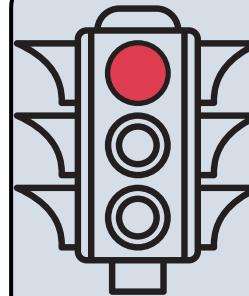


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V e g h a - S o l v i n g T r a f f i c

vegha.vikasrajyadav.com

Problem Statement



Indian cities face severe traffic congestion, with **Kolkata, Bengaluru, and Pune** being ranked among the **world's worst**. Traditional fixed-timing traffic signals fail to adapt to dynamic traffic patterns, resulting in **annual economic losses of ₹1.47 lakh crores** due to delays, a **33% increase in commute times during peak hours**, and **escalating air pollution and fuel wastage**.

TRAFFIC CRISIS



34 min to travel
10km (vs 15 min
ideal)



117-132 hours lost/
year per
commuter



2.21x longer
commutes during
peak hours



₹1.47L crores
annual economic
loss



70% urban
population –
respiratory issues



11 working days
wasted annually

World rank	City	Average travel time per 10 km
1	Barranquilla Colombia	36 min 6 s
2	Kolkata India	34 min 33 s
3	Bengaluru India	34 min 10 s
4	Pune India	33 min 22 s
5	London United Kingdom	33 min 17 s

Competitor Analysis

Cost Factor	Bengaluru BATCS	Mumbai ITMS	Vegha (Our System)	Vegha Advantage
Cost per Junction	₹15.5-32 L	₹1.44 Cr	₹47-50k	98% cheaper vs Bengaluru
Optical Fiber Installation	Included (Expensive)	₹200-300 Cr	₹0 (Wireless)	₹200-300 Cr savings
Software (5-yr)	₹40-60 L	₹50-80 Cr	₹20-30L	₹50-80 Cr savings
Hardware Cost	₹25-35 L	₹1 to 1.5 Cr	₹22k to 40k	99% cheaper
Annual Maintenance	₹20-30 L/year	₹20-30 L/year	₹5-10 L/year	60% reduction
Real-time Analytics	Limited	Violation-focused	AI-Powered + Edge	Game-changer
Emergency Vehicle Priority	Manual	Manual	Automatic	Game-changer
5-Year Total Cost (100 junctions)	₹18-22.5 Cr	₹918+ Cr	₹1.47-2.25 Cr	90% cheaper than Bengaluru, 99.8% cheaper than Mumbai

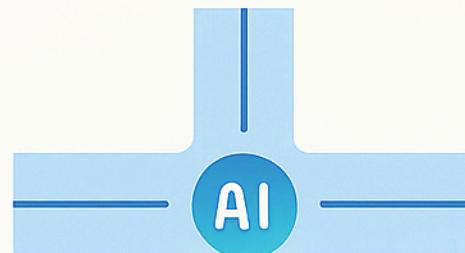
Solution



Vegha - AI-driven **Federated Reinforcement Learning system** transforms traffic management with a **decentralized, multi-agent architecture**, where each intersection acts as **an autonomous, intelligent agent**. **Edge-deployed**, these agents analyze **real-time traffic patterns** and **optimize signal timings independently**, while federated learning enables **collaborative intelligence** without **compromising data privacy**. Combining **satellite-pretrained models for Indian traffic** and **adaptive multi-agent coordination**, the system **achieves a 27.34% reduction in vehicle waiting times**, scaling seamlessly with **existing camera infrastructure** at **₹22,900 per intersection**, making smart traffic control both **affordable** and **accessible** for **Indian cities**.

Team Of Local Genuises

1. EACH INTERSECTION GETS A BRAIN



SEES
A bus is holding up 12 cars

2. THE TEAM CREATES A Master MASTER PLAN



Combines all experiences to handle any situation



It shares the winning recipe. NOT the kitchen's security camera footage!

3. THE RESULT: SMOOTH, COORDINATED FLOW



Combines all experiences to handle any situation.



Faster Commutes



Less Gridlock



Clear Emergency Routes

Innovation and uniqueness

Emergency Vehicle Priority System

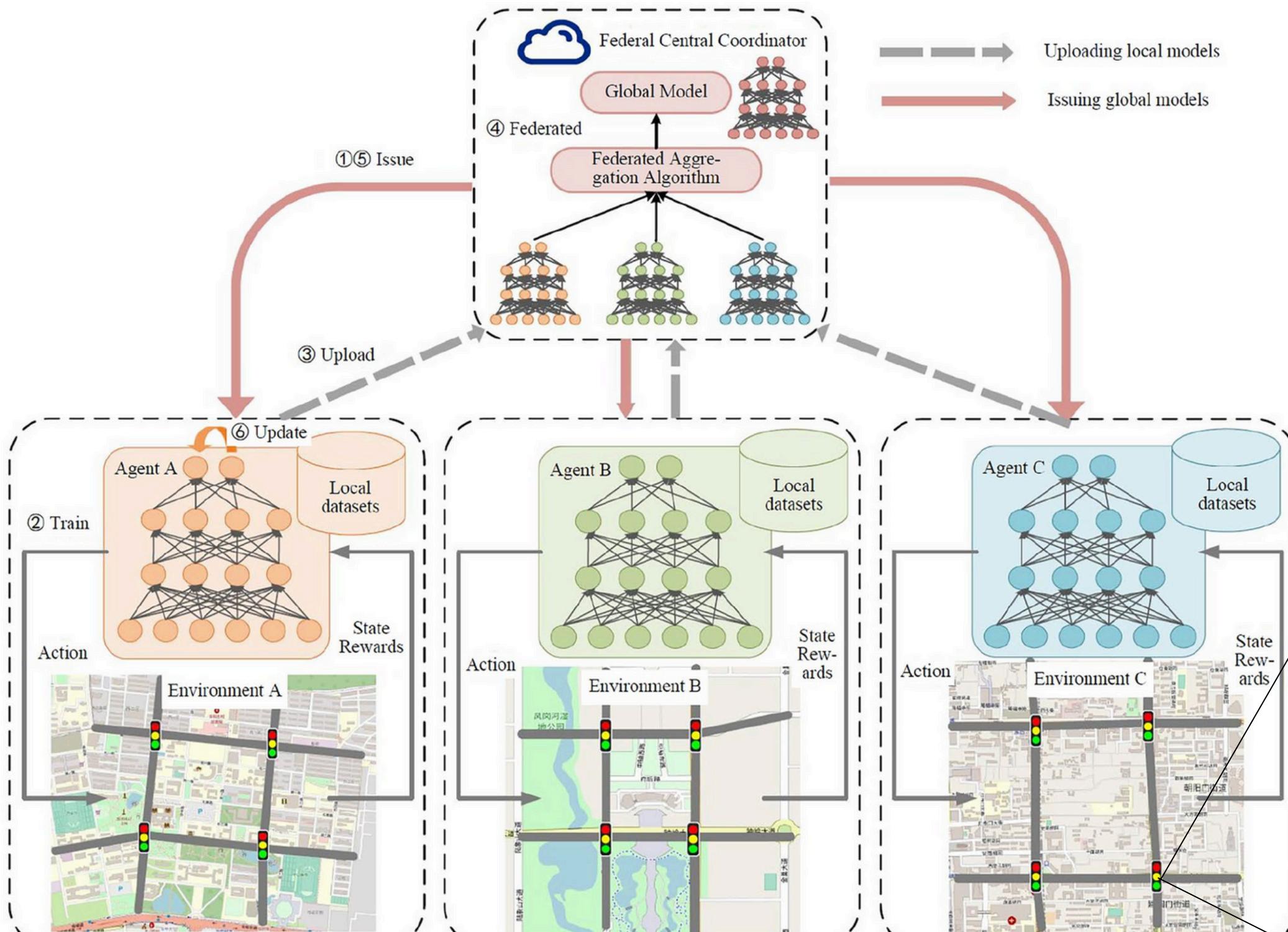
Edge Computation

Event Impact Analysis

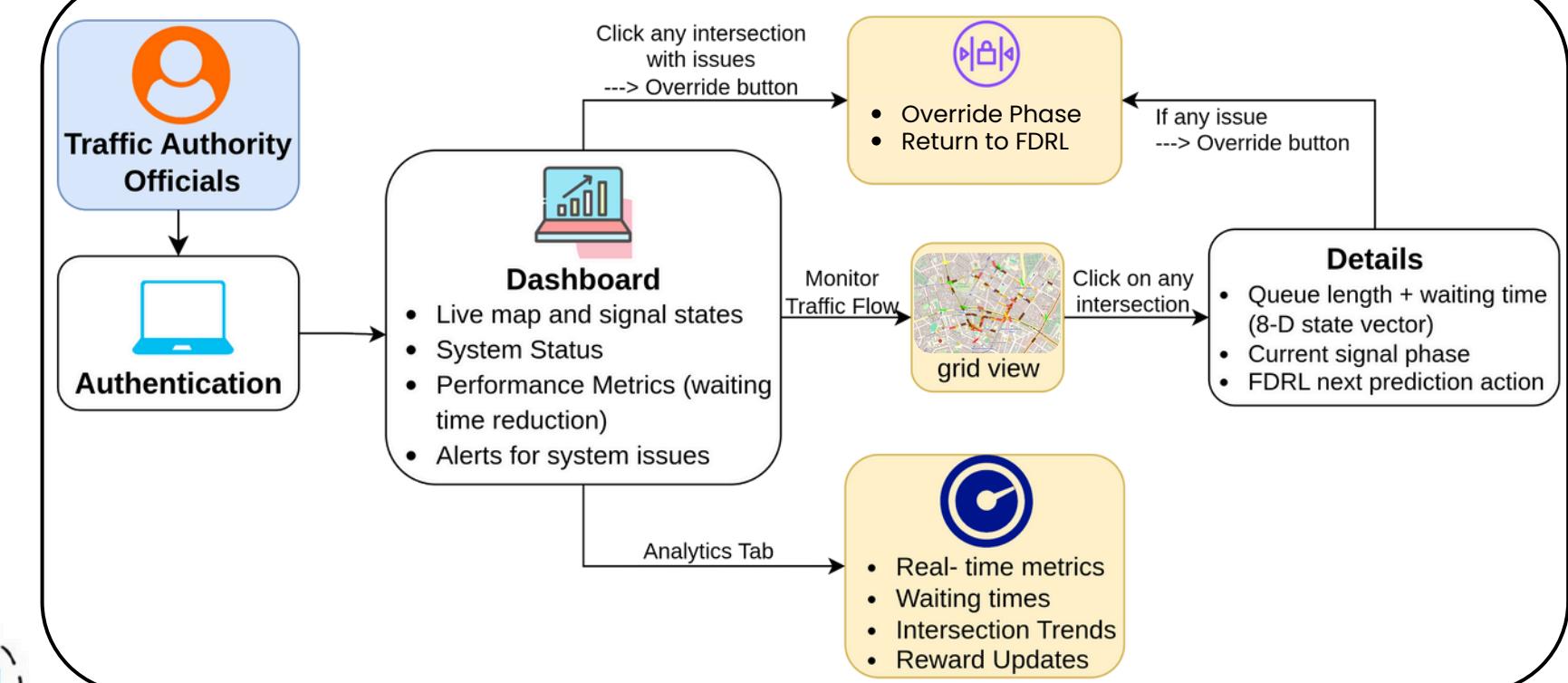
Retro Fit Model can utilize existing infrastructure

Flowchart & Architecture

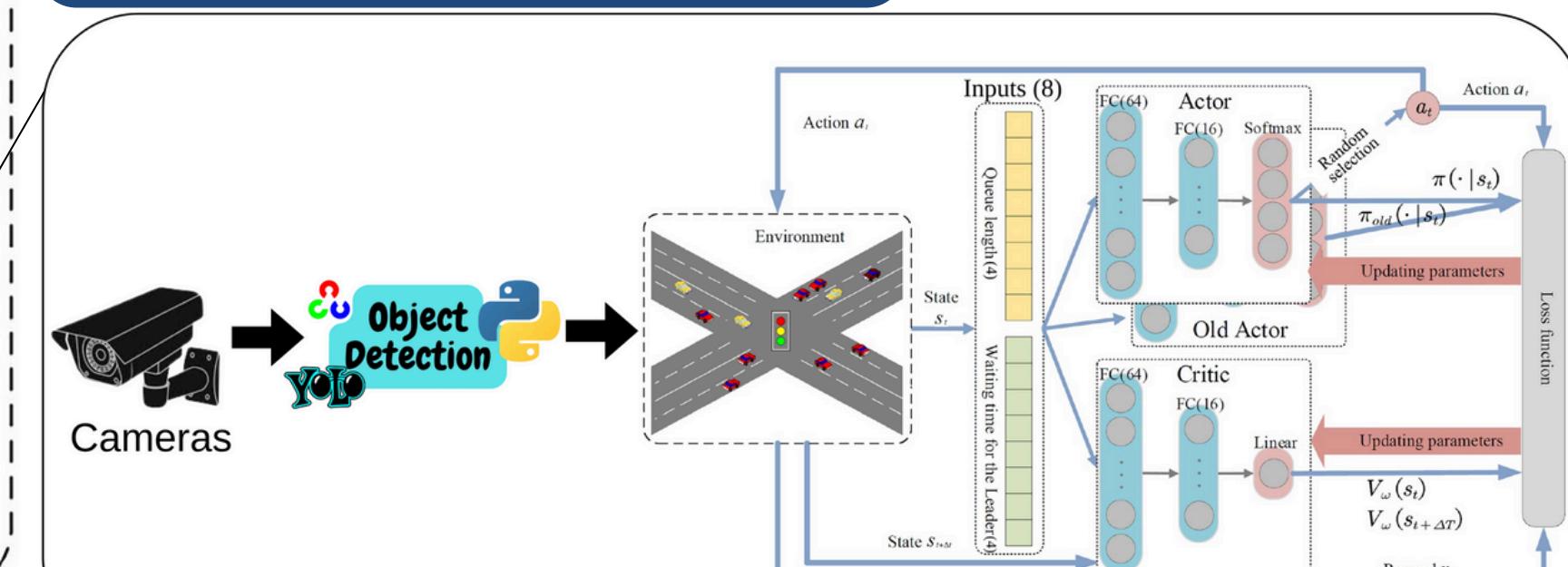
FDRL based cross-domain intelligent traffic signal control architecture



User Flow Diagram



Schematic of single intersection



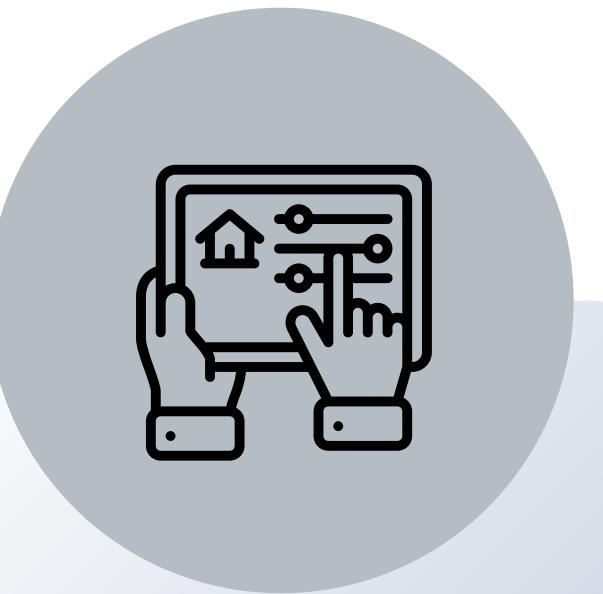
Credits: Federated deep reinforcement learning-based urban traffic signal optimal control

Go-to-Market Strategy



Observe & Build Trust

Deploy at 3–4 intersections in monitor-only mode. Shadow AI compares real traffic with optimized timings, while validation dashboards provide actionable insights to authorities.



Controlled Pilot

Enable AI-controlled signals at the same intersections with strict safety and instant rollback. Police-monitored operations demonstrate measurable congestion reduction.



City-Wide Rollout

Gradually expand AI signals city-wide with zone-level coordination. Centralized monitoring and continuous model updates ensure optimized, safe traffic management.



Platform & Monetization

Launch analytics dashboards, alerts, and APIs for emergency and mobility services. Enable consumer notifications and third-party integrations while preparing for multi-city expansion.

Phase-I

Month 0 - 4

Phase-II

Month 5-8

Phase-III

Month 9-14

Phase-IV

Month 15-18

Future Plans



Smart City Platform Integration

Unified hub: parking, transport, emergency, pollution control.

V2X Enablement

Signal broadcasts for connected & autonomous vehicles

Satellite Integration (City-Wide Visibility)

Bird's-eye view congestion detection beyond camera coverage.

Model Improvement Pipeline (MLOps)

Continuous retraining, drift detection, safe staged rollouts.

Prototype - Dashboard

The screenshot displays the 'Vegha - Smart Traffic Manager' dashboard at vegha.vikasrajyadav.com/dashboard. The interface is clean with a light blue header and a white main content area. A sidebar on the left contains navigation links: Dashboard (selected), Map, Simulation, Events, Emergency Vehicles, and Challans. The top right shows a user profile for 'Admin' with a notification count of 3. The main content area features a 'Traffic Management Dashboard' title and a subtitle: 'Real-time monitoring and analytics for your traffic management system'. A prominent green box displays 'SYSTEM STATUS' with a large green checkmark icon and the word 'Operational'. It includes a last update timestamp of '4:17:24 am' and a performance metric of '94% Operational' with a green upward arrow icon. Below this are six data cards arranged in two rows of three:

- TOTAL JUNCTIONS:** 127 (Monitoring all) with a location pin icon.
- ACTIVE JUNCTIONS:** 119 (94% operational) with a green lightning bolt icon.
- Avg CONGESTION:** heavy (City-wide average) with a red car icon.

- TOTAL VEHICLES:** 2,847 (+5.2% vs yesterday) with a purple car icon.
- EMERGENCY VEHICLES:** 3 (Active responses) with a red truck icon.
- ACTIVE EVENTS:** 2 (Ongoing incidents) with a purple calendar icon.

At the bottom, there's a large blue box for 'AVERAGE WAIT TIME' showing '2m 36s' across all monitored junctions, with a clock icon. To the right, it shows '2.6 min' per vehicle. A 'System Alerts' section at the very bottom indicates 'Live updates'.

Prototype -Simulation

Vegha - Smart Traffic Manager +
vegha.vikasrajyadav.com/dashboard/simulation Admin

V Vegha Refresh

Dashboard Map Simulation Events Emergency Vehicles Challans

Vegha Traffic Simulation
Real-time SUMO traffic simulation with live metrics

VEGHA FIXED

Event Management

SEARCH STREET Type to search streets...

SELECT STREET / EDGE

- 787858369
- 787858371
- 787858372
- 787945997
- 789770470

794 streets available

Close Street Open Street

Closed Streets (0)
No closed streets

VEHICLES 47 AVG SPEED 28 km/h WAITING 7 TIME 78s SIGNALS 249

v1.0.0

Prototype - Events

The screenshot shows the 'Events' section of the Vegha - Smart Traffic Management dashboard. The left sidebar includes links for Dashboard, Map, Simulation, Events (selected), Emergency Vehicles, and Challans. The main area displays five event cards:

- Road Maintenance - Outer Ring Road** (Scheduled, Medium): Date: 28 Dec 2025, 10:00 am; Location: Outer Ring Road between Marathahalli and Whitefield; Delay: 15m; Event duration: 6h 0m; Authorities: BBMP, Bangalore Traffic Police. [See details](#)
- Ganesh Chaturthi Procession** (Scheduled, Critical): Date: 27 Dec 2025, 06:00 pm; Location: South Bangalore procession route; Delay: 1h 30m; Event duration: 5h 0m; Authorities: Karnataka Police, BBMP. [See details](#)
- Road Accident - Silk Board Junction** (Active, Critical): Date: 27 Dec 2025, 04:00 pm; Location: Silk Board Junction main flyover; Delay: 45m; Event duration: 2h 0m; Authorities: Bangalore Traffic Police, BMTC, 108 Ambula... [See details](#)
- Student Protest - Vidhana Soudha** (Completed, Medium): Date: 27 Dec 2025, 11:00 am; Location: Vidhana Soudha area and surrounding roads; Delay: 30m; Event duration: 4h 0m; Authorities: Karnataka Police, Bangalore Traffic Police. [See details](#)
- Metro Construction - MG Road** (Active, High): Date: 27 Dec 2025, 06:00 am; Location: MG Road between Trinity Circle and Cubbon Park; Delay: 25m; Event duration: 16h 0m; Authorities: BMRCL, Bangalore Traffic Police. [See details](#)

At the bottom, there is a footer bar with icons for file operations, a status bar showing v1.0.0, and a system tray with various icons.

Prototype - Emergency

Vegha - Smart Traffic Manager X +

vegha.vikasrajyadav.com/dashboard/emergency

V Vegha Admin

3 Live

Dashboard Map Simulation Events Emergency Vehicles Challans

Traffic Management Dashboard

Real-time traffic monitoring and vehicle analytics

Total Vehicles **97** Across all categories

Avg Wait Time **12.2s** Network average

Emergency **10** Priority vehicles

Vehicle Types **3** Distinct categories

Category Private • Excellent

Active 73 Avg wait 14.7s

Traffic flow Smooth

Category Public • Excellent

Active 14 Avg wait 10.4s

Traffic flow Smooth

Category Emergency • Excellent

Active 10 Avg wait 11.4s

Traffic flow Smooth

Traffic Consumption

97 vehicles

- Private 73 vehicles 75.3%
- Public 14 vehicles 14.4%
- Emergency 10 vehicles 10.3%

Waiting Time Distribution

36.5 seconds

- Private 14.7s avg wait 40.3%
- Public 10.4s avg wait 28.4%
- Emergency 11.4s avg wait 31.3%

v1.0.0

Prototype -Challan

Vegha - Smart Traffic Manager +

vegha.vikasrajyadav.com/dashboard/challans

Vegha Admin

Traffic Challans
Monitor and verify traffic violations

Total Challans: 30 (vs last month: +12%)

Verified Challans: 18 (vs last month: +15%)

Pending Verification: 9 (vs last month: -5%)

Refuted Challans: 3 (vs last month: -3%)

Challan Records
30 total challans

Search by challan ID, vehicle, violation, location...

All Status Export All (30)

CHALLAN ID	VEHICLE NO.	VIOLATION	LOCATION	FINE AMOUNT	STATUS	ISSUED AT	ACTIONS
CHLN-2025-000872	MH12AB1234	SIGNAL JUMP	MG Road Junction	₹1,000	PENDING	25 Dec 2025, 10:42 am	⋮ ⌂
CHLN-2025-000873	KA01MN5678	SPEEDING	Silk Board Junction	₹2,000	VERIFIED	24 Dec 2025, 02:22 pm	⋮ ⌂
CHLN-2025-000874	DL3CAR9012	NO HELMET	Koramangala Junction	₹1,000	REFUTED	15 Nov 2025, 08:10 am	⋮ ⌂
CHLN-2025-000875	TN09BC3456	WRONG SIDE DRIVING	Anna Nagar Junction	₹5,500	VERIFIED	23 Dec 2025, 09:15 am	⋮ ⌂
CHLN-2025-000876	GJ05XY7890	OVERLOADING	SG Highway Toll Plaza	₹22,000	PENDING	22 Dec 2025, 11:30 am	⋮ ⌂
CHLN-2025-000877	RJ14PQ2345	TRIPLE RIDING	MI Road Junction	₹1,000	VERIFIED	21 Dec 2025, 04:45 pm	⋮ ⌂

v1.0.0

Our Great Team

Vinayak Yadav



Team Lead

Vishwajit Sarnobat



Team Member

Yateen Vaviya



Team Member

Sahil Gupta



Team Member

THANK YOU

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