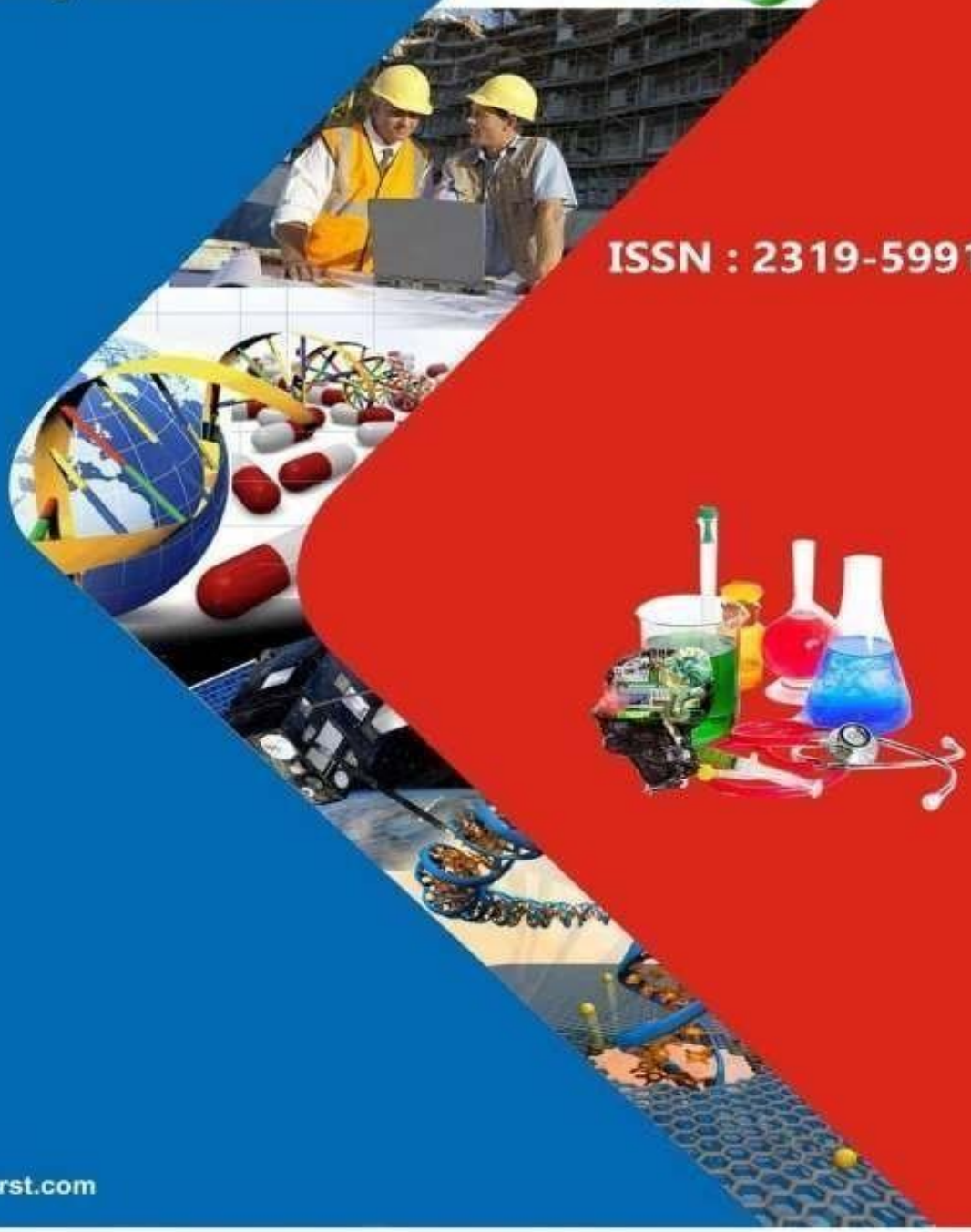
International Journal of Engineering Research and Science & Technology

IJERST

ISSN : 2319-5991



www.ijerst.com

Email: editor@ijerst.com or editor.ijerst@gmail.com

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 20, Issue 2, 2024

RESEARCH ON TRAFFIC CONGESTION AND IT'S MANAGEMENT IN LUDHIANA CITY

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ABSTRACT:

Traffic congestion has now become a very big problem in this modern world. People get stuck in traffic and that causes a lot of unwanted problems. Now, the problem of traffic congestion has become the national focus. Road congestions are seriously affecting people's normal travel; they are restricting the economical development, so this is a serious problem that needs to be solved as soon as possible. With the use of various traffic monitoring system and new technologies, using image and video processing technologies to detect road congestion and is attracting more and more interests. Ludhiana is a city with population over 1.93 million and more population means more vehicles and hence resulting in congestion. In this paper we will identify and study the problems causing traffic congestion problem in Ludhiana city and then propose a proper estimation method and solution for it.To resolve the problem of site visitor's congestion to start with we need a right and unique congestion estimation technique. So on this paper we are able to also discuss about range of congestion. In this review paper we will look into different efficient traffic congestion estimation methods. We have different methods like image texture analysis which uses grey scale level co-occurrence matrix method (GLCM), there is GPS trace analysis, multiple data estimation.

KEYWORDS: Congestion ,Traffic analysis, Estimation of congestion, Congestion management.

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

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INTRODUCTION:

Traffic congestion is such a condition on shipping community that happens as use increases, and is characterised through slower speeds, longer ride times, and elevated vehicular queueing. When traffic call for is extremely good enough that the interplay among networks slows the rate of site visitors circulate, this bring about some congestion.Urban traffic congestion is a huge and developing problem in many elements of the arena. Moreover, as congestion keeps to growth, the traditional approach of "constructing more roads" would not always paintings for a ramification of political, economic, and environmental reasons. In truth, building new roads can virtually compound congestion, in some instances, through inducing extra needs for vehicle journey that speedy devour away the additional potential? Against this backdrop of significant existing and growing congestion site visitors control strategies and information structures are wanted that can substantially boom capacity and enhance site visitors go with the flow efficiency.

Ludhiana City, with its burgeoning population and industrial activity, is no exception. The modern world's reliance on automobiles and the rapid urbanization process has led to a surge in vehicular traffic, resulting in congestion on Ludhiana's roads. This problem not only disrupts the daily lives of residents but also poses serious economic and safety concerns for the city.The implications of traffic congestion extend beyond inconvenience; it hampers economic development by impeding the efficient movement of goods and people. As Ludhiana serves as a pivotal industrial and commercial hub in Punjab, any hindrance to traffic flow directly impacts the region's economic productivity and competitiveness.

TRAFFIC CONGESTION:

A physical spectacle regarding the manner wherein vehicles hinder every others’headway as demand for inadequate road space methodologies full ability.

Problem Background:-

Ludhiana is the busiest business & commercial center in Punjab is dealing with severaltroubles in visitor’s control. In the present inadequacy of infrastructure centers in the metropolis, the visitors police is difficult to place ensures continuity in the

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float of sitevisitors. The street users should take care of the bullock cart aspect with the aid of facet with cutting-edge technology motors, main to discordance inside the glide of traffic.

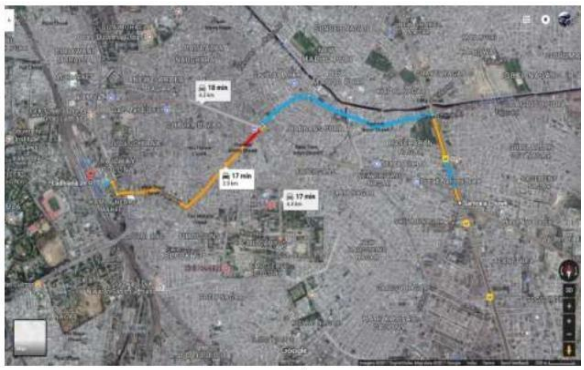


Fig 1.1 Illegal Parking on the road near a shop

Ludhiana has an old road network and now as the number of vehicles has also increased with the increase in the population of the city which has now increased to more than 1.9 million[1] the problem of congestion has increased in a large scale. Being an old city there are advantages of good networking of roads. There are more than one roads that leads to a major landmark destination.

Example Area:-

The distance from Samrala chowk to railway station Ludhiana is 4 km[2] and still it takes more than 15 to 20 minutes to travel this distance. The reasons behind this congestionis mainly increase in number of



vehicles and irregular parking on the roads. The roads from samrala chowk to railways station mainly consist of markets and that is also one of the main reason behind the jams and congestion of that route. As in the screenshot below of map route of samrala chowk to railway station Ludhiana.

Fig.1.2 Map showing routes from samarla chowk to railway station.

OBJECTIVES:

Reasons Behind traffic Congestion:-

1)Inadequacy of traffic police: Traffic police in Ludhiana town is insufficient in numbers compared to different mega towns.

2)Narrow roads: Streets of Ludhiana metropolis are not that extensive unfold, due to unlawful ownership on the street they are getting slender and turning into a purpose at the back of traffic jam.

3)Illegal Parking: Illegal parking on the road has been growing congestion each day

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from samrala chowk to railway station. On-road parking of cars is one of the major reasons in theback of critical traffic congestion on exclusive parts of the Ludhiana metropolis.

4)Higher purchasing power: There are families who own morethan two vehicles even when there are just two or three people in the family.

5)Improper planning of city development: Development plans always have a long term planning fir the city but here in Ludhiana city the planning is not proper and hence it is also one of the reasons behind the congestion problem of the city.

REVIEW LITERATURE:

Road traffic congestion in the developing world by(Vipin Jain, Ashlesh Sharma & Laxminarayan Subramanian 2014):-

After reading this research paper I concluded that road traffic congestion is a major problem is most developing nations.This paper consists of use of simple photo processing set of rules to estimate visitors density at a warm spot location using CCTV digital camera feeds.

Hall and Pendleton (1990):-

Investigated the association between hourly crash rates and the traffic volume-to-capacity ratio on rural roadways. They discovered that when traffic volume grows, so does the rate of traffic crashes on roadway sections.

Chandra, S Kumar, et. al. (1995):-

Conducted a detailed analysis of urban road capacity. It was emphasized that passenger car unit values for vehicle types are dynamic in nature and depend on all elements influencing vehicle behavior in traffic.

S. R. Samal, P. Gireesh Kumar, J. Cyril Santhosh, and M. Santhakumar's (2002):-

Observed their selected stretches and analyzed the received data in terms of travel time index, buffer time index, planning time index and also determined road capacity while referring IRC 106.

Jithin Raj, P. Vedagiri, et. al. (2022):-

Evaluated and comprehended the urban road LOS using two approaches, perception and non perception. The study used percent free-floe speed(PFFS) as service measure which is similar to existing manuals.

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Seelam Srikanth, Arpan Mehar (2017):-

Used different methods given in the literature used to calculate PCU value of vehicle types. It was found that these values are not realistic under traffic flow conditions observed in field data. **By Elenora D' Andrea, Francesco Marcelloni2017:-**

After reading this paper I understood the detection of traffic congestion through GPS data. This paper presents a good system or technique for detecting congestion or any other incident on the road through GPS data that are collected from GPS trackers and smartphones of the drivers on the road.

Singh et al.2019 :-

A study by Singh et al. highlighted the multifaceted nature of traffic congestion in Ludhiana, attributing it to a combination of factors such as inadequate infrastructure, mixed traffic conditions, and inefficient traffic management.

Theoretical Framework:

Introduction:

Traffic congestion in Ludhiana City has become a pressing issue due to its adverse effects on daily life, economic activities, and road safety.This theoretical framework aims to explore the underlying factors contributing to traffic congestion in Ludhiana and propose potential solutions based on existing research and methodologies.

FACTORS CONTRIBUTING TO TRAFFIC CONGESTION:

Population Growth and Vehicle Ownership:

Ludhiana's population growth correlates with an increase in vehicle ownership, leading to higher traffic volume on its roads. The rise in private vehicle ownership exacerbates congestion during peak hours and in densely populated areas.

Inadequate Infrastructure:

The city's infrastructure struggles to keep pace with the rapid urbanization and population growth.

Mixed Traffic Flow:

Ludhiana's roads accommodate a diverse mix of vehicles, ranging from traditional bullock carts to modern automobiles. This heterogeneity in traffic flow creates disruptions and slows down overall movement, especially in congested areas.

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Traffic Management Policies:

Inefficient traffic management strategies, such as ineffective signal timings, lack of enforcement of traffic rules, and inadequate parking facilities, further compound congestion issues.

Lack of Real-time Traffic Monitoring:

Limited availability of real-time traffic data hinders authorities' ability to promptly identify congestion hotspots and implement timely interventions

Methods for Traffic Congestion Estimation:

Image Texture Analysis:

Utilizing techniques like Grey Level Co-occurrence Matrix (GLCM), image texture analysis enables the extraction of valuable information from traffic camera feeds.

GPS Trace Analysis:

GPS data from vehicles can provide insights into traffic patterns and congestion levels. By analyzing vehicle trajectories and speeds, researchers can infer the density of traffic flow and identify congested areas.

Multiple Data Estimation:

Integrating data from various sources, including traffic cameras, GPS traces, and traffic flow sensors, allows for a more comprehensive assessment of congestion. By combining multiple data streams, researchers can enhance the accuracy and reliability of congestion estimation models.

PROPOSED SOLUTIONS:

Infrastructure Development:

Investing in expanding road capacity, constructing new thoroughfares, and improving public transportation infrastructure can alleviate congestion by providing alternate routes and encouraging modal shifts.

Intelligent Traffic Management Systems:

Implementing intelligent traffic signal control systems, dynamic route guidance, and realtime traffic monitoring technologies can optimize traffic flow and reduce congestion at critical intersections.

Public Awareness and Education:

Educating the public about responsible driving behaviors, promoting carpooling and ridesharing initiatives, and encouraging the use of public transportation can help mitigate traffic congestion.

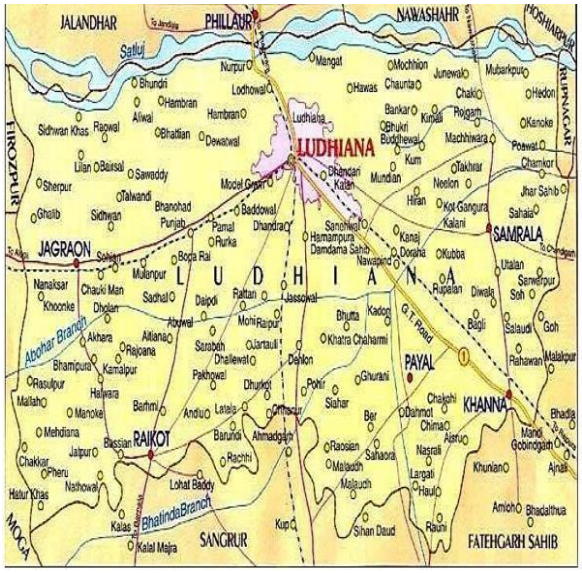
International Journal of Engineering Research and Science & Technology

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RESEARCH METHODOLOGY:

Overview of task



The method used here have to be in right steps as proven under within the following determine to get the first-rate and accurate end result.

Site survey

The very first step to be done in any type of construction work is site survey. We need to go and get a proper idea of the site and its details.

Problem identification

Now the second one step is to identify the troubles of the site and seek an answer for that. In this step we need to identify the problems in the area or the sight we have chosen.

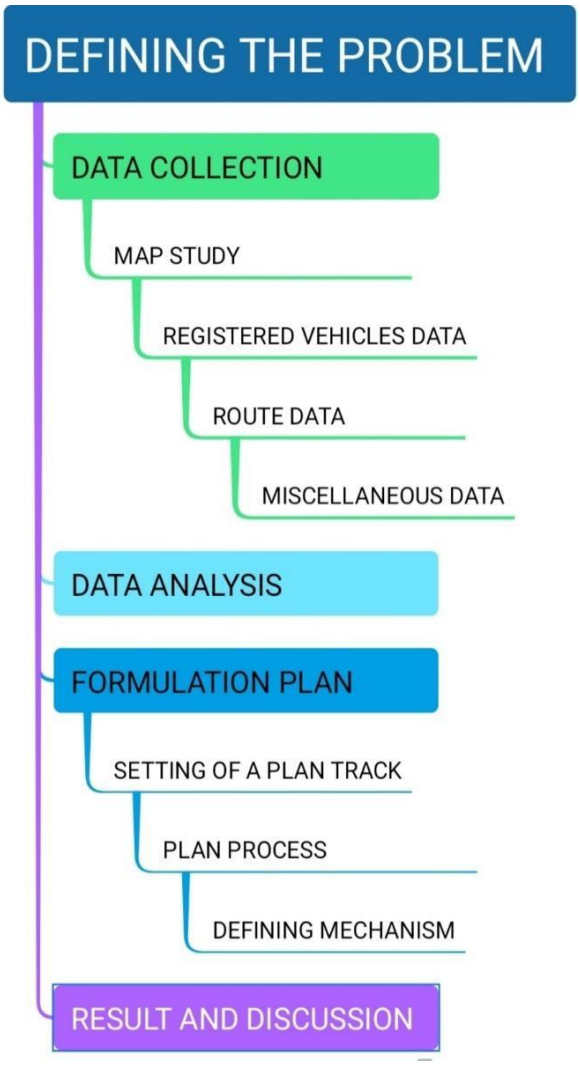
Data Analysis

In this step we examine the data which has been accumulated in advance. There are numerous styles of records collections performed at the web page for the advancedconstruction and to save you the structure from any disaster.

Planning

Planning is an crucial factor for any paintings. In making plans, each and every step are organized in a serial and are scheduled in a right manner. Planning is a pre proposed work for any structure going to be made.

Flow Chart of Methodology:



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DATA COLLECTION:

1. Map study and site selection:-

At first we have to study the map of the city and the route that we are taking for the survey. The city Ludhiana has 368000 hectare of geographical area and as it is an old city of Punjab state it has a good routes of roadways in the city but due to the increase in population the city has become congested and polluted as well.

Fig 1.3 Road map of Ludhiana district

2) Data of Registered vehicles in Ludhiana:-

Type of vehicles	No of vehicle registered
Two wheelers	4729594
Light motor vehicles	66734
Jeeps	63527
Cars	616549
Taxis	18539
Buses	30260
Goods carrier	201758
Miscellaneous	536078
Total	6262939

3) Miscellaneous data:-

Average speed	9kmph
Average time	20 minutes
Distance	3.2 km
Population of Ludhiana	1.93 million
Number of registered bus	6291
Four wheelers	31694
Carriage way	10+10m
Waiting time for bus	10-15 minutes

Data of past three years:-

THREE YEAR TREND

MONTH	2023	2022	2021
January	4,067	3,988	4,545
February	5,164	4,052	4,304
March	6,436	5,380	5,146
April	5,828	5,470	3,854
May	6,419	5,154	1,839
June	5,790	5,084	3,019
July	6,609	4,833	3,694
August	6,642	6,358	3,359
September	6,506	4,639	3,194
October	7,520	9,778	4,709
November	9,939	8,952	5,551
December	7,990	6,674	4,705
Total	78,910	70,362	49,919

(Source: Transport Department)

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The official figures compiled by the Regional Transport Office (RTO) here, a copy of which is with The Tribune, showed that November last year had recorded the highest monthly registrations of 9,939 new vehicles while January had registered the lowest monthly average of 4,067 vehicles in 2023. It was the highest since 2021.

The cumulative figure of the past three years takes the new registrations in Ludhiana to 1,97,191 vehicles, which accounted for 5,477 new vehicles hitting the road here every month and almost 183 new vehicle registrations daily.

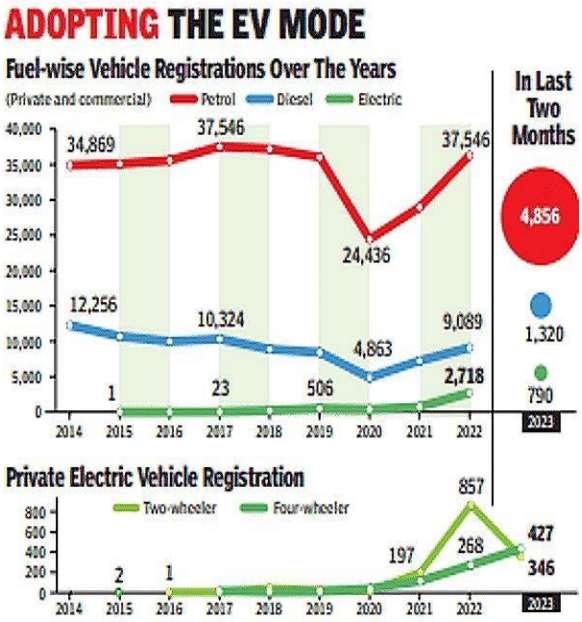
Of the total 78,910 new vehicles registered here in 2023, 68,683 were non-transport, meaning private vehicles, while the rest 10,227 were transport vehicles.

Ludhiana leads:

Vehicle registrations in the state were maximum in Ludhiana following which the workload here was also the highest. “The last two months of 2023 had recorded the maximum registrations of new vehicles during the entire year.

As we see in the above graph of Fuel wise vehicle registrations Petrol has been the highest vehicles registered.

CONCLUSION:



1) Traffic congestion in Ludhiana city poses a significant challenge that requires urgent attention and effective management strategies. With a population exceeding 1.93 million, resulting in frequent congestion on its roads.

2) November last year had recorded the highest monthly registrations of 9,939 new vehicles & January had registered the lowest monthly average of 4,067 vehicles in 2023.

3) Past three years :-

A) new registrations in 1,97,191 vehicles,

B) almost 183 new vehicle registrations daily. 78,910 new vehicles registered here in 2023, 68,683 were non-transport, 10227

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were transport vehicles.

4) In the Year 2024 till March the data of registered vehicles are: January – 26000,

February - 46000, March – 24000 . February is the month which have noted highest registered vehicles till now (March).

5)By following techniques or technology mentioned in this page traffic authorities can gain valuable insights into traffic patterns, identify congestion hotspots, and devise targeted solutions.

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