

SMART INDIA HACKATHON 2025



- **Problem Statement ID – 25138**
- **Problem Statement Title- Student Innovation**
- **Theme- Transport And Logistics**
- **PS Category- Software**
- **Team ID-**
- **Team Name - Tree.io**





M-GPS
Unified Platform



Where did the idea come from ?

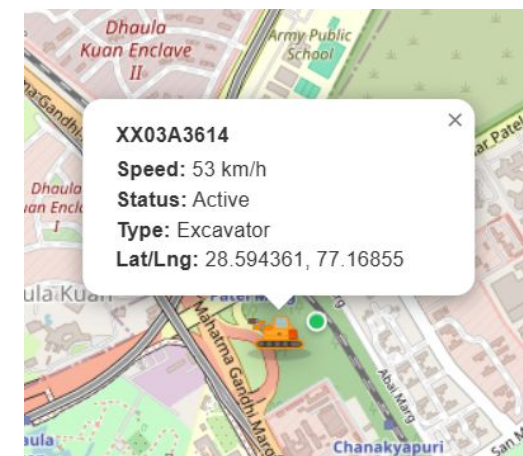
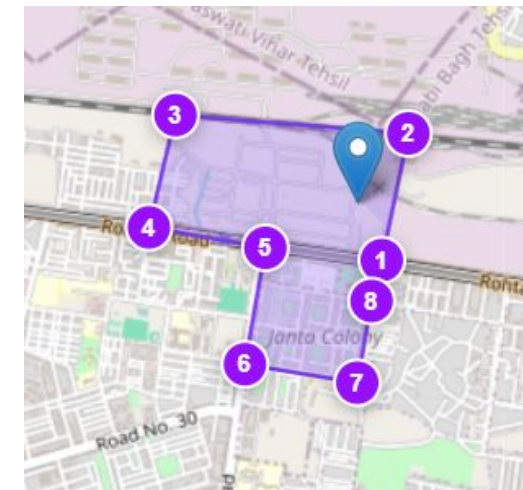
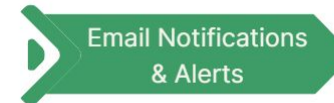
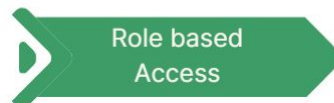
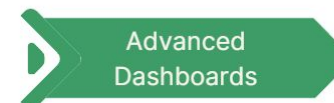
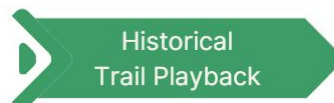
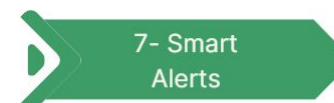
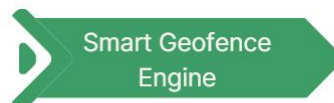
MARG was developed to **STREAMLINE LOGISTICS MANAGEMENT** for government operations, tackling challenges like **outsourced systems with limited customization, high dependency, and lack of real-time visibility**. Noticing how departments struggle without predictive or ETA-based vehicle tracking and face difficulty integrating data from multiple services, we created a **UNIFIED GPS PLATFORM** that connects all logistics operations under one transparent layer, enabling accurate tracking, efficient resource planning, and data-driven decision-making for smarter governance.

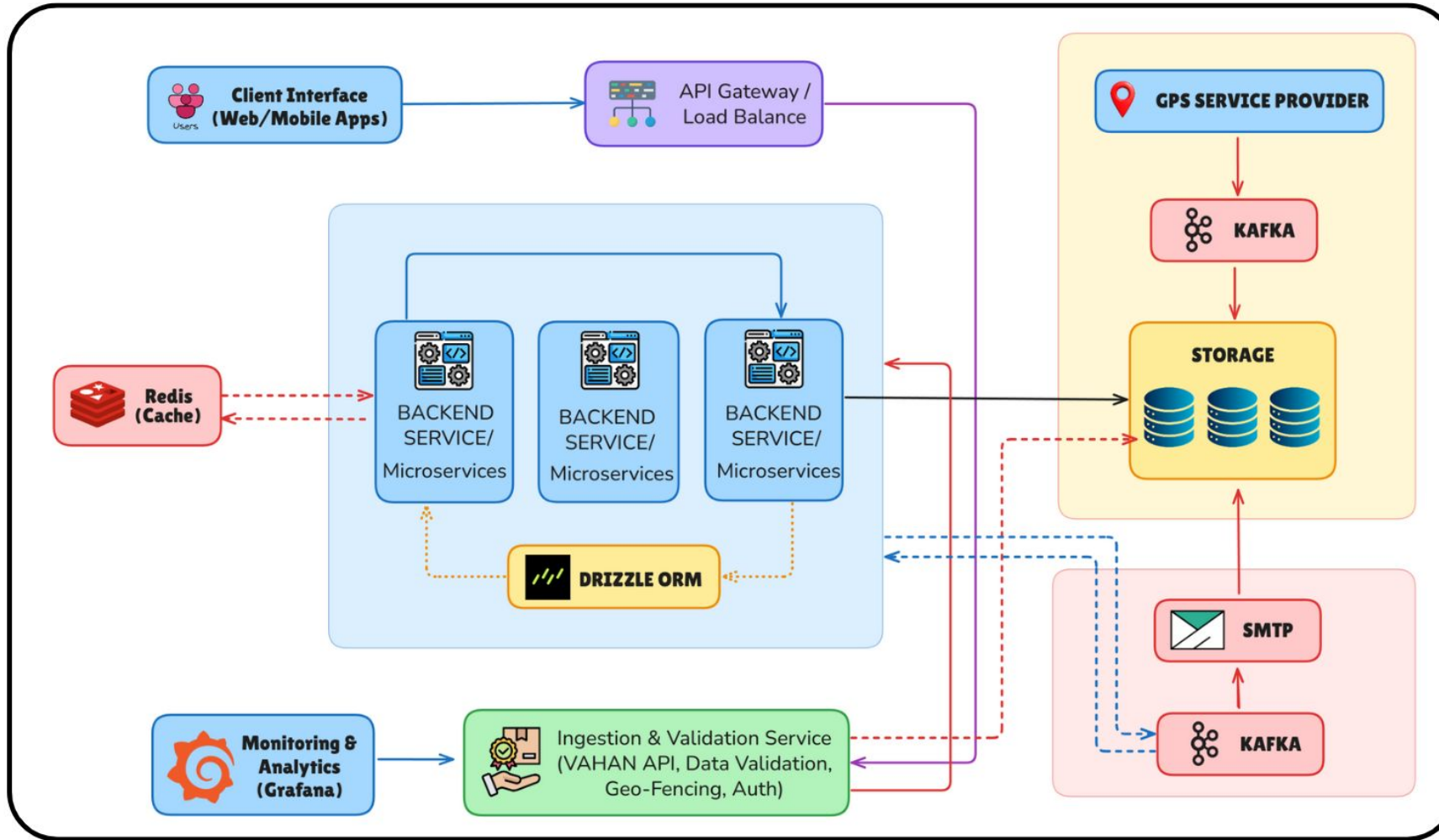
Proposed Solution

Introducing **MARG**: A unified GPS platform that gives governments real-time for efficient operations

- MARG delivers real-time fleet intelligence, ingesting 50,000+ GPS & shipment events/day through **RESTful APIs** and a **Kafka pipeline** processing 1M+ location updates/day with 99.99% uptime, offering **ETAs**, stoppages, speed analytics, historical paths, **geofenced** overlays, and 7 smart alerts.
- **Role-based access** with page and group-specific permissions ensures secure data control, while **vendor, customer, and vertical-based vehicle grouping** allows efficient filtering and visibility management, supported by 70% faster MySQL queries through Drizzle ORM indexing for real-time operations.
- Seamless management tools such as **bulk Excel upload/edit/delete**, multi-select actions, light/dark mode, and **5 exportable report types** with filter-based Excel exports empower data-driven planning, smooth fleet administration, and reliable end-to-end trip coverage.

MARG is a unified GPS platform transforming government logistics with real-time tracking, predictive analytics, and seamless data integration, enabling smarter, more transparent operations. It offers multiple features like:





Feasibility



Robust Architecture

- RESTful APIs
- Kafka pipeline
- MySQL (Drizzle ORM)



High Scalability

- Handling 1M+ location updates/day with 99.99% uptime



Cloud Ready Deployment

- Containerized for rapid deployment



Seamless Integration

- Govt TMS
- ERP
- IT infra



Access Control

- Role-based permissions enable custom user hierarchies.

Potential Challenges & Risks



Data Privacy

- Ensuring data privacy
- Compliance with govt norms (IT Act, CERT-In)



System Integration

- Integration complexity with legacy vendor systems



Infra & Cost Barriers

- High upfront setup cost and infra readiness



Adoption Resistance

- Pushback from staff & operational stakeholders



Connectivity Issues

- Possible network latency in remote or low-connectivity areas

Strategies to Overcome



Change Management

- Training, capacity-building workshops & phased rollouts



Data Security & Compliance

- End-to-end encryption, anonymization & role-based access controls



Connectivity Resilience

- Edge caching & offline sync for remote regions



Cost & Infra Optimization

- Public-private partnerships for infra support & cost sharing



Legacy System Integration

- Middleware APIs & adapters for compatibility

IMPACTS

Operational Teams



- Real-time fleet intelligence
- Geofenced alerts
- Bulk utilities for scheduling and reporting.



- Improves on ground visibility
- Reduce idle time & stoppages.
- Cuts manual work

Management



- Kafka-based data pipeline
- Group-based vehicle segmentation
- Advanced dashboards



- Enables 99.99% uptime
- Helps track KPIs at vendor/customer levels
- Highlight bottlenecks

Drivers & Ground Staff



- Real-time speed & stoppage alerts
- Digital Workflow



- Enhance accountability
- Reduced confusion via automated notifications

Partners & Vendors



- Transparent dashboards
- Excel-based exports
- REST APIs



- Ensure trust in delivery SLAs
- Reporting becomes collaborative and simple

BENEFITS

Social



- Safer Roads
- Driver Wellbeing
- Stronger Public Trust



- Via smart alerts & speed monitoring
- Reduces manual reporting
- Reliable service delivery

Economic



- Lower Operational Cost
- Faster Decision Making
- Scalable Platform



- Optimized routing & vehicle grouping
- Real time data
- Handles 1M+ updates/day

Environmental

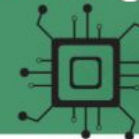


- Reduce Carbon Emissions
- Lower Vehicle Deployment
- Efficient Resource Use



- Through Geofencing & stoppage analytics
- Optimized trip scheduling

Technological



- Real time data streaming
- Cloud-based dashboards
- Secure digital transformation



- Via Kafka pipelines
- For anytime, anywhere visibility
- Using role based access



RESEARCH AND REFERENCES



❑ Real-Time Fleet Tracking Systems

- Demonstrates improved operational efficiency through GPS-based vehicle monitoring.
- References: [ResearchGate: Fleet Management with GPS](#)

❑ Event Streaming with Apache Kafka

- Kafka enables reliable, low-latency processing of large-scale logistics data streams.
- References: [Confluent: Kafka in Transportation](#)

❑ Predictive ETA and Route Optimization

- ML-powered ETA prediction improves delivery accuracy and reduces idle time.
- References: [IEEE: ETA Prediction Models](#)

❑ Geofencing & Location Analytics

- Research on using geofences for automated event triggers and compliance monitoring.
- References: [Esri — Geofencing & Real-time Tracking](#)

❑ Digital Infrastructure for Smart Governance

- Examines how unified digital platforms improve government efficiency and transparency.
- References: [UN E-Government Survey](#)