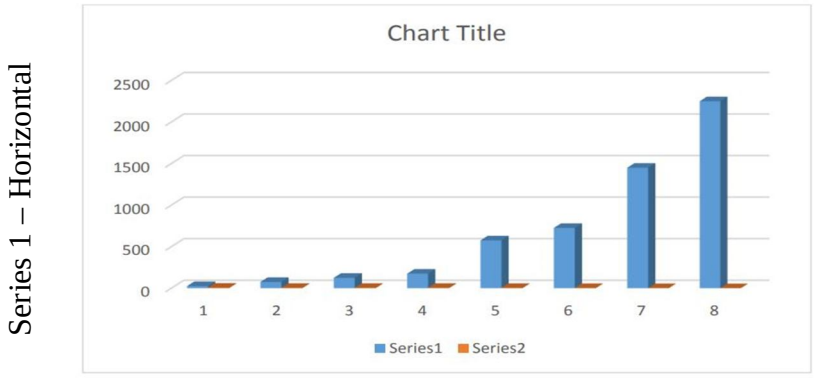
$$AR = \frac{C \times 100{,}000{,}000}{V \times 365 \times N \times L}$$

AR = Accident Rate expressed as crashes per 100 million vehicle-kms of travel
C = Total number of crashes in the study period
V = Traffic volumes using Annual Average Daily Traffic (AADT)
N = Number of years of data
L = Length of the roadway in km
The data is of Annual average daily traffic and crashes are obtained from the respective area with which they are concerned and the analysis is carried out. The results of the analysis are further explained below.

V. ANALYSIS OF GEOMETRIC PARAMETERS

A. Horizontal Radius

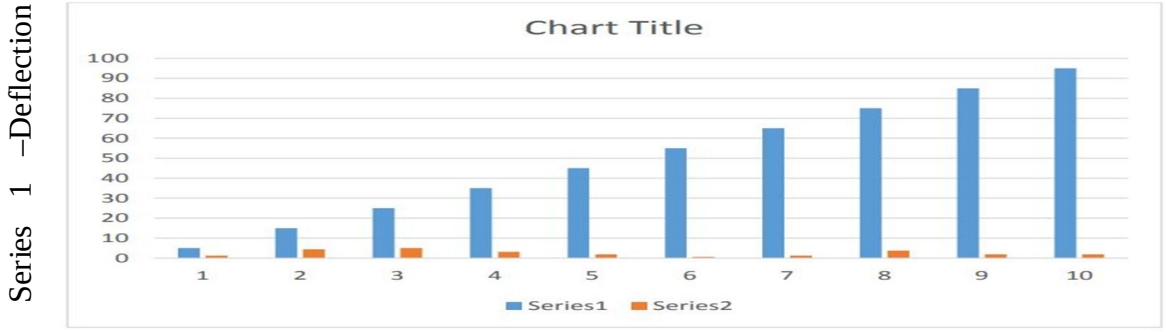
The number of crashes within range of radius are counted and accident rate has been calculated for the respective range of radius and histogram is plotted as shown below. From the data we can say that we could observe a significant change in the accident rate and that this should be given importance while design of roads. Also for small values of radius the value of accident rates are high which proves the fact that for steep curves the probability of accidents is more than that of the curves with larger radii.



Series 1 – Horizontal
Series 2 – Accident rate

B. Deflection Angle

The accidents in every 100 interval of deflection angle are measured and the accident rate has been calculated and comparison Histogram has been shown below. From this it can be clearly said that the deflection angle doesn't have a significant change in the accident rate the value of accident rate in this case are very less when compared with other geometric factors.

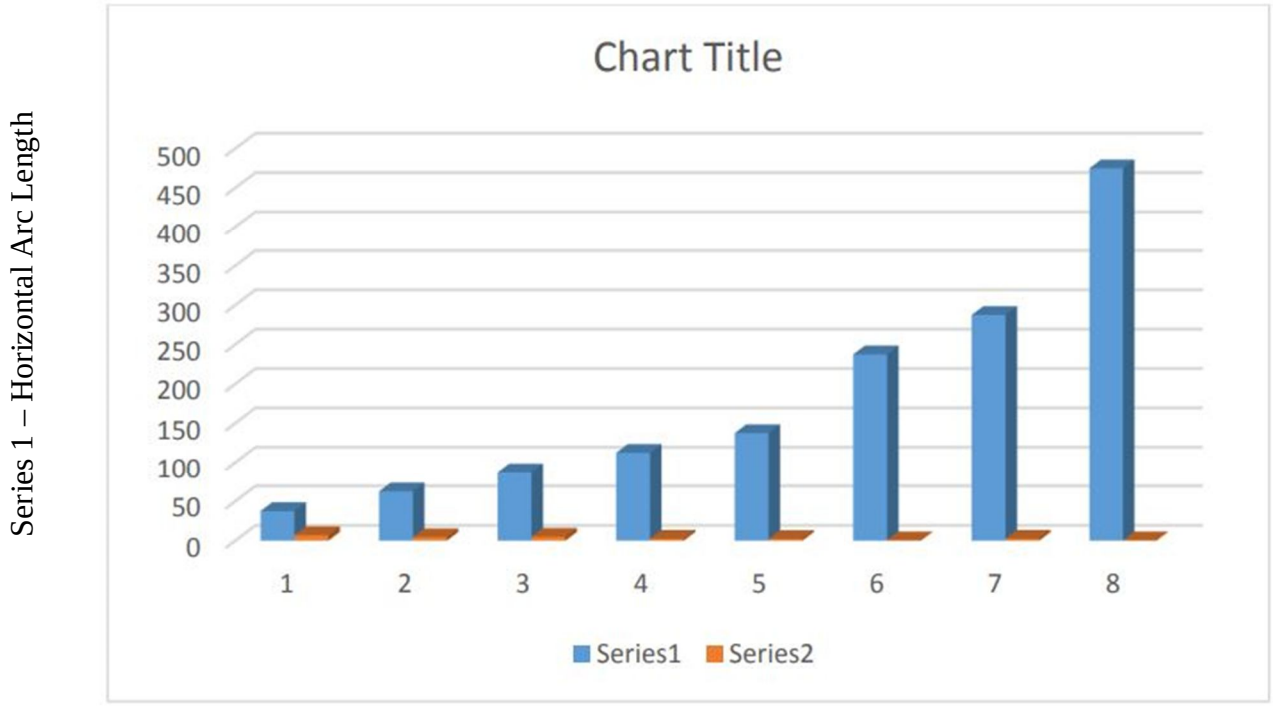


Series 1 – Deflection Angle
Series 2 – Accident rate

C. Horizontal Arc Length

The accident rate has been calculated for the range of arc length.

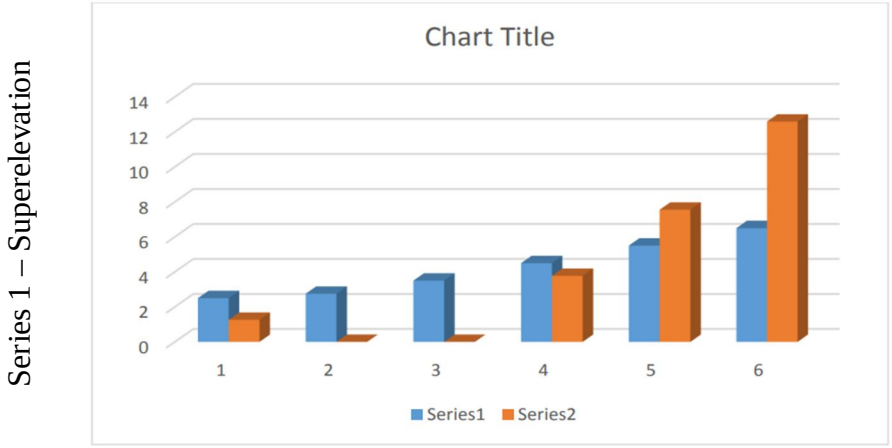
The comparison plot between horizontal arc length and accident rate is shown below. From the plot we could say that the accident rate decreases with increase in the horizontal arc length but it is very less when compared with other geometric factors like super elevation and visibility.



Series 1 – Horizontal Arc Length
Series 2 – Accident rate

D. Superelevation

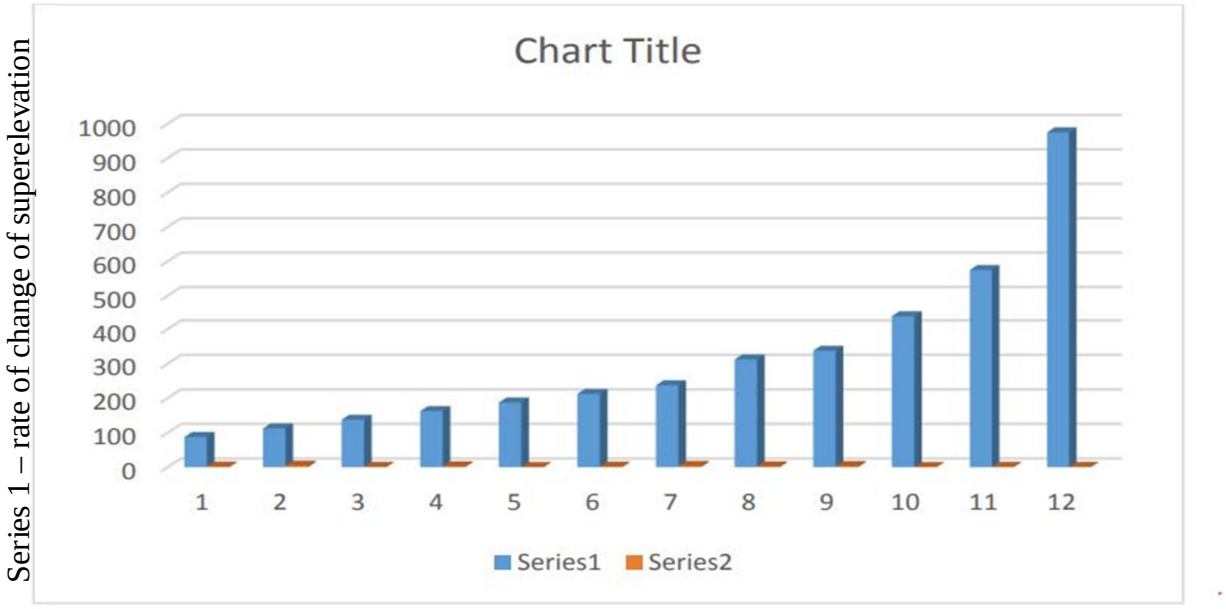
The number of accidents are counted in one percent interval of super elevation and accident rate has been calculated and plotted below as histogram. The comparison shows that for very low values and for high values of super elevation the accident rates are high and they are comparatively for super elevation values between 2.5 to 4. Hence this has to be kept in mind while designing the road.



Series 1 – Superelevation
Series 2 – Accident rate

E. Rate of Change of Superelevation

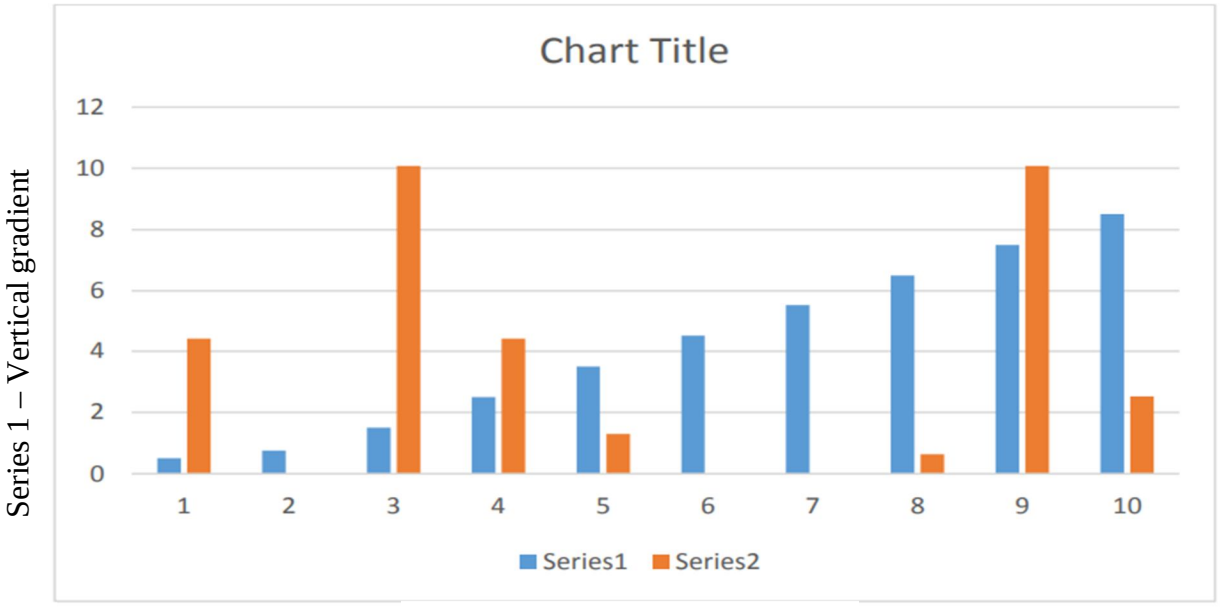
The accident rate has been calculated by counting the accidents within the range of change of super elevation. The histogram is shown below which clears that there isn't much change in the accident rate with respect to the rate of change of superelevation. Hence this might not be an important geometric factor which needs attention.



Series 1 – rate of change of superelevation
Series 2 – Accident rate

F. Vertical Grade

The accident rate has been calculated by knowing the number of accidents in one percent interval of vertical grade. The comparison histogram is shown below from which we can observe that the values of accident rate are very irregular and doesn't follow a trend with vertical grade. However from the data we could observe the range where accident rate is high and hence we could design the road according to that

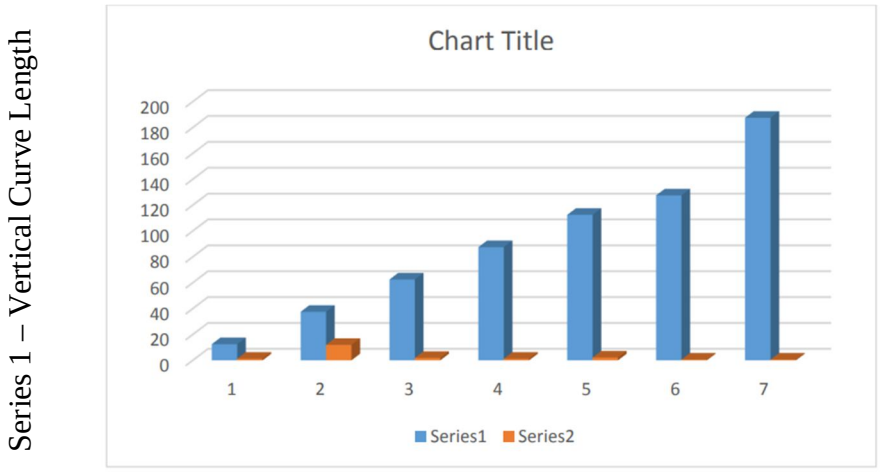


Series 2 – Accident rate

Series 1 – Vertical gradient
Series 2 – Accident rate

G. Vertical Curve Length

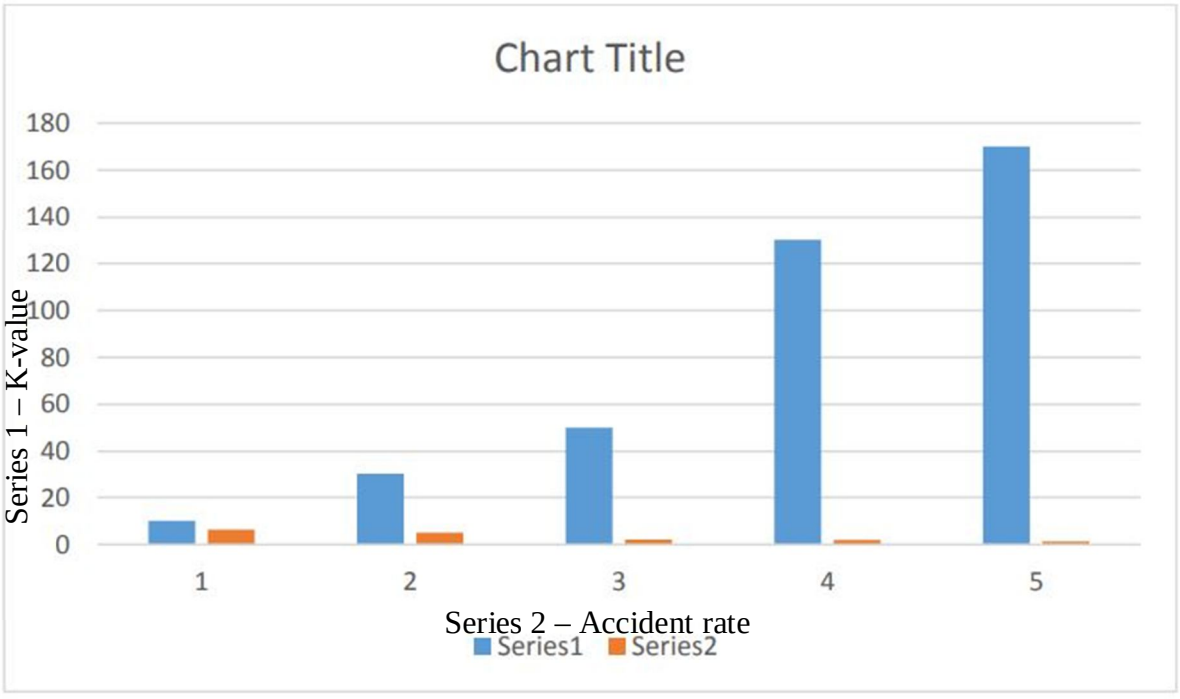
In 25 m interval of the vertical curve length the accidents have been counted and the accident rate has been calculated. The comparison is shown below in the form of Histogram and from the comparison we can say that it varying irregularly with the vertical curve length but however for the range of 25-50 the accident rate is the highest observed. Hence proper precautions should be taken while providing the vertical curve length during the design.



Series 1 – Vertical Curve Length
Series 2 – Accident rate

H. K-value

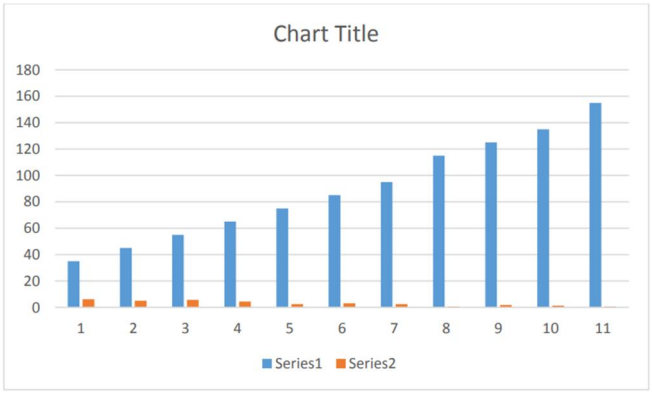
The number of accidents have been counted for K-value that is the distance required to change 1% in grade and accident rate has been calculated. The comparison as shown below shows that for lesser K-values the accident rate is more and it went on decreasing for increase in the K-value. Which means that the accident rate is inversely proportional to K-value and the fact that the distance provided to change the gradient when provided insufficiently could lead to accidents. The comparison histogram is shown below.



Series 1 – K-value
Series 2 – Accident rate

I. Visibility

The number of crashes has been measured in 10 m interval of visibility and the accident rate is calculated. The comparison is done and shown below and we can observe from the diagram that for the less visibility values the accident rate is more which proves the fact tha the sight distance should be provided ufficiently for the safe journey on roads



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Series 1 – visibility
Series 2 – Accident rate

VI. RESULTS OF ANALYSIS

A. Manmade Features

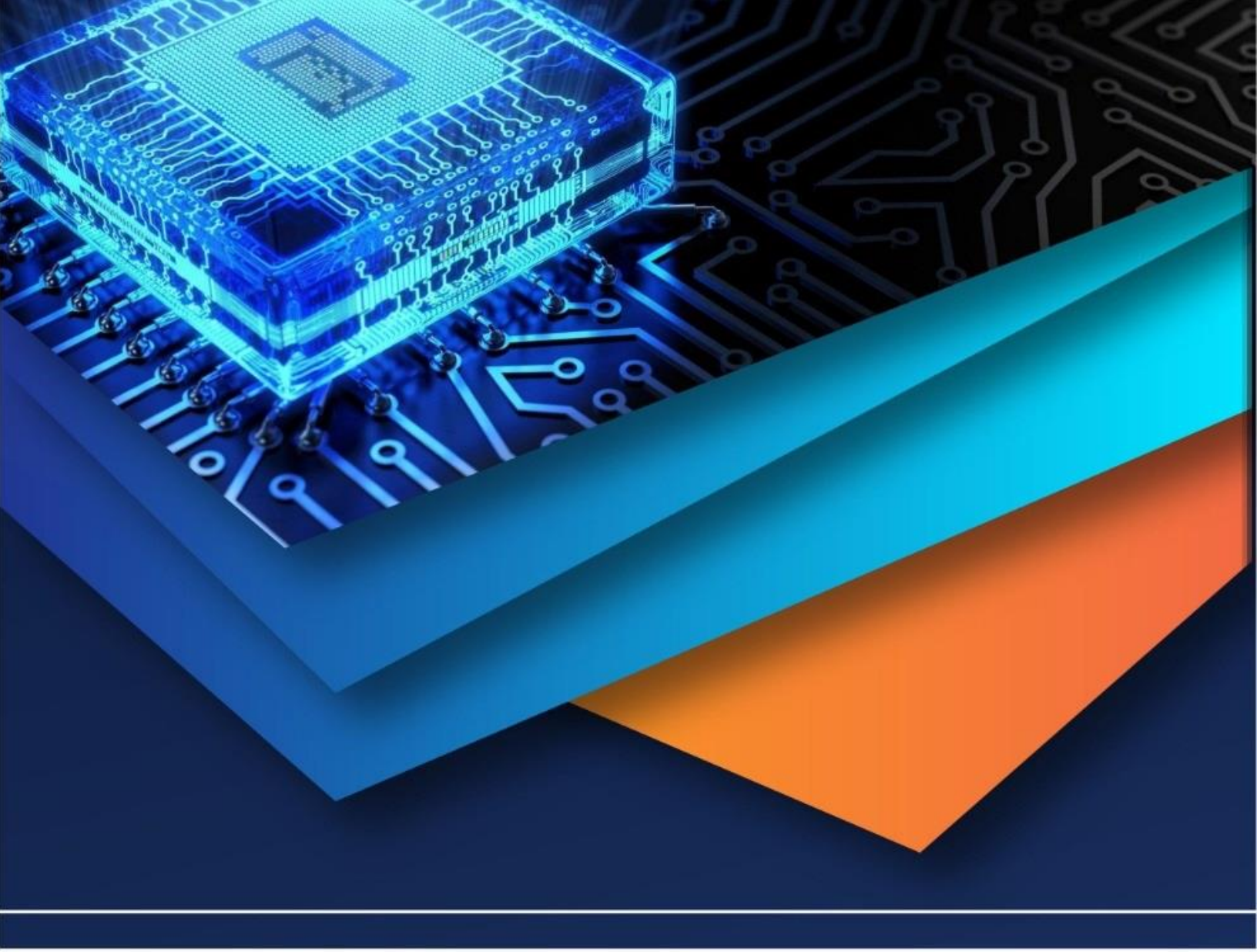
I have studied here how a driver gets disturbed due to the presence of some unwanted things on the road/vicinity of the road.
The term “manmade features” mainly refers to any object on the side of the road that, by virtue of its placement and structure, results in or is likely to cause, a maximum probability of vehicular damage, occupant injury or fatality.
In my case I have considered three features such as roadway obstacles, obstacles very near to road and posters though it will not cause obstruction, but it can affect human’s mind).
Our main aim is to consider these factors and analyze it using some video data and and then analyzed it through regression.

VII. CONCLUSION

In this study the study corridor is Site area. The section of 60 km length is chosen and studied for the geometric features of the road such as horizontal radius, super elevation, K-value, Visibility and others and the analysis is done. Hence for Location which is of plain and rolling terrain the geometric features that influence accident rate more are horizontal radius, K-value, Superelevation and visibility. Hence while designing a road in plain and rolling terrain these geometric features namely Horizontal radius, K-value, Superelevation and visibility has to be given more importance.

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