Revolutionizing Road Infra with Modern Equipment, Technologies, Sustainable Materials and Policy Guidelines

February 29th - March 1st, 2024, Manekshaw Centre, New Delhi

Project iRASTE

Intelligent Solutions for Road Safety through Technology & Engineering

Re-imagine Road Safety with the predictive power of AI

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Agenda

* Background

* Project Overview

* New Innovations

* Project Outcomes

* Summary

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Project Background

* Started in Sep 2021 with the primary objective of reducing Road Accidents in Nagpur. Launched by Minister Gadkari ji.

* Project fused together <u>ADAS Devices</u>, <u>AI based prediction models</u>, <u>Innovative Driver training methods</u>, <u>Transport engineering</u>, Wide scale <u>citizen awareness programs</u> & Golden hour <u>black spot intervention programs</u> in a holistic manner.

* Undertaken by a consortium: Central Road Research Institute (CSIR - **CRRI**), Mahindra & **Mahindra, INAI** (Applied Research Center for AI at IIIT-Hyderabad)**,** International Institute of Information Technology (**IIITH**) Hyderabad, & **Intel** India.

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Goal: Implementation of a holistic Safe Systems Approach for **up to 50 % reduction in road crashes** by leveraging **A**rtificial **I**ntelligence.

Vehicle Safety
ADAS + Driver Trainings

Camera focused on road

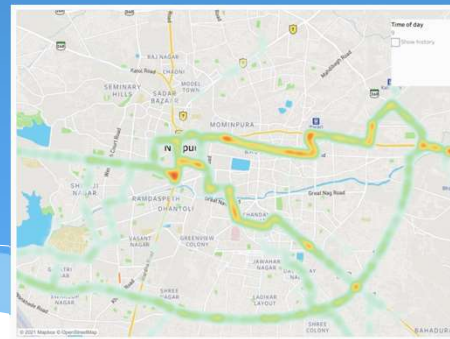Display unit *(audio + visual alerts)*

Infrastructure Safety
Blackspots Improvement Plan

Mobility Analysis
Greyspot Map

Social Awareness
City Wide Campaigns

5Es – iRASTE Model

Engineering - Vehicle

ADAS   DMS

Engineering - Infra

Blackspot DPRs   Digital Infra Mapping

Greyspot-Traffic police/C&C   **Enforcement**

Blackspot Responder (Trystander) Cell   **Emergency**

Avgatkara - Family Centric Campaign

Good Samaritan – City wide First-aid training   **Education**

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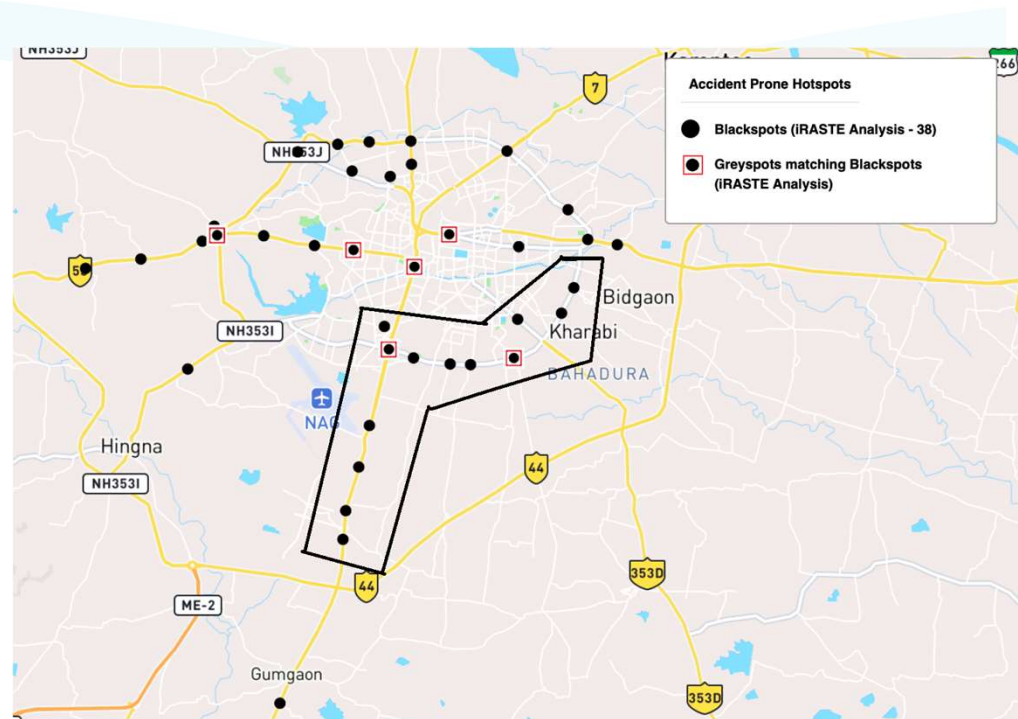
Project Coverage & Blackspot Focus Area

- 250 ADAS enabled Buses – 150 NMC Aapli Buses 150 + 50 School Buses + 50 Others
- 1100 Drivers trained in Defensive driving
- 150 Safety Champion Awards Delivered
- 65 Lakh Kilometers covered (May '23)
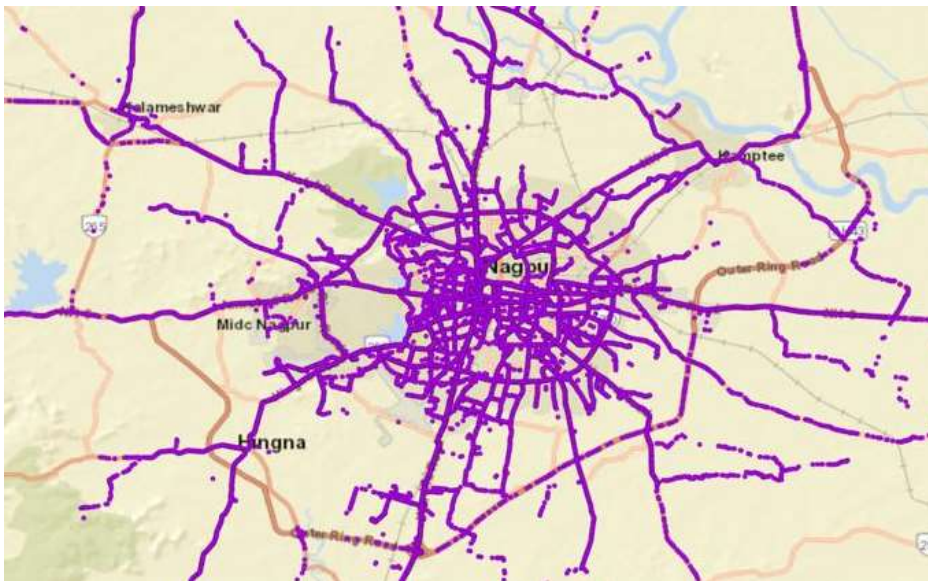
Coverage of Nagpur road network by ADAS buses

Focus Area for Blackspot & Awareness Measures

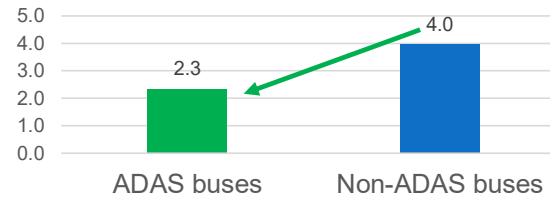**International Road Federation - India Chapter**
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iRASTE Nagpur - Project Outcomes

RISK SCORE TREND of NMC's ADAS* buses

Risk score values: CP: 73, OCT'22: 62, NOV'22: 63, DEC'22: 60, JAN'23: 59, FEB'23: 54, MAR'23: 54, APR'23: 57, MAY'23: 59, JUN'23: 53, JUL'23: 55, AUG'23: 51
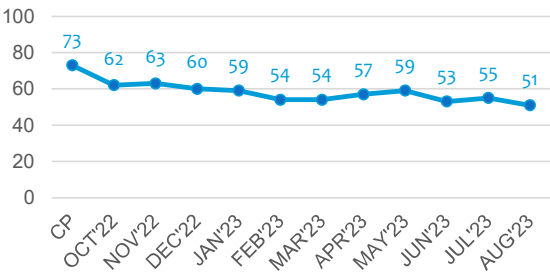
30% reduction in risk score

ACCIDENTS PER 50 BUSES
Jan - Aug, 2023

ADAS buses: 2.3
Non-ADAS buses: 4.0

41% lower accidents in ADAS buses in '23

Remedial Measure
DPRs @ **8 Blackspots**
Implemented -4, WIP-4

Proper pedestrian movement

Proper traffic movement

40% reduction in fatalities estimated after all remediation measures are complete

Greyspot Map
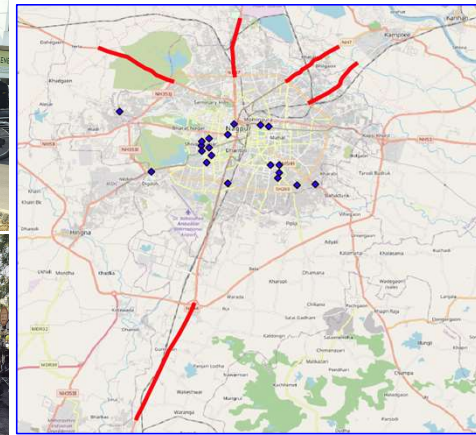
Greyspot Map
Identified
20 new spots and 5 unsafe corridors

8 Trystander Cells

31 lives saved in past 4 months

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Driver Safety Performance Summary
Nagpur Municipal Corporation (NMC)

RISK SCORE TREND of NMC's ADAS* buses

Observed ideal score range is 50-55

ACCIDENTS PER 50 BUSES Jan - Aug, 2023

In 2023, ADAS* buses reported **41% lower accidents**

2.3 — ADAS buses (Number of Accidents per 50 buses)
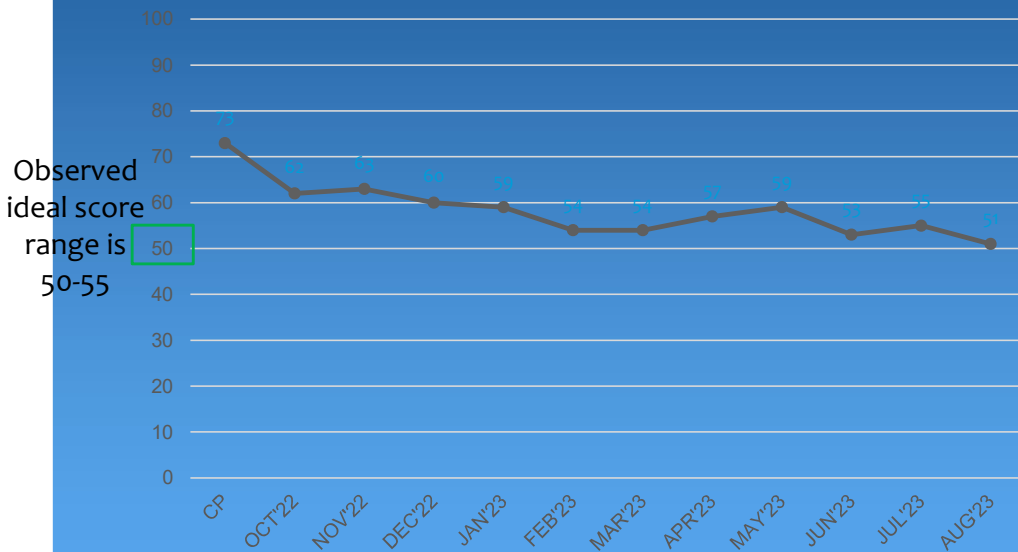
4.0 — Non-ADAS buses (Number of Accidents per 50 buses)
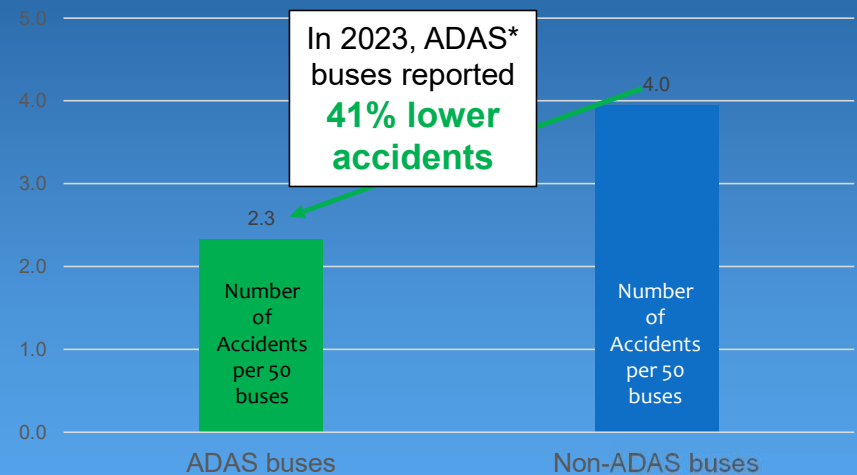
✓ **Accident rate in ADAS buses has seen a significant decline**
• In the 1st 8 months of 2023, ADAS buses reported **41% lower accidents** than non-ADAS buses.

*ADAS: Advanced Driver Assistance System
Driver display unit of ADAS safety device →

Blackspots

- Analyzed 117 listed spots from all sources & identified **38 Blackspots**

- Detailed Project Report (**DPRs**) for all the 38 locations were **delivered** in September 2022 to 5 Road Owning Agencies *(NHAI, NMC, PWD-SR, PWD-NHAI, PWD-WB)*
  - 8 Blackspots have been identified and remedial measures are being implemented
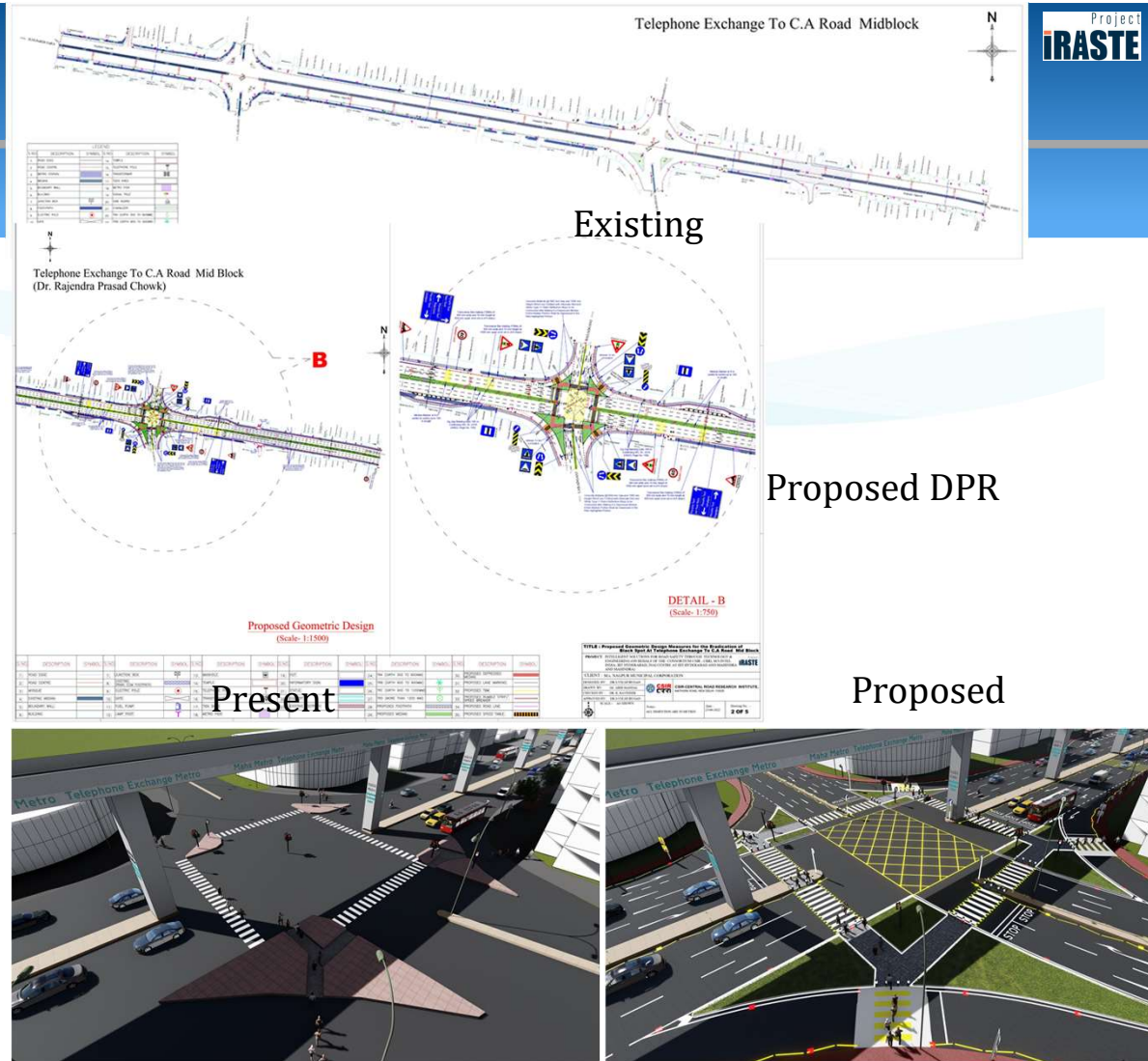 - 20% - 40% speed reduction observed with TBH & Night reflectors at Wadhamna BlackSpot

- Economic Impact Assessment was done for 4 locations & estimates show that **66% reduction** in <u>road crashes</u> & **40% reduction** in <u>fatalities</u> can be achieved by implementing all the recommended measures

Telephone Exchange To C.A Road Midblock

Existing

Proposed DPR

Present

Proposed

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Black Spot – Ajni Square Junction

Before:

After:

Improper traffic and pedestrian movements

Proper traffic movement

Proper Pedestrian movement

- Reclaimed the residual spaces, reduced the pedestrian crossing distance, larger channelizers for vehicles.
- Traffic islands for traffic controls.
- Tabletop slip lanes for safer left turns.
- Dividers for easier traffic movement at the junction.
- Reclaimed extra spaces on the sides of the road for: Organized parking, cycle track, wider footpaths, green spaces and public sitting spaces with proper lightings.

Black Spot – Chhatrapati Square Junction

Before:

After:

Improper traffic and pedestrian movements

Proper traffic movement

Proper pedestrian movement

Proper traffic movement

- Reclaimed the residual spaces, reduced the pedestrian crossing distance, larger channelizers for vehicles, & elongated traffic islands for traffic control.
- Tabletop slip lanes for safer left turns.
- Extended the dividers for easier traffic movement at the junction.
- Reclaimed the extra spaces on the sides for: Organized parking, cycle track, wider footpaths and green spaces

Black Spot – Jaiprakash Nagar Junction

Before:

Improper traffic and pedestrian movements

Proper traffic movement

- Reclaimed the residual spaces, reduced the pedestrian crossing distance, & larger channelizers for vehicles.
- Speed calming premises and road signs.
- Table top slip lanes for safer left turns.
- Re-oriented the dividers for easier traffic movement at the junction.
- Reclaimed the extra spaces on the sides of the road for: organized parking, cycle track, wider footpaths and green spaces etc.
- Provided proper lightings

After:

Proper Pedestrian movement
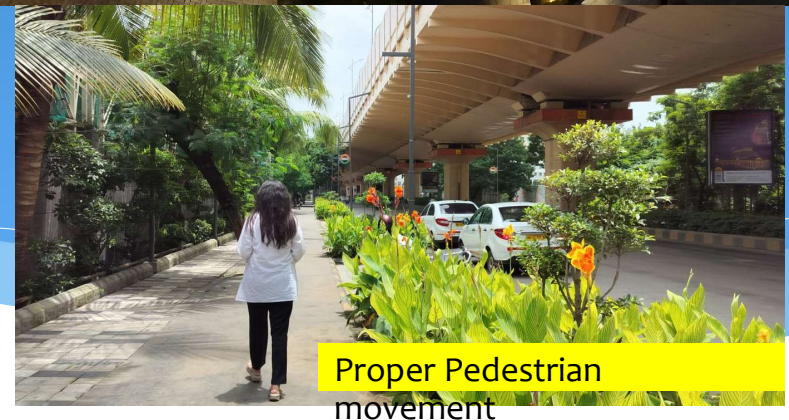
Greyspot Map: A leading indicator of road risk

Greyspot Map: Potential future Black spots

❑ **New data based approach to predict Potential Black spots, Current Black spots, & Improved spots**
❑ **Accurate, automated and more scalable than manual surveys**
❑ **Enables precise & prompt interventions in Enforcement and Emergency Care**
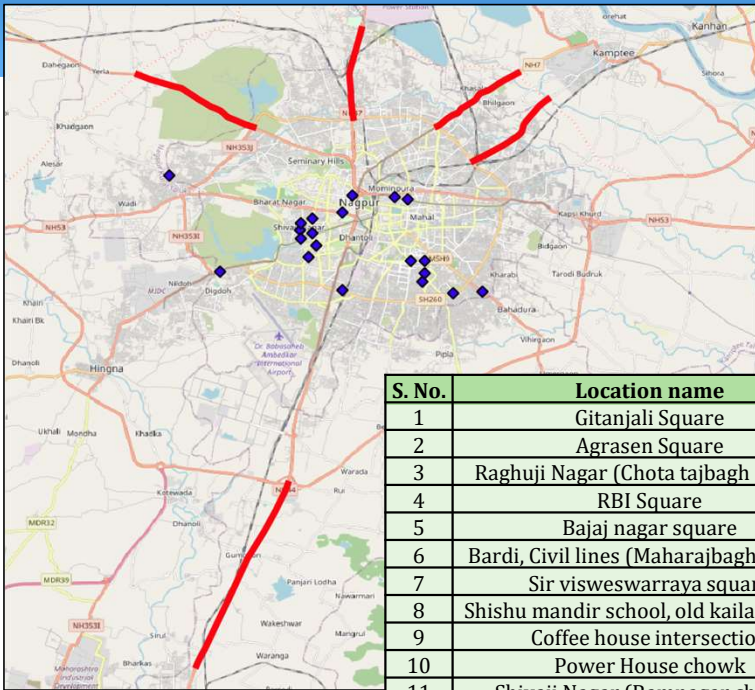
Greyspots and Top 5 most unsafe corridors identified *from 2023 Q1 and Q2 data.*

S. No.	Location name	lat	Long
1	Gitanjali Square	21.152096	79.097942
2	Agrasen Square	21.150943	79.103744
3	Raghuji Nagar (Chota tajbagh chowk)	21.123422	79.111365
4	RBI Square	21.152658	79.078818
5	Bajaj nagar square	21.130229	79.062645
6	Bardi, Civil lines (Maharajbagh chowk)	21.145244	79.074407
7	Sir visweswarraya square	21.124952	79.058975
8	Shishu mandir school, old kailash nagar	21.113882	79.110405
9	Coffee house intersection	21.142358	79.060894
10	Power House chowk	21.108898	79.124219
11	Shivaji Nagar (Ramnagar chowk)	21.137011	79.055349
12	Ayodhaya Nagar Square	21.117775	79.111231
13	Tukdoji Putla Square	21.12335	79.104979
14	Bhagat Square	21.118545	79.019093
15	Ram nagar to Chota ram nagar	21.140332	79.055418
16	Shankar nagar square	21.135921	79.060619
17	Gandhi nagar square	21.133362	79.055608
18	Chatrapati Hall, Somalwada	21.110287	79.074173
19	Atul Lawn, Dighori	21.109586	79.137266
20	Khadgaon Road Gajanan Mandir	21.161838	78.996274

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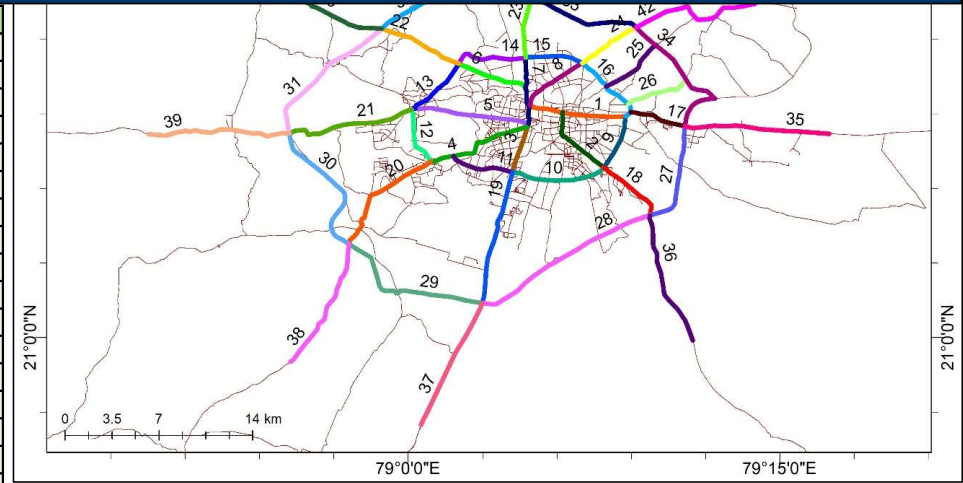
Social Awareness

Avagat Kara: 30-day comprehensive public awareness program of 500 people in a locality culminated in each participant taking an oath to follow the traffic rules every day & to correct human errors. The program made positive changes to improve their driving behavior near Blackspot/Greyspot Locations.

First Aid Training: Traffic Police Station led community First Aid Training programs to train citizens in basic First Aid to assist accident victims.

Good Samaritan Event: Held successfully on July 10 with 2000 attendees from various segments of society. All of them were trained on first aid and took an oath to follow traffic rules.

Date	Location
17/5/2023	M.I.D.C POLICE STATION
20/5/2023	SONEGAON POLICE STATION
22/5/2023	MAHINDRA & MAHINDRA
24/5/2023	KAMTHI POLICE STATION
25/5/2023	AJNI POLICE STATION
25/5/2023	BALTARODI POLICE STATION
28/5/2023	JANKI NAGAR MAHILA MANDAL

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Trystander Cells - Emergency Care

- **Trystander Cells installed in 8 Blackspot Locations**
- Each Cell has a First Aid Box and list of Volunteers (10-15) who can be called for Emergency Care.
- All Volunteers trained on how to handle Emergency Golden Hour Situations
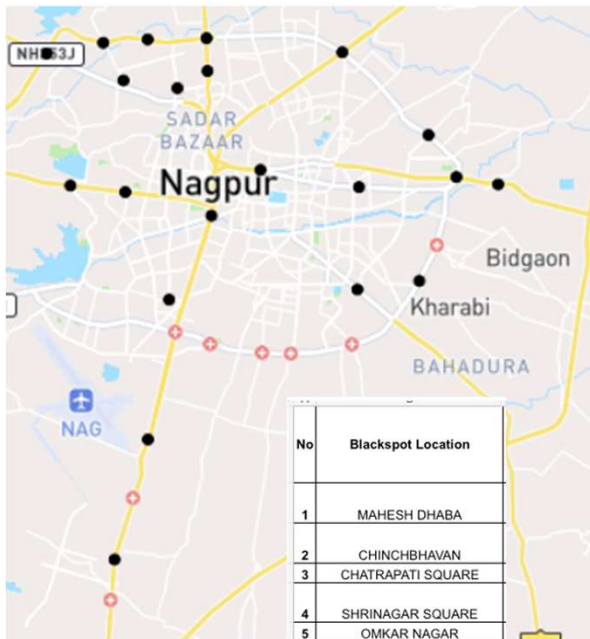
No	Blackspot Location
1	MAHESH DHABA
2	CHINCHBHAVAN
3	CHATRAPATI SQUARE
4	SHRINAGAR SQUARE
5	OMKAR NAGAR
6	MANEWADA SQUARE
7	MAHALGII NAGAR SQUARE
8	WATHODA SQUARE

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Trystander Cells - Outcome

No	Blackspot Location	DATE OF OPENING	No of People who attended the Inaguration	No of people Registered for screening	No of Good Samaritans who are available to help	No of Accident victims helped	Type of Help provided
1	MAHESH DHABA	22-Jul-23	62	206	13	10	Major Accident provided First Aid & Admitted to Hospital
2	CHINCHBHAVAN	10-Aug-23	77	152	15	4	Major Accident provided First Aid & Admitted to Hospital
3	CHATRAPATI SQUARE	28-Aug-23	55	272	17	7	Minor Accidents Provided First Aid Only.
4	SHRINAGAR SQUARE	28-Nov-23	58	280	14	5	3 Minor Accidents And 2 Major Accidents where Admitted to Hospital
5	OMKAR NAGAR	10-Nov-23	73	230	15	0	
6	MANEWADA SQUARE	24-Nov-23	78	280	14	0	
7	MAHALGII NAGAR SQUARE	10-Nov-23	82	250	17	1	
8	WATHODA SQUARE	05-Nov-23	68	180	13	4	Minor Accidents Provided First Aid . And One was Admitted to Hospital

Since Aug 2023, Trystander Cells in these 8 Blackspot Locations have attended to **31 accident victims**.

Outcome of Trystander cells

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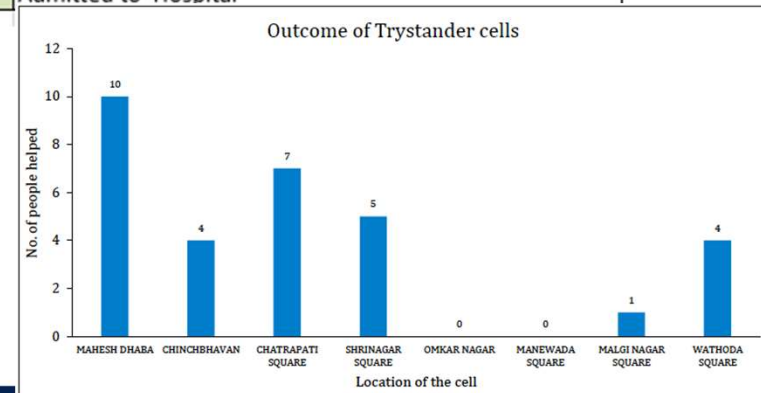
6Es – iRASTE Model

Engineering - Vehicle

ADAS   DMS

Engineering - Infra

Blackspot DPRs   Digital Infra Mapping

Greyspot-Traffic police/C&C

Enforcement

Blackspot Responder (Trystander) Cell

Emergency

Avgatkara - Family Centric Campaign

Good Samaritan – City wide First-aid training

Education

Encouragement

trafficrewards
Drive Safe, Get Rewarded

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Encouragement – Traffic Rewards

- **438** NMC buses have been tagged
- **31** drivers have got 1000+ points
- **24%** improvement in signal adherence across all the vehicles with traffic rewards tag.

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iRASTE Summary

Project iRASTE is now India's largest & longest-running study of ADAS for Commercial Vehicles

- **Nagpur**
  - **41% lower accidents** in ADAS buses in '23
  - **New AI Model** developed to predict Greyspots (Potential Black spots)
  - **DPRs Implemented** at 4 Black spots
  - **31 lives saved** in past 4 months @ 8 Trystander cells
  - Integrated New E: **Encouragement**

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iRASTE

VEHICLE ENGINEERING

Safer public transit
Large-scale Greyspot maps

INFRASTRUCTURE ENGINEERING

Timely DPRs
Continuous Monitoring

VEHICLE SAFETY
ADAS, DMS, Driver Scores

MOBILITY ANALYSIS
Greyspot Map

INFRASTRUCTURE SAFETY
DPRs, Digital Surveys

AWARENESS
GOOD SAMARITAN
First-aid Trainings

AVGAT KARA
Door-to-door
Citizen Campaign

EMERGENCY
RESPONDER CELL @
Blackspots

Precise and prompt inter-ventions

EDUCATION

ENFORCEMENT

EMERGENCY CARE

5Es INTERCONNECT with **iRASTE** model
Faster Implementations | Accurate Monitoring

Thank You

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