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"STUDY ON ROAD TRAFFIC MULTIMODAL SIMULATION, COMPARITIVE STUDY ON SIMULATION SOFTWARES ON INTERSECTION AND ITS ROAD SAFETY AUDIT"

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Abstract: **In today's world of advancements transportation engineering is the most focused branch in terms of software development. In order to provide a small part to this branch a comparative study is a must to identify the most efficient software for providing this work is important. To do this study in the project we need to identify the best software for simulations of vehicles in multimodal means is also of that importance. This also suggests the need of this softwares in use also. To do this designing a intersection is optimum. Also the Ministry of Works, Housing and Communications has a duty of care to all road users, and so has always been concerned with the safety of its roads. However, the significant increase in road crashes in recent years has prompted the Ministry to intensify its efforts to promote road safety. One small part of this effort are new procedures to ensure that the safety of all road schemes is checked by specialists before construction this is called safety auditing. demand for transportation, safety is an issue of major social concern and an area of extensive research work. The rate of Crashes in developing countries like India increases year by year. A Crash is an unplanned and uncontrolled event, which occurred on a road open to a public traffic resulting in personal injury, damages to the property and loss of life in which at least one moving vehicle was involved. In the world, India has world's largest heavy traffic and accidents also. It is necessary to provide the safety to roads. Lack of infrastructure, interaction of vulnerable road users (VRU) with high-speed traffic, and faulty geometric design are some of the most alarming safety deficiencies identified through the audit process. The insights obtained from the RSA report could not have been gained from the Crash reports alone. Finally, countermeasures need to be suggested based on the observations made during the RSA.**

Keywords- **Black Spots, Road Safety Audit, countermeasures, Multimodal simulations, Bentley cube, BIM, PTV Vissim.**

I. INTRODUCTION:

The term intersection road is used to mean a public road and a road indicates a way made for travelling between places by automobiles, pedestrians, cyclists, animals, etc. Engineering is the art of designing, constructing and maintaining works. Thus, road engineering means the art of designing, constructing and maintaining roads. Roads are considered to be one of the most cost effective and preferred modes of transportation. It is easily available and accessible to all the sections of the society. It facilitates the movement of both men and materials from one place to another within a country. It helps to bring about national integration as well as provide for country's overall socioeconomic development. It is a key infrastructural unit which links to other modes of transportation like railways, shipping, airways, etc. Hence, an efficient and well-established road network is inevitable for promoting trade and commerce as well as meeting the needs of a sound transportation system in the country. It is significant to note that the networks of highways existed in all parts of the world for the flow of people and goods. The initial carrier on a highway was man himself followed by the camel, donkey, horse and after the invention of wheel, the cart and many other wheeled vehicles. The technique of road engineering is thus known to man, hundred and even thousands of years before our time. The problems of highway engineering such as constructing, maintaining, managing, financing, controlling the traffic, etc. were also faced by our predecessors and they solved these problems in their own way to satisfy their requirements.

The formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. Road is a way or route between the two or more places connected for travelling and transportation of human, goods, etc. by vehicles like motorcycles, buses, trucks, tempos, cycles, I.e. 2 wheelers and 4 wheelers. In the year 1943, the conference of Chief Engineers of

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Central and state governments of India, at Nagpur, conveyed by the central government, make an equalized system of plan of road development for India called 'Nagpur Road Plan' by Indian road Congress (IRC).
Terming road accident scenario in India more "dangerous than COVID-19 pandemic", Union minister Nitin Gadkari on said there could be a saving of Rs 90 lakh per person by preventing deaths and reducing injuries to minor ones in such incidents. India accounts for the highest number of road accidents with 1.5 lakh people being killed and more than 4.5 lakh crippled annually in 4.5 lakh road accidents with losse amounting to 3.14 per cent of the GDP.
In India cost per seriously injured person comes at Rs 3.64 lakh while cost per minor injured person stands at Rs 77, 93 and the cost per death is estimated at Rs 91.16 lakh.So death cost is 100 times more than injury cost. It shows that if we succeed in preventing deaths in a road accident and restrict the life of accident victims to minor injuries only, we can save around Rs 90 lakh per person. Around 70 per cent of deaths are in the working-age group of 18 to 45 years old while India accounts for 415 deaths per day in road accidents.
The minister said IITs and engineering colleges could take up highway stretches for road safety audit with some financial aid while third- party road safety audits will help in finding engineering faults and correcting them. It is necessary that the roads constructed or which are to be constructed in future were according to proper design, measures to be taken for accident prevention, provision of safety signs and symbols, proper road markings, etc. and providing better access to services,
In order to provide a better perspective and view of the intersection with a visual aid it is essential to provide a simulation study to the intersection. To perform this activity we need a particular set of softwares, Such as AutoCAD, Sketch up, Vissim, Cube, BIM, In past there was a study conducted to compare a few simulation softwares but in this fast moving world of advancements there is great need of this kind of studies to be carried out, In particular we need to provide the best aids available currently so the comparative study exists.
To fulfill this need the topic covers all point of views and softwares related to the safety scenario being concentrated due to mandation in our country so the project might provide a huge opportunity for advancements in this particular area.

Body:

AIM

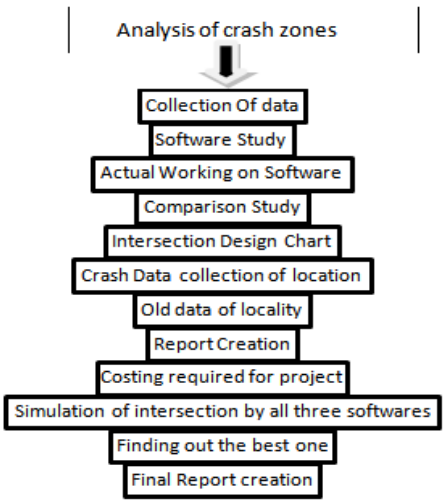
To provide a proper traffic behaviour we are going to provide a best software for the process by providing a comparative study on these aspects is also a must so that is the particular aim of this project. Furthermore,
Road Safety Audit is a systematic process for checking the road safety implications of highway improvements and new road schemes. The sole objective of the process is to minimize future road accident occurrence and severity once the scheme has been built and the road comes into use. So to provide this Case study is also an aim of this project.

OBJECTIVES

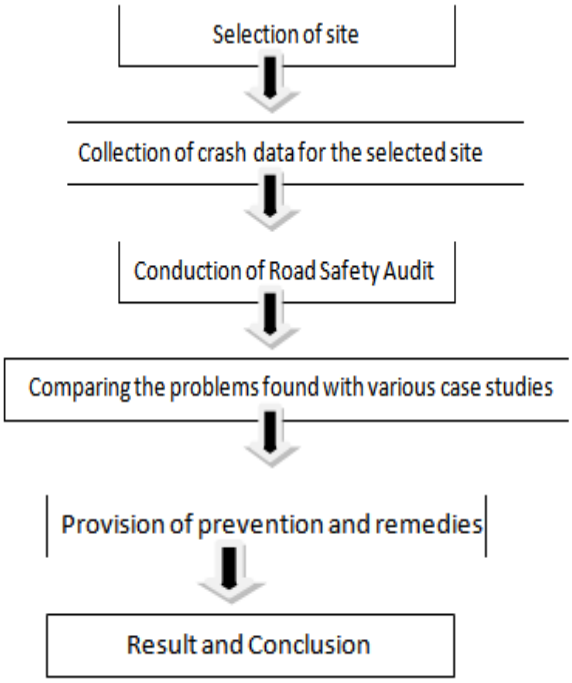
1. Selecting the best software for providing multimodal road simulation as per Indian roads.
2. Comparing Different softwares which are best in industry for simulation and design of roads.
3. Designing an intersection in consideration of the road safety aspects with low cost remedial measures.
4. Providing multimodal Simulation to the given intersection before and after the enhacements are bein provided.
5. Finding out the total funds required for development and minimizing them to the lowest sum of money to provide it efficiently.

METHODOLOGY

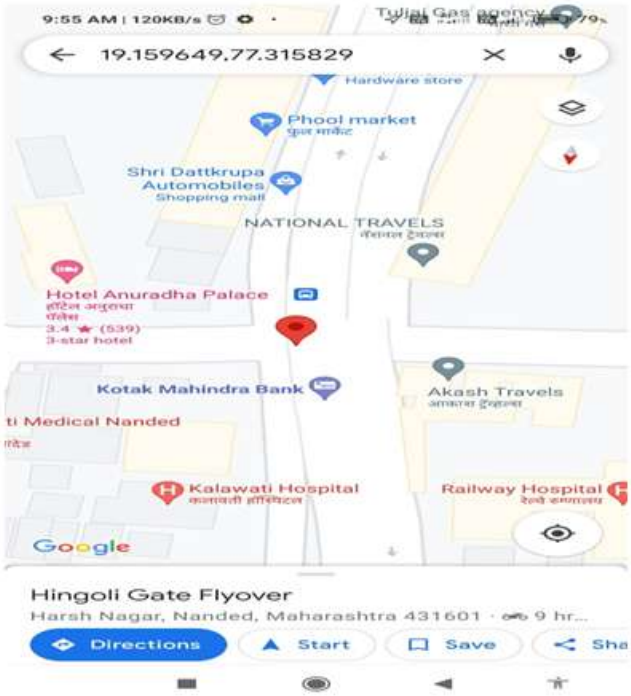
Scope of this case study is to provide a comparative study of softwares related to the simulation and design of a particular road network and to consider time factor to reduce it. Also along with this the Scope of this RSA work is to improve the standards of the existing roads, to reduce the rate of Crashes, reduction of traffic congestion, to deduce the conflict points and to increase the road user's safety.
The steps carried out for the Project are shown in the flow chart



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Description of Study Area
4 lane road intersection (Hingoli Gate To Chikhalwadi corner 1km)
Nanded is located in India
Straight Line Distance: 500 Mtrs and 100 meters / 1kms
Travel time : 5 minutes.

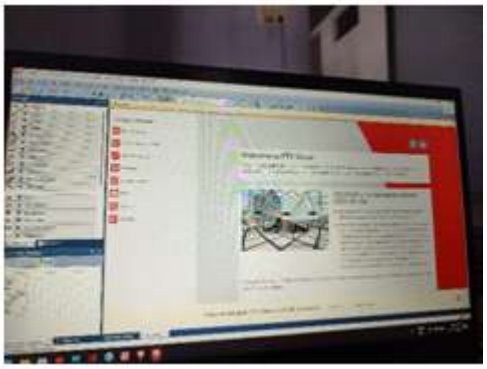


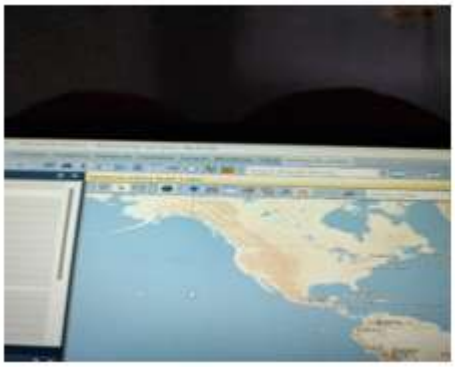
The audit process included inspection of operating condition of all the ends of intersection during day and night. To do that the RSA traveled through the entire project corridor (both at day and night time) and identified several safety critical components. Notes were taken on the way with respect to horizontal and vertical alignments; available sight distance; layouts of curves and intersections/interchanges; road cross-section; bridges; side drains; provision for parked vehicles, slow moving vehicles (tractors, bullock carts, bicycles) and pedestrians; bus bays; truck parking etc. In addition to these, the audit examined appropriate markings and signs, presence of clear zone, road side friction, traffic control devices, lighting requirement and other interim measures. During the audit the gave importance is given in observing the type of geometry and traffic behavior at a site, which would lead to a certain type of conflict and crash types with probable severity level. In this study, potential safety hazards were identified at the critical locations based on the RSA to be conducted. We will observe and assess all the risk elements along the project intersection and any unsafe road geometry, traffic operation, sub-standard design elements, and lack of appropriate infrastructure were noted. Based on the findings of RSA, suitable countermeasures were proposed.
Adding this particular intersection we will also provide a simulation of traffic behavior on this particular intersection before and after design during the peak hour. Again adding to the given methodology a deep study will be conducted to find best software for the job.

Software Comparative study:
PTV VISSUM:

- It can also be known as the best network design software which gives us the impression of the roads actual traffic network condition.
- This software creates a virtual data set of the movement that vehicle sustains quite a bit easily and a complete area map just like google maps
- This software does the importing of data from its brother software that is vissim.
- Unlike vissim the vissum software only provides us with volumetric study and not actual simulations to be precise about it.
- In and all best network formation software to know the traffic volumetric study but is not an actual simulation ware.

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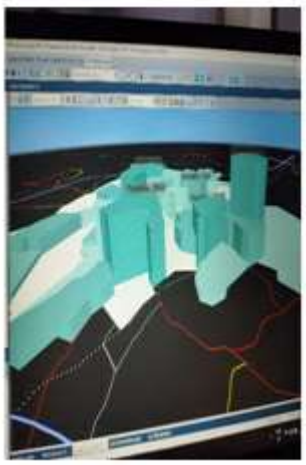




BIM COLLABRATE PRO:

- This actually is a complex combination of three of the best softwares of this generation.
- Autocad for basic road design and vehicle tracking, 3ds max for its detailed 3d design, Civil 3d for actual bridges and paths along the structure.
- After the final processing this software forms a view glass for simulation work flow design causing it a complex network structure.
- This complex structure gives the best result but is not worth purchasing and also the only software which gives flexibility of design without actual map data required.





Bentley Cube:

- There are three design-based modules in this particular software.

1. Cube Avenue:- Micro simulation static and dynamic design as per network details.
2. Cube Voyager:- This software is a beast simulation ware software easy and pin point precise designer made out more for city-based simulation network design data software.
3. Cube legion:- Standard full vehicle study simulation design software designed to build road network structure safety design.



PTV Vissim:

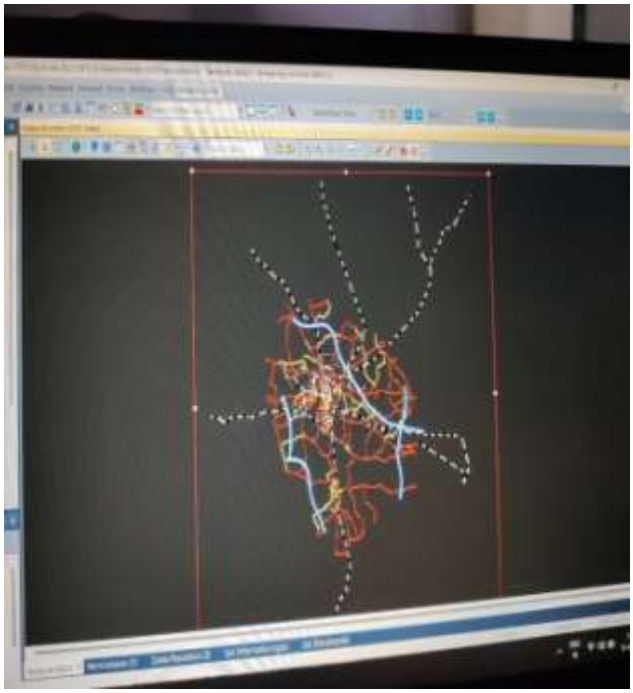
- This software is the best software to determine the dynamic as well as static data for interpretation of traffic data study.
- It also determines the conflict areas of the problems caused in intersection.
- By simulation in this software, it is also possible to design the traffic as per Indian driving conditions.
- Final verdict is this software gives best ui experience simple and effective determining net worth of work required to make the road safe

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Final Simulation Image:



II. RESULT & CONCLUSION:

When we compare all three software's and design the simulation of particular intersection, according to the study we found out that the best software to view the simulations in simplified manner is BIM. But the coding is difficult in this particular software, PTV vissim is a simple coding software with Indian vehicle sitting arrangements included but it shows only single path movement of vehicles. Study on Bentley cube software is yet inadequate as the software is being redesigned as per the Indian market survey till date but the UI is quite easy and accessible in this software's. As per my recommendations Bentley cube provides the best view of simulations as compared to two software's above but the pricing for software is the biggest issue over here. For my study of work in blackspot treatment and its simulation I did use all three software but for multimodal transportation simulation the best software recommended is BIM.

The source of inspiration of working on this project was completely two of my mentors, Primarily Aseem Tigga Sir, And Bhushan Burande Sir.

III. REFERENCE:

[1]. Arun S Bagi1, Dheeraj N kumar2, Road Safety Audit IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE) ISSN :2278-1684 Volume 1, Issue 6 (July-August 2012), PP01-08

[2]. Marisol Castroa , C. Angelo Guevarab,☐ , Angel Jimenez-Molinac, A methodological framework to incorporate psychophysiological indicators into transportation modeling, Transportation Research Part C 118 (2020) 102712, https://doi.org/10.1016/j.trc.2020.102712

[3]. Afshin Jafari a,∗ , Alan Both a , Dhirendra Singh b,c , Lucy Gunn a , Billie Giles-Corti, Building the road network for city-scale active transport simulation models, Simulation Modelling Practice and Theory 114 (2022) 102398, https://doi.org/10.1016/j.simpat.2021.102398

[4]. Yingheng Zhang a,b,c , Haojie Li a,b,c, *, N.N. Sze d , Gang Ren a,b,c, Propensity score methods for road safety evaluation: Practical suggestions from a simulation study, Accident Analysis and Prevention 158 (2021) 106200, https://doi.org/10.1016/j.aap.2021.106200

[5]. Albert Peireta , Eric Karpman a,⇑ , László L. Kovács a , JózsefKövecses a , Daniel Holz b , Marek Teichmann b, Modelling of off-road wheeled vehicles for real-time dynamic simulation, Journal of Terramechanics 97 (2021) , https://doi.org/10.1016/j.jterra.2021.04.001

[6]. Vivek Roy☐ , S.K. Mitra, Manojit Chattopadhyay, B.S. Sahay, Facilitating the extraction of extended insights on logistics performance from the logistics performance index dataset: A two-stage methodological framework and its application, Research in Transportation Business & Management 28 (2018), http://dx.doi.org/10.1016/j.rtbm.2017.10.001

[7]. Ana Ogando-Martínez ∗ , Francisco Troncoso-Pastoriza, Enrique Granada-Álvarez, Pablo Eguía-Oller, approximation method for the estimation of the actual reduced luminance coefficients of road surfaces for accurate lighting simulations, Sustainable Cities and Society 63 (2020), https://doi.org/10.1016/j.scs.2020.102502

[8]. Kaveh Safari a ,HessamAzariJafari, Challenges and opportunities for integrating BIM and LCA:



Methodological choices and framework development, Sustainable Cities and Society 67 (2021), https://doi.org/10.1016/j.scs.2021.102728

[9]. Baoju Liu a , Jun Long a , Min Deng b , Jianbo Tang b,* , Jincai Huang a, Revealing spatiotemporal correlation of urban roads via traffic perturbation simulation, Sustainable Cities and Society xxx (xxxx) xxx, https://doi.org/10.1016/j.scs.2021.103545

[10]. Hitesh kumar1, Mrs. Monika2 Research Paper on the Road Safety Audit and a Case Study on Kaithal-Kurukshetra Road Haryana, IndiaInternational Journal of All Research Education and Scientific Methods (IJARESM) ISSN: 2455-6211, Volume 5, Issue 5, May- 2017, Impact Factor:2.287

[11]. K. Durga Abhishek, K. Yogesh Kumar, and R. Vijayalakshmi*Road Safety Audit and Comparison with Accident Case Studies Indian Journal of Science and Technology, Vol 12(22), DOI: 10.17485/ijst/2019/v12i22/144265, June 2019

[12]. N. Naveen , M. Rajesh, M. Srinivas, Md. Fasioddin, ROAD SAFETY AUDIT OF A RURAL ROAD International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 4, April 2017, pp. 752-761, Article ID:IJCIET_08_04_087

[13]. Omkar Gholap1, Nikita Shinde2, Vaishnavi Shelke3,Navnath Navale4, Kuldeepak Deshmukh5 Road safety audit International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181Vol. 7 Issue 04,April-2018

[14]. Tummala Bharat Kumar1, ChukkapalliJeswanth Chowdary2, Road safety audit: a case study on NH-65 International Journal of Engineering & Technology, 7 (2.1) (2018)69-74

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