42

Vegha - Solving Traffic

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

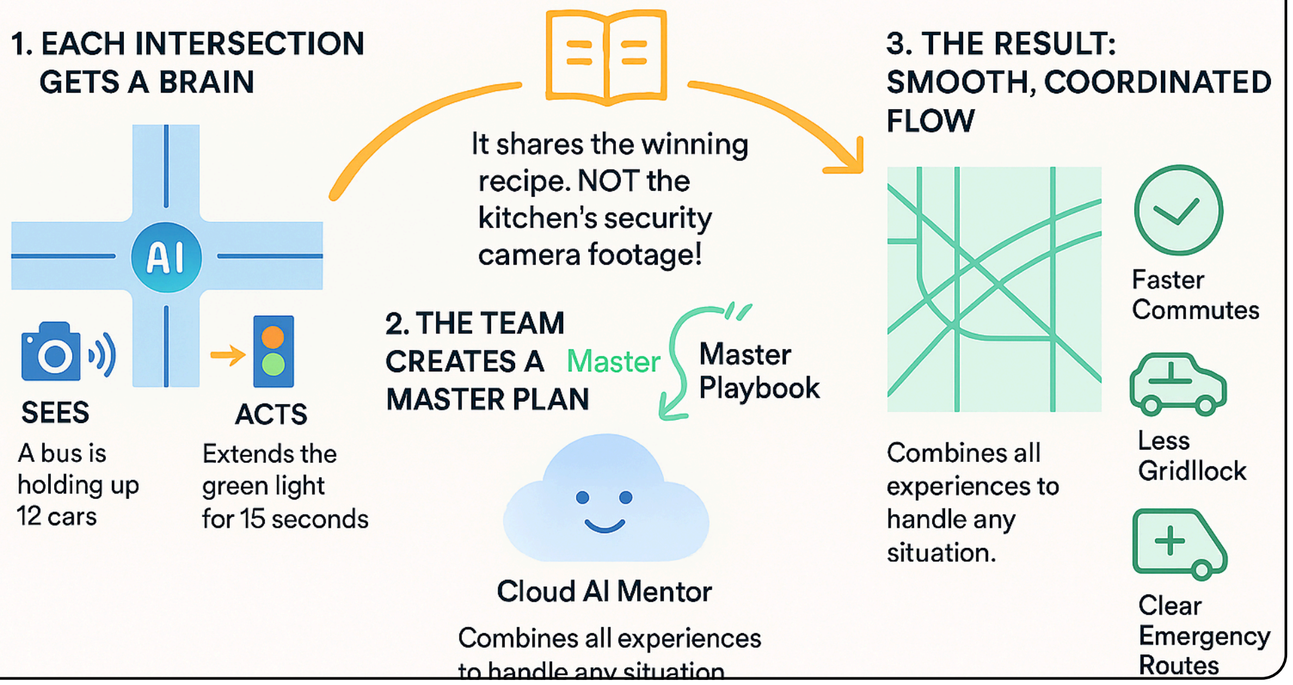
Competitor Analysis

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

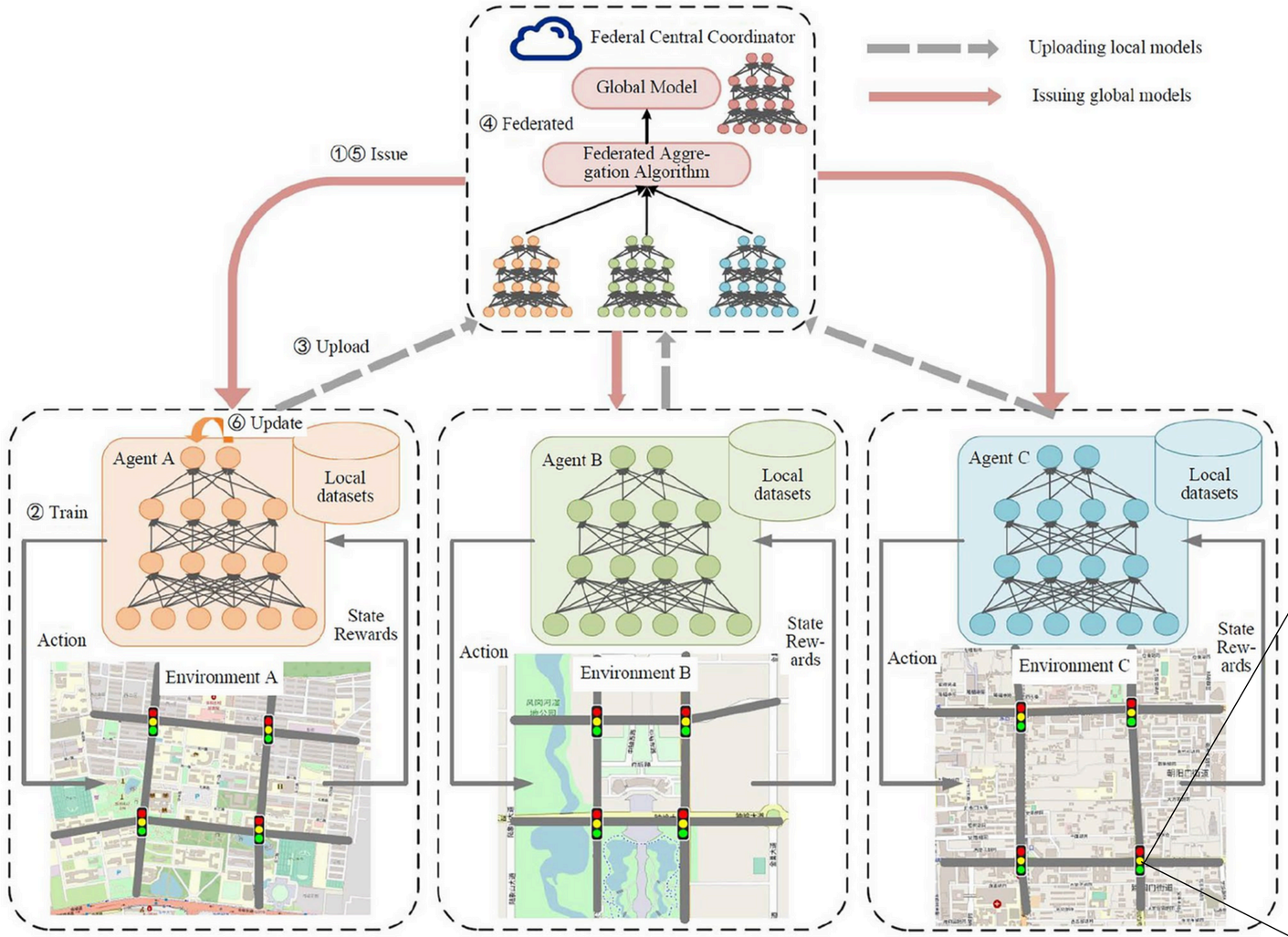


Innovation and uniqueness

- **Emergency Vehicle Priority System**
- **Edge Computation**
- **Event Impact Analysis**
- **Retro Fit Model can utilize existing infrastructure**

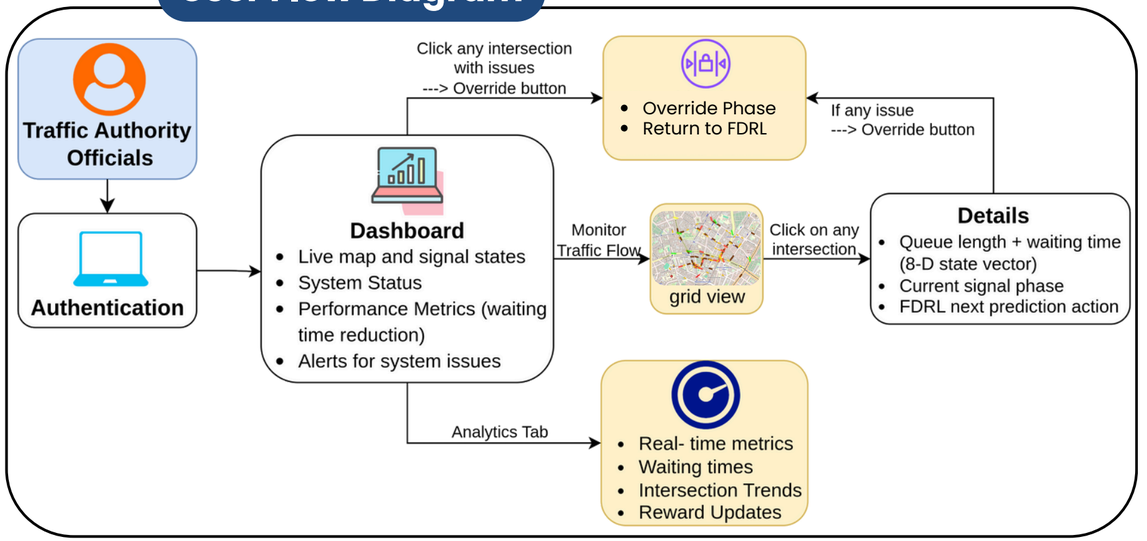
Flowchart & Archietecture

FDRL based cross-domain intelligent traffic signal control architecture

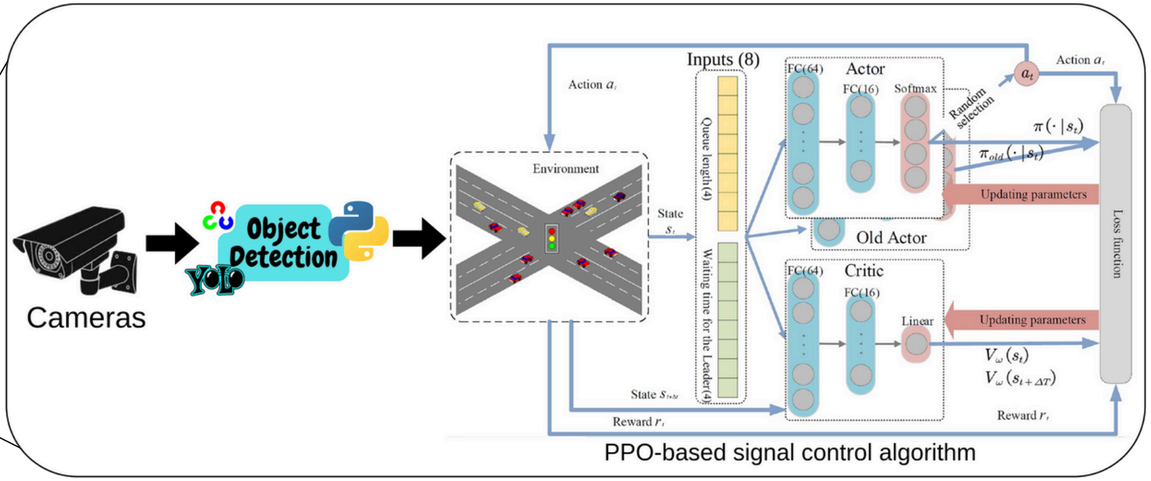


Credits: Federated deep reinforcement learning-based urban traffic signal optimal control

User Flow Diagram



Schematic of single intersection



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.

Phase-I
Month 0 -4

Controlled Pilot

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

Phase-II
Month 5-8

City-Wide Rollout

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

Phase-III
Month 9-14

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-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

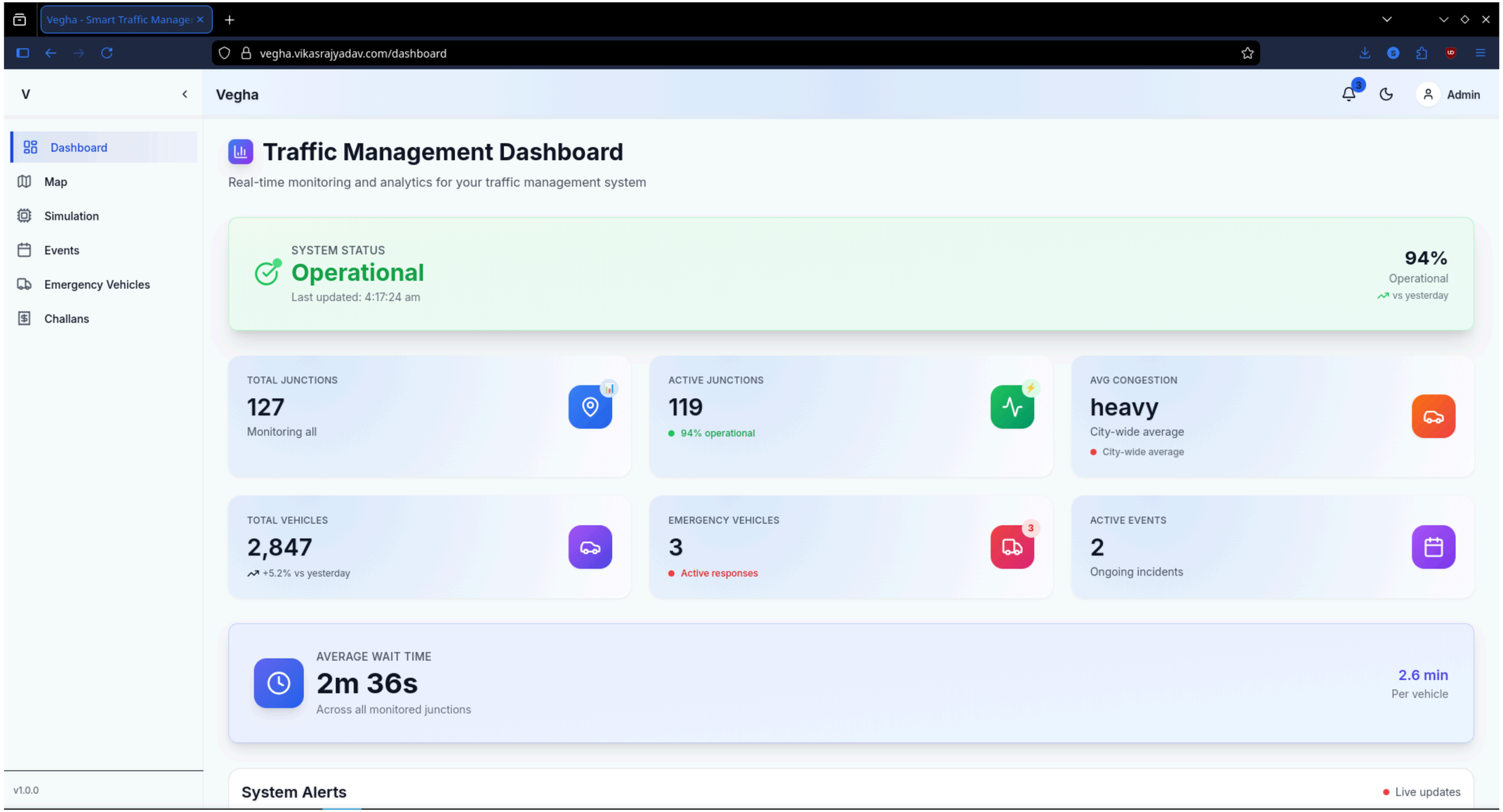
Satellite Integration (City-Wide Visibility)

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

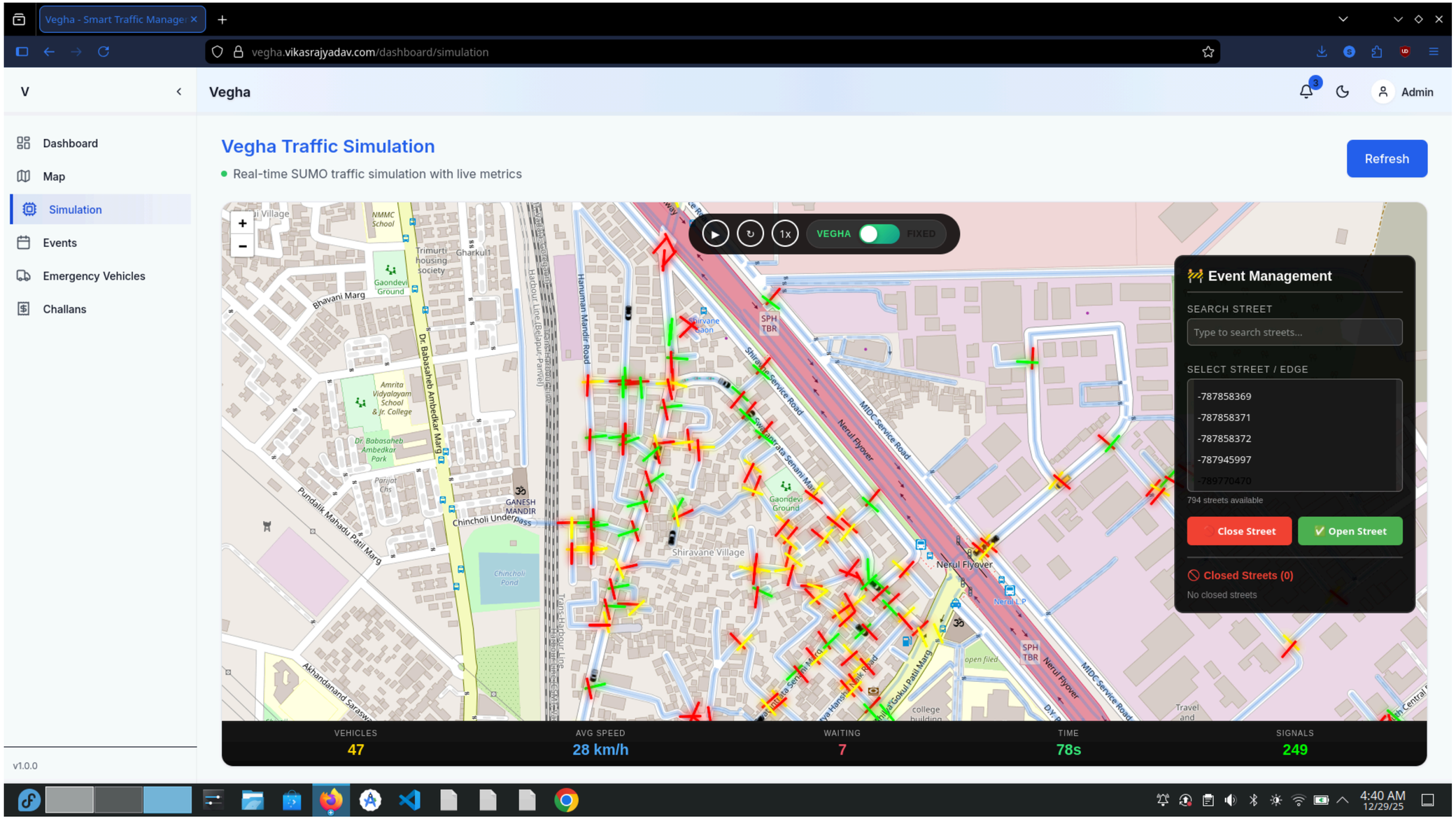
Model Improvement Pipeline (MLOps)

Continuous retraining, drift detection, safe staged rollouts.

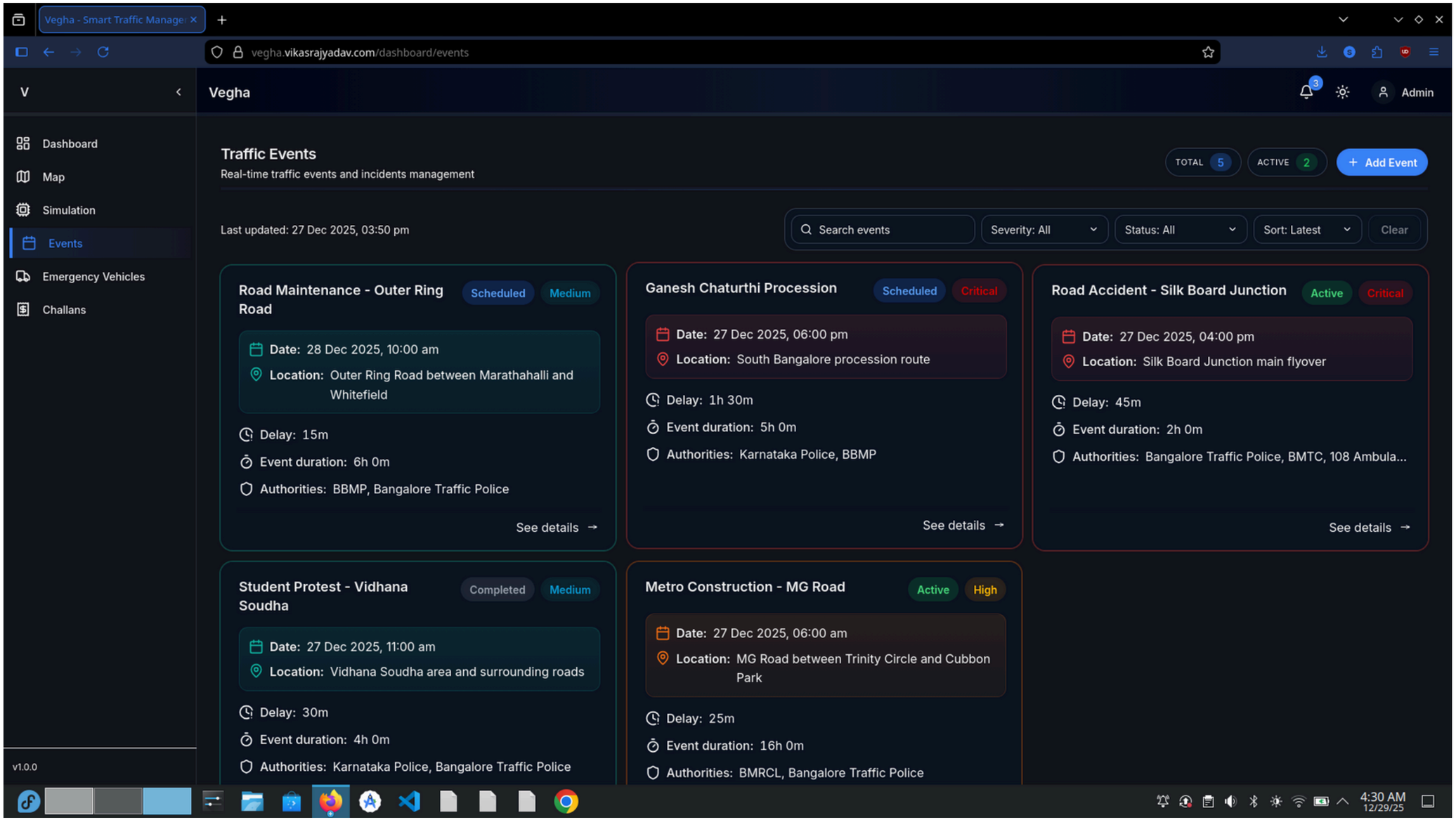
Prototype - Dashboard



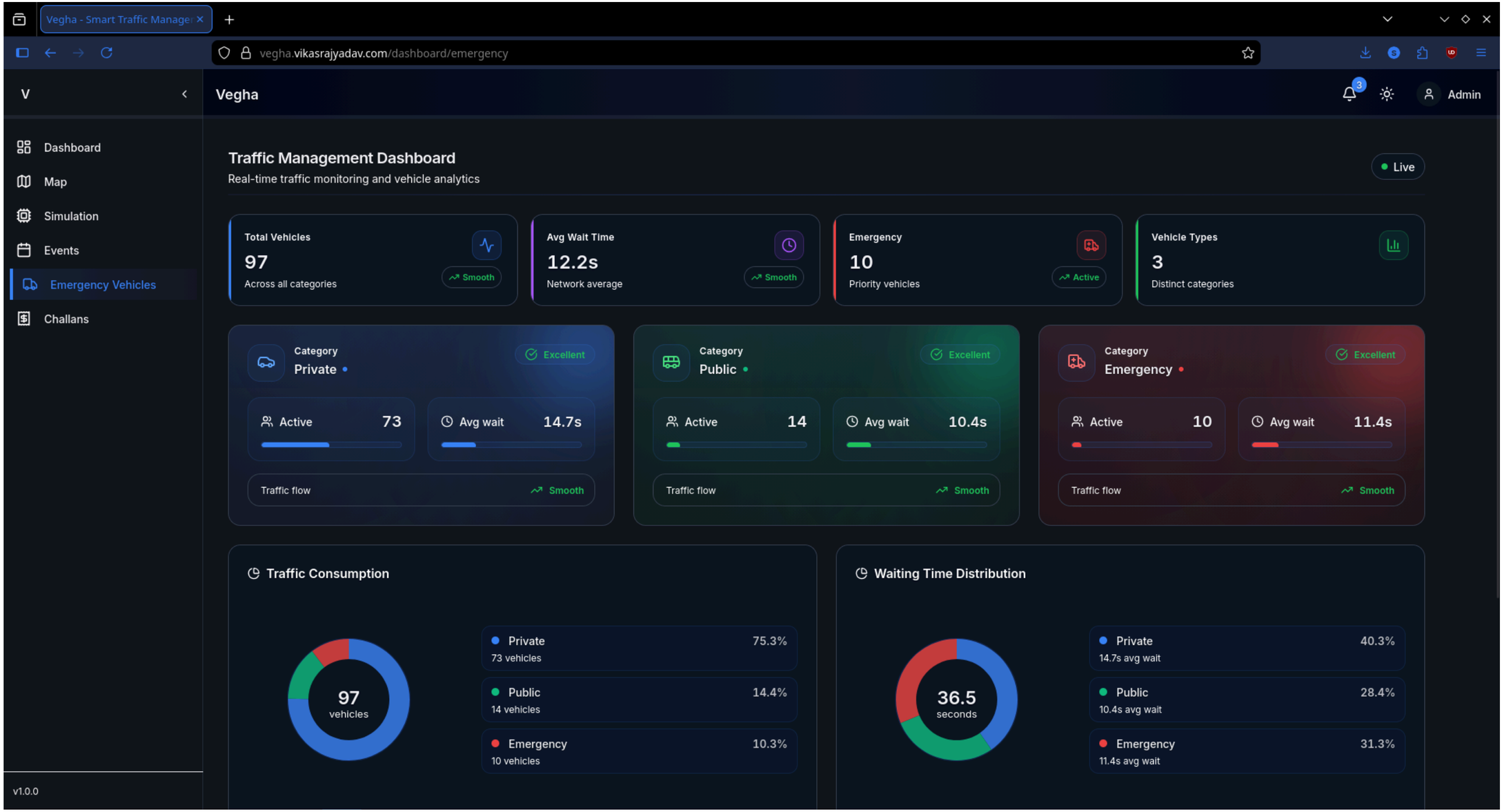
Prototype -Simulation



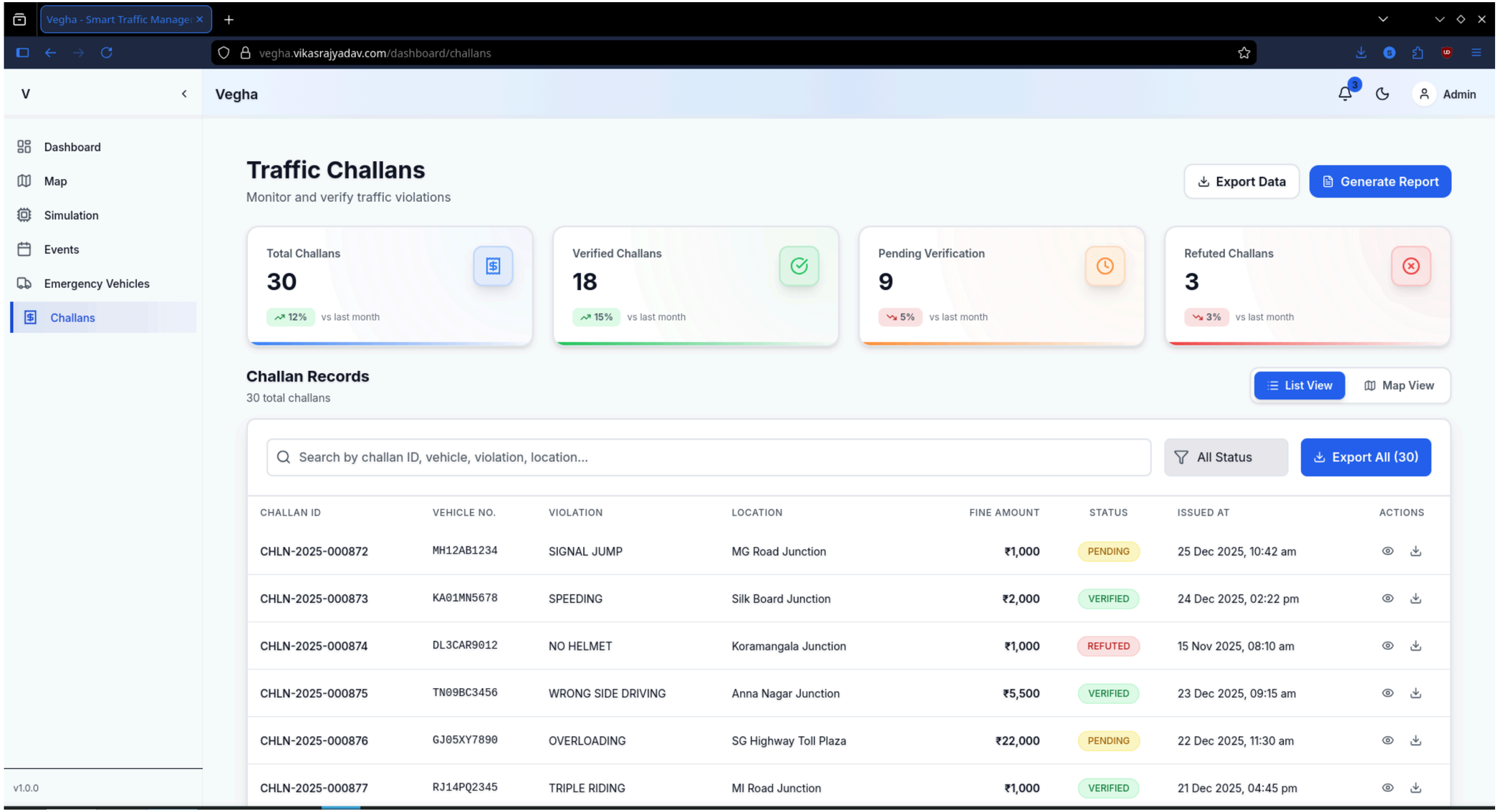
Prototype - Events



Prototype - Emergency



Prototype -Challan



Our Great Team

Vinayak Yadav

Team Lead

Vishwajit Sarnobat

Team Member

Yateen Vaviya

Team Member

Sahil Gupta

Team Member

THANK YOU

Name	Email	Phone	LinkedIn
Vinayak Yadav	vinayakyadav2709@gmail.com	8303807051	Vinayak Yadav
Vishwajit Sarnobat	sambhaji2772@gmail.com	9373039188	Vishwajit Sarnobat
Yateen Vaviya	yvaviya@gmail.com	9324101581	Yateen Vaviya
Sahil Gupta	sahil160506@gmail.com	7038711591	Sahil Gupta