Traffic Congestion Analysis and Solution During Nashik Kumbh Mela

Traffic Management And Analysis

[1]Yukta Narendra Mali [2]Rakhee Hemant pelmahale , [3]Arshin Tanveer Shaikh,[4] Pravin Sunil Gavit

[1]Diploma Student , [2]Diploma student , [3]Diploma student ,[4]Diploma Student

[1]Civil engineering, [1]K.K.Wagh college, Nashik, India

[1]yuktamali5539@gmail.com, [2]rakheepelmahale7@gmail.com, [3]arshinshaikh741@gmail.com, [4]montugavit004@gmail.com

Abstract— **The Nashik Kumbh Mela is a very big religious festival where millions of people come to Nashik for holy bathing in the Godavari River. During this time, the city becomes overcrowded and heavy traffic problems are seen everywhere. Roads get blocked, vehicles move very slowly, parking space becomes insufficient, and even ambulances face difficulty.This project studies why traffic congestion happens during Kumbh Mela and what solutions can reduce this problem. The study includes traffic survey, parking study, and observation of vehicle and pedestrian movement.**

The study suggests solutions like one-way traffic system, temporary parking areas outside the city, shuttle buses, separate walking paths for pilgrims, and use of smart traffic systems. Proper planning and technology can help in managing traffic smoothly during future Kumbh Melas.

(Abstract)

Index Terms— **Kumbh Mela, Traffic Congestion, Smart Traffic Management, GIS Mapping, Crowd Control, Parking Management, Pedestrian Safety, Nashik City.** *(key words)*

_____

I. INTRODUCTION (HEADING 1)

The Kumbh Mela is a major spiritual and cultural event held in four cities of India — Prayagraj, Haridwar, Ujjain, and Nashik. In Nashik, the main activities take place around Ramkund, Tapovan, and nearby ghats.

During the Kumbh Mela period, the population of Nashik increases many times compared to normal days. Lakhs of pilgrims, saints, tourists, volunteers, and officials enter the city daily. Along with people, a huge number of vehicles such as cars, buses, two-wheelers, taxis, and goods vehicles also enter the city.

Because of this sudden increase:

- Roads become highly overcrowded and slow-moving.
- Traffic jams continue for several hours, especially during peak bathing days.
- Ambulances and emergency services struggle to move quickly.
- Fuel consumption increases due to idling vehicles.
- Noise and air pollution levels rise significantly.
- Local residents face difficulty in commuting to work, school, or hospitals.

Therefore, traffic management becomes one of the most important responsibilities of city administration during the Kumbh Mela.

This project focuses on identifying the causes of traffic congestion and proposing effective and realistic traffic management solutions for future Kumbh Melas in Nashik.

historical background and significance

The Kumbh Mela is deeply connected to Hindu mythology and the story of Samudra Manthan (churning of the ocean).

Nashik is considered sacred because drops of Amrit (nectar of immortality) are believed to have fallen here.

Over the years, the number of visitors has increased rapidly due to:

- Improved road and railway connectivity to Nashik.
- Increased use of private vehicles.

- Awareness through television and social media.
- Population growth and religious tourism.

In earlier times, traffic was manageable because the number of vehicles was less. However, in recent Kumbh Melas, heavy congestion has been observed particularly near:

- Ramkund
- Tapovan
- Mumbai Naka
- Dwarka Circle
- CBS (Central Bus Stand)

These areas experience high pedestrian and vehicle interaction, which increases delay and accident risk. This clearly shows that modern and scientific traffic planning is necessary.

II. PAST KUMBH MELAS AND THEIR SCALE

The Kumbh Mela has grown significantly over the centuries. In the 19th century, gatherings like the 1823 Kumbh at Prayagraj attracted around 4–5 lakh pilgrims, which was considered very large at that time. With the development of railways and road transport in the 20th century, participation increased rapidly. By 1954, nearly 50 lakh people attended, and by 1989 the number crossed 1 crore.

In the 21st century, the scale became massive. The 2001 and 2013 Kumbh at Prayagraj saw attendance of several crores, with 2013 recorded as the largest peaceful human gathering in the world, crossing 10 crore visitors over the event period. Similarly, Kumbh Melas at Haridwar, Ujjain, and Nashik have also witnessed massive crowds, requiring advanced planning for traffic, safety, and infrastructure management.

Evolution of organization and infrastructure

In the past, local religious authorities and communities organized the Kumbh Mela with little help from the state. However, as the festival grew, the British colonial government became interested in managing it, mainly for reasons of law and order. They set up basic administrative systems to ensure safety and public health. After independence, the Indian government took on a much bigger role. It has provided modern amenities, medical services, and infrastructure to handle the large number of pilgrims. This has included building temporary cities, water supply systems, sewage treatment, transportation networks, and security measures, making sure that the spiritual experience stays safe and accessible.

.Abbreviations and Acronyms (Heading 2)

- PCU – Passenger Car Unit
- LOS – Level of Service
- V/C Ratio – Volume/Capacity Ratio
- GIS – Geographic Information System
- CCTV – Closed Circuit Television
- RTO – Regional Transport Office
- MSRTC – Maharashtra State Road Transport Corporation

Units

- km – Kilometer
- m – Meter
- hr – Hour
- min – Minute
- PCU/hr – Passenger Car Unit per hour

Scope of project

1. Traffic Volume Study

To measure the number and type of vehicles entering Nashik during the Kumbh period and compare it with normal days.

2. Identification of Congested Areas

To identify major traffic bottlenecks and intersections where congestion is severe.

3. Parking Management Study

To study temporary and permanent parking arrangements and evaluate whether they are sufficient for peak demand.

4. Public Transport Planning

To analyze the effectiveness of buses, shuttle services, and MSRTC operations during the event.

5. Pedestrian Movement Study

To observe and analyze pedestrian flow near ghats and check conflicts between pedestrians and vehicles.

6. Emergency Route Planning

To examine whether special routes are available for ambulances, fire brigades, and police vehicles.

:

Objectives

- To observe how traffic flow changes during the Mela period due to the sudden increase in vehicles and pilgrims.
- To find out reasons such as narrow roads, heavy pedestrian movement near Ramkund, illegal parking, and lack of proper traffic control.
- To compare the number of vehicles with the carrying capacity of roads and calculate the V/C ratio.
- To study the shortage of parking spaces and its effect on smooth traffic movement.
- To understand how mixed movement of vehicles and pilgrims affects safety and causes delays.
- To recommend measures like park-and-ride systems, shuttle services, one-way traffic, and proper signage for better traffic management.

methedology

The project follows a step-by-step systematic approach:

1. Study Area Selection

The following major roads and junctions were selected for study:

- Mumbai Naka
- Dwarka Circle
- CBS Area
- Panchavati Area
- Ramkund Area

These locations were chosen because they experience maximum congestion during Kumbh Mela.

2. Data Collection

Data was collected by:

- Manual traffic counting during peak and non-peak hours.
- Classifying vehicles into two-wheelers, cars, buses, auto-rickshaws, and trucks.
- Observing traffic conditions during Shahi Snan days.
- Discussing problems with traffic police officials.

3. Traffic Analysis

- Conversion of vehicles into PCU (Passenger Car Unit).
- Calculation of Volume/Capacity (V/C) ratio.
- Identification of peak hour traffic flow.
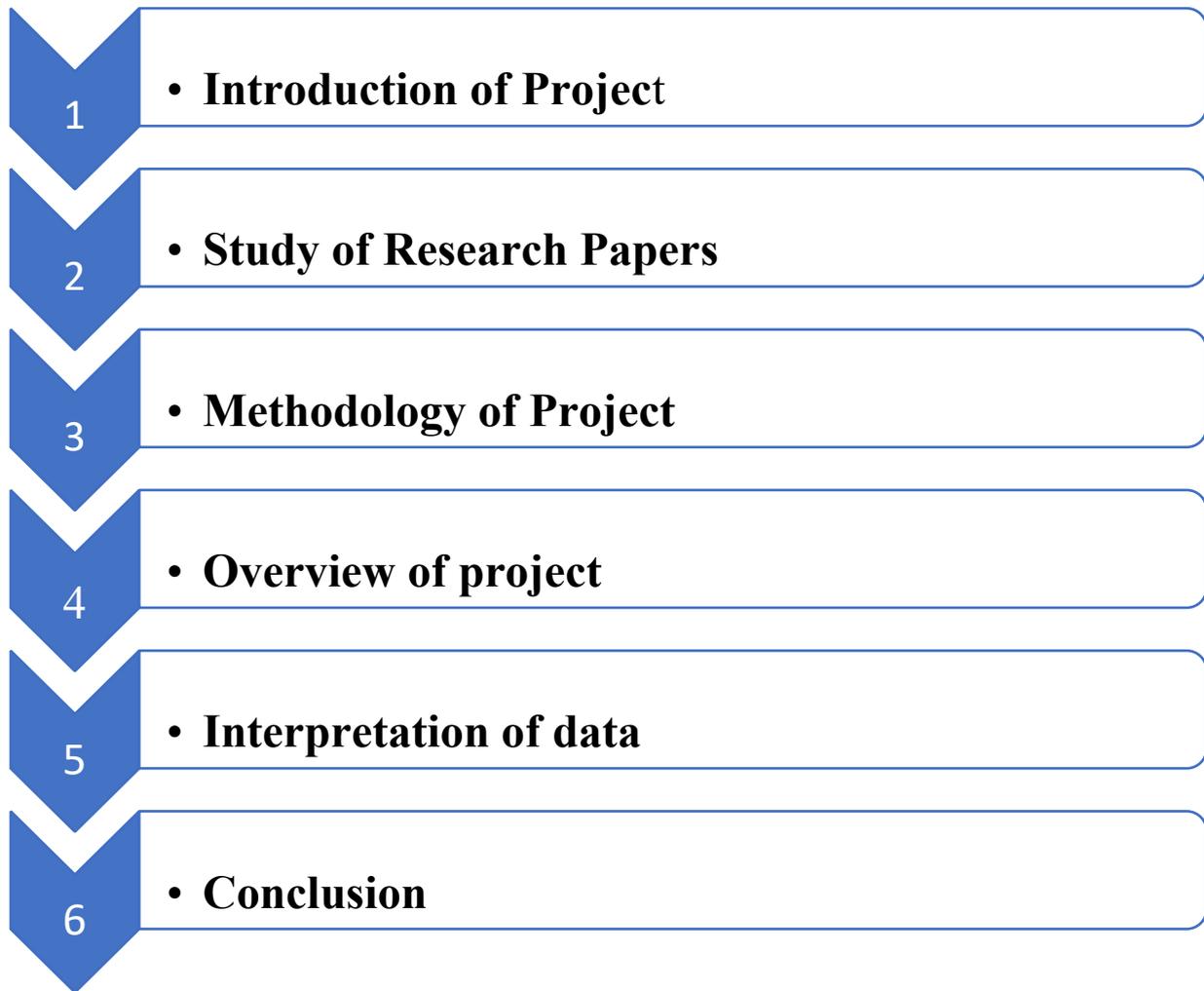- Study of Level of Service (LOS).

4. Problem Identification

The following problems were identified:

- Narrow roads in old city areas.
- Illegal roadside parking.
- Encroachment by temporary shops and vendors.
- Lack of clear direction signboards.
- Mixed traffic movement without lane discipline.
- Heavy pedestrian crossings without proper control.

5. Suggesting Solutions

Based on collected data and analysis, practical and cost-effective solutions were suggested.

1	• **Introduction of Project**
2	• **Study of Research Papers**
3	• **Methodology of Project**
4	• **Overview of project**
5	• **Interpretation of data**
6	• **Conclusion**

Flow chart of Project

1. Introduction of Project

This project studies traffic congestion during the Nashik Kumbh Mela held in Nashik. During this event, lakhs of pilgrims visit the city, which creates heavy traffic problems. The project focuses on understanding these traffic issues and finding practical solutions.

2. Study of Research Paper

Previous research papers on Kumbh Mela and other mega events were studied. These papers explain problems like traffic jams, parking shortages, mixed traffic flow, and emergency delays. They also suggest solutions such as smart traffic systems, GIS mapping, and better public transport planning.

3. Project Methodology

The project includes traffic volume survey, parking study, and observation of pedestrian movement. Data was collected from major junctions and crowded areas. The collected data was analyzed to identify congestion points and peak hour traffic load.

4. Overview of Project

The project analyzes causes of traffic congestion such as narrow roads, sudden population increase, and lack of parking. It also proposes short-term and long-term traffic management strategies to reduce congestion during Kumbh Mela.

5. Interpretation of Data

The data shows that traffic volume during peak hours exceeds road capacity. Parking demand is higher than available space. Mixed movement of vehicles and pedestrians reduces speed and increases congestion.

6. Conclusion

Traffic congestion during Nashik Kumbh Mela is mainly caused by high crowd density and limited infrastructure. With proper planning, smart traffic systems, and better coordination, congestion can be reduced and public safety can be improved.

- Result

1. Short-Term (Immediate) Solutions

Sr. No.	Solution Type	Description	Expected Outcome
1.	Traffic Diversion	Create temporary one-way routes near ghats and temples.	Reduces congestion and vehicle conflict.
2.	Temporary Barricades	Use metal barricades to separate pedestrians from vehicles.	Improves safety for pilgrims.
3.	Signage and Directions	Place clear, visible direction boards and maps in Marathi, Hindi, and English.	Reduces confusion among drivers and visitors.
4.	Volunteer and Police Management	Deploy trained volunteers and additional traffic police at junctions.	Quick control in case of jams.
5.	Temporary Parking Zones	Allocate open grounds for temporary parking with shuttle connections.	Decreases vehicle load near ghats.

2. Long-Term (Permanent) Solutions

Sr. No.	Category	Proposed Solution	Advantages
1.	Infrastructure	Widen major approach roads to 4-lane standard.	Increases road capacity and reduces congestion.
2.	Public Transport	Introduce electric shuttle buses from parking areas to ghats.	Reduces pollution and private vehicle use.

3.	Intelligent Traffic System (ITS)	Install AI-based traffic cameras and real-time monitoring at major junctions.	Enables immediate response to congestion.
4.	Smart Parking	Multi-level parking facilities with automatic ticketing.	Saves space and improves organization.
5.	Pedestrian Management	Construct separate elevated footpaths and bridges for pilgrims.	Prevents road crossing delays and accidents.
6.	Information System	Mobile app and LED display system showing traffic routes, timings, and diversions.	Guides visitors efficiently.
7.	Emergency Management	Dedicated ambulance and police lane across the route network.	Fast emergency response during crowding.

3. Proposed Solutions

1.   Traffic Engineering Measures
- One-way traffic system
- Diversion routes
- Dedicated emergency lanes
- Temporary flyovers (if required)

2. Parking Management
- Peripheral parking zones
- Park-and-ride system
- Shuttle bus service

3. Public Transport Strengthening
- Extra MSRTC buses
- Shuttle service from parking zones
- Special railway scheduling

4. Smart Traffic Management
- CCTV monitoring
- Drone surveillance
- GPS-based traffic control
- Real-time traffic updates

5. Pedestrian Management
- Separate walking corridors
- Barricading
- Crowd density monitoring

4. Temporary Parking Locations

1. Large Open Grounds

o Agricultural fields (with owner permission)

o Government vacant land

o Parade grounds

2. School & College Grounds

o Grounds of colleges and schools (during holidays)

o Large playground areas

3. Stadium Areas

o Parking around sports complexes

o Open stadium land

4. Industrial Area Open Plots

o Vacant MIDC plots

o Factory open yards (temporary agreement)

5. Highway-Side Land

o Land near major highways entering Nashik

o Before city entry points (to stop vehicles outside)

6. Railway Yard Surroundings

o Open land near railway stations (if available)

7. Unused Construction Sites

o Large approved but undeveloped layouts

8. River-Side Open Land (Safe Distance)

o Open flat land away from flood zone

9. Outer Ring Village Grounds

o Open land in villages around Nashik

o Use shuttle buses from there

5. Total Visitors

Event Year	Total visitors (Approx.)	Key Notes
2027-28 (Projected)	5-10 Crore (50-100 million)	Authorities preparing for up to 10 crore visitors: 1+ crore Expected on Shahi Snan days
2015	2.5-3 Crore (25-30 million)	Major sanitation setup; heavy crowd in Nashik & Trimbakeshwar

2003	60 Lakh (6 million)	Stampede near Ramkund
1992	22 Lakh (2.2 million)	Main Parvani day peak
1980	15-20 Lakh (1.5-2 million)	Start of rapid growth phase

Conclusion : The Kumbh Mela held at Nashik is one of the largest religious gatherings in India, attracting lakhs of pilgrims within a short duration. Such a massive gathering creates extraordinary pressure on the city's transportation system. This project focused on analyzing traffic congestion problems during the Kumbh Mela and proposing practical and effective solutions to manage traffic efficiently.

From the traffic study conducted at major locations such as Ramkund, Tapovan, Mumbai Naka, Dwarka Circle, and CBS area, it was observed that traffic volume increases multiple times compared to normal days. The Volume/Capacity (V/C) ratio at several junctions exceeded 1.0, which clearly indicates overloading of roads and severe congestion. Narrow internal roads in old city areas, insufficient parking facilities, roadside encroachments, and heavy pedestrian movement were identified as the major causes of traffic jams.

The study also revealed that parking demand during peak bathing days is much higher than available supply. Due to this shortage, vehicles are parked on roadsides, reducing effective carriage width and increasing delay. Mixed movement of vehicles and pedestrians near ghats further slows down traffic speed and increases safety risks. Emergency vehicles also face difficulty in moving quickly during peak hours, which can create serious public safety concerns.

However, the analysis shows that traffic congestion during the Kumbh Mela can be effectively controlled with proper planning and scientific traffic management strategies. Solutions such as the implementation of a park-and-ride system, shuttle bus services from outer parking areas, temporary one-way traffic systems, zonal traffic restrictions, pedestrian segregation corridors, intelligent traffic monitoring using CCTV, and dedicated emergency green corridors can significantly reduce congestion levels.

It is also important that authorities focus on public awareness programs, digital signboards, real-time traffic updates, and strict enforcement of traffic rules. Proper coordination between municipal authorities, traffic police, transport departments, and event organizers is essential for successful execution of these measures.

In conclusion, traffic management plays a crucial role in the successful organization of the Kumbh Mela at Nashik. With advanced planning, proper infrastructure development, and smart management techniques, congestion can be minimized, travel time can be reduced, safety can be improved, and environmental impact can be controlled. If the recommended solutions are implemented effectively, future Kumbh Melas in Nashik can be conducted in a safer, smoother, and more organized manner for pilgrims as well as local residents.

III. ACKNOWLEDGMENT

REFERENCES

1.   Nashik Municipal Corporation, "Traffic Management Plan for Simhastha Kumbh Mela," Nashik, India, 2015. Available: https://nmc.gov.in

2.   Ministry of Road Transport and Highways, "Road Safety and Traffic Management Guidelines," Government of India, 2022.
Available: https://morth.nic.in

3.   Developing Public Transport Accessibility Model for Nashik City, Maharashtra, India
Available: https://www.academia.edu/download/83017901/Developing-Public-Transport-Accessibility-Model-For-Nashik-City-Maharashtra-India.pdf

4.   Kumbh Mela: Nasik. Dr. Bibhuti Tripathy = Kumbh Mela: Nasik City Logistics study of the state shuttle-bus transportation system using simulation approach 2015 Available : https://share.google/zojuqFGVxT04H84vO

5.   Transport Management for Nashik City. Ravindra B. Bagul Prof.Dr.P.G.Gaikwad Nashik India 2016 .
Available : 1462170452_02-05-2016.pdf https://share.google/mFM56JFgLYSFrjJDM

6.   Smart Management of Kumbh Mela 2025 .PROF.K R JALAJA, Ms.DEEKSHA S .
Available: https://share.google/p7VNVUfMOW3WiG05f