



IDEATHON PROJECT PROPOSAL

Team Name	Innov8ors
University Name	Sri Lanka Institute of Information Technology
Product Name	AcciNex - Predict, Prevent, Protect

1. Problem Definition Analysis

The Crisis on Sri Lankan Roads - A Statistical Emergency

Every three hours, a life is lost on Sri Lanka's roads. These are not just statistics—they reflect a growing crisis and a nation urgently in need of meaningful change.

The 2025 Reality Check:

- **1,870 deaths in only 8 months** (Jan-Sept 2025) - [PulseLine.lk, September 9, 2025](#)
- **7-8 deaths daily** – one death every 3 hours [PulseLine.lk, September 9, 2025](#)

Five Years of Tragedy:

- **12,140 road accident deaths (2020-2024)** - [Hiru News, January 6, 2025](#)
- **12,322 deaths in 118,697 accidents (2020-2024)** - [Ceylon Today, May 12, 2025](#)

Known Danger Zones:

- **779** high-risk areas have been identified on the road network - [Daily Mirror, July 14, 2025](#)

The tragedy is compounded by a systemic failure: **current systems only document accidents AFTER they happen, but do nothing to prevent the NEXT one.**

Systemic Failure Points:

- **Fragmented Data:** The police, hospitals, as well as emergency response departments, have disjointed pieces of data that lack a common analysis
- **Reactive Approach:** Present approaches to this issue are based on the reaction paradigm
- **Public Blindness:** Drivers navigate dangerously without awareness of high-risk zones
- **Pattern Ignorance:** The government does not have the ability to process "WHERE and WHEN" of accidents that occur
- **Delayed Response:** There is no predictive intelligence for the emergency services.

The Human Cost: These aren't just statistics - they represent 12,140 families devastated, thousands of livelihoods destroyed, and a persistent national tragedy that continues unabated.

2. Analysis

Why Current Solutions Are Ineffective

With 7-8 lives lost daily on Sri Lankan roads, the failure of current systems is not just an inefficiency—it's a national emergency.

Existing Landscape:

- **Police Databases:** Paper-based or digital records that never leave the station
- **Navigation Apps:** Google Maps/Waze show traffic but ignore accident history
- **Government Systems:** Silos that don't communicate or analyze patterns
- **Public Awareness:** Occasional billboards that don't provide real-time protection

The Root Causes:

1. **Data Silos:** Each authority maintains separate systems with zero integration. **779 known danger zones** are identified but never actively used to warn the public.
2. **Lack of Predictive Intelligence:** No system asks "Where will the next accident occur?"
3. **Public Exclusion:** Safety intelligence stays locked in government offices
4. **Manual Processes:** Time-consuming reporting delays analysis by weeks/months
5. **No Real-Time Protection:** Drivers receive warnings about traffic, but never about context-aware accident risks

The Stark Reality: As highlighted by recent media reports and police statistics, Sri Lanka requires an intelligent, predictive system that bridges the gap between accident data collection and public safety. The current approach is like using outdated approaches for modern challenges while lives hang in the balance.

3. Solution

AcciNex: Predict, Prevent, Protect

Our Vision: Build a working prototype that demonstrates how authoritative accident data can be transformed into life-saving intelligence.

The Dual-Platform Solution:

FOR AUTHORITIES (Data Guardians):

- **Smart Reporting:** GPS-tracked and image verified accident reports
- **AI-Driven Analytics:** Real-time hotspot detection and pattern analysis
- **Predictive Intelligence:** Machine Learning models predicting high-risk periods
- **Automated Reporting:** NLP-generated Comprehensive reports in minutes

FOR THE PUBLIC (Protected Drivers):

- **Intelligent Navigation:** Inertial navigation layer with real-time risk indication
- **Context-Aware Alerts:** High-risk zone upcoming in rainy evenings Slow Down
- **Predictive Warnings:** Not only where accidents have occurred, but where they are LIKELY to occur
- **Life-Saving Intelligence:** Transforming Government Info Into Personal Protection

Core Innovation: A single platform that securely manages authoritative data while delivering life-saving intelligence directly to drivers.

4. Product Overview

Two Interfaces, One Life-Saving Mission

Authority Dashboard:

- Role-based access (Traffic Police, EMS, Road Safety Authorities)
- Artificial intelligence data visualization through heat maps and trend analysis
- Predictive analytics dashboard for high-risk zones and timings
- Automated report generation and evidence management

Public Navigation App:

- Google Maps-powered navigation with an AcciNex safety overlay
- Color-coded risk zones (Red/Orange/Green) based on AI analysis
- Voice and visual alerts when Approaching High-Risk Areas
- Route optimization considering safety alongside efficiency

Key Features: Unlike existing solutions, AcciNex aims to create a closed-loop system where every reported accident immediately enhances public safety intelligence.

1. **Real-Time Risk Mapping:** Dynamic heatmaps updated with every new report
2. **Predictive Alerts:** Not just historical data, but forecasted risks
3. **Evidence Chain:** GPS-tagged photos with EXIF data verification
4. **Multi-Agency Integration:** All stakeholders on one platform
5. **Public-Private Bridge:** Secure data flow from authorities to citizens

5. Uniqueness of the Product

Why AcciNex Is Different

First-Mover Advantages:

1. **Predictive vs. Reactive:** We prevent accidents while others document them
2. **Authority-Public Bridge:** First platform connecting government data directly to citizen safety
3. **Spatio-temporal Intelligence:** We don't just map past accidents; we forecast future risks
4. **Closed-Loop System:** Accidents reported → AI analyzes → Public warned → Accidents prevented

Technical Differentiators:

- **Unified AI Engine:** Combining severity prediction + hotspot detection + trend analysis
- **Privacy-by-Design Architecture:** Public sees intelligence but never raw data
- **Real-Time Processing:** From accident report to public warning in under 5 minutes
- **Scalable GIS Integration:** Built for city-wide to national deployment

Innovation Metrics (Projected Achievements):

- Predictive positioning to enable 70% faster emergency response
- Targeted hotspots to achieve 40% fewer repeat accidents
- Authoritative data collection ensuring 100% data integrity

6. Business Model and Marketing Plan

Sustainable Impact, Sustainable Business

Revenue Streams:

1. **B2G Licensing:** Annual subscription for government authorities
 - Base package (Accident reporting, heatmaps, dashboards): LKR2,500,000 per city/year
 - Premium analytics (AI risk prediction, trend analysis, exportable reports): LKR 4,000,000 per city / year
2. **B2B Solutions:** Fleet management for corporations
 - Per-vehicle monthly subscription: LKR 500 per vehicle / month
3. **Insurance Partnerships:** Risk analytics for insurance companies
 - Data insights API: LKR 25,000 / month
4. **Smart City Integration:** National deployment contracts

Pricing is benchmarked against existing smart-city and fleet management platforms in South Asia

Market Strategy:

Phase 1: Pilot Dominance (Months 1-6)

- Target: Colombo Metropolitan Region
- Partner with Sri Lanka Police and Road Safety Authority
- Deploy at 50 high-accident zones with tracking metrics

Phase 2: Regional Expansion (Months 7-18)

- Expand to Kandy, Galle, Jaffna
- Corporate fleet partnerships (PickMe, Uber, logistics companies)
- Insurance company partnerships

Phase 3: National Scale (Years 2-3)

- Government-wide deployment
- ASEAN region expansion
- API marketplace for developers

5-Year Projection:

- Year 1: 2 cities, 100,000 protected drivers
- Year 2: 5 cities, 500,000 users, profitability
- Year 3: National coverage, 2M+ users
- Year 4-5: Regional expansion, smart city ecosystem

7. Future Plans

Building the Future of Road Safety

Phase 1: Pilot deployment with Colombo Traffic Police

- Live testing at 20 high-risk junctions
- Integration with emergency services
- Public beta launch

Phase 2: National Expansion & AI Enhancement

- Deploy in 5 major cities
- Advanced ML models for 95%+ prediction accuracy
- Integration with weather and traffic APIs
- Multilingual support (Sinhala, Tamil, English)

Phase 3 : Regional Leadership & Ecosystem

- Country-Wide Coverage: All 25 districts
- Corporate Partnerships: Logistics & insurance integration
- Public safety dashboards for communities

Phase 4 : Global Vision

- International Scaling: Developing nations adaptation
- UN Road Safety Partnership
- AI-driven infrastructure planning tools

Focus: Sri Lanka first, then regional, then global. Measurable impact at each phase.

8. Technical Overview

Enterprise-Grade Architecture

System Architecture:

- **Frontend:** React.js + Flutter (Cross-platform)
- **Backend:** Node.js + Python Microservices
- **Database:** For the MVP, Firebase +Firestore will be used. PostgreSQL + PostGIS will be adopted during scale-up.
- **AI/ML:** Python (Scikit-learn, Pandas, NumPy)
- **GIS:** Google Maps APIs + OpenLayers
- **Cloud:** Firebase (Mobile) + Heroku (Web) OR Vercel
- **Security:** End-to-end encryption, JWT Authentication with Role-Based Access, HTTPS/TLS Encryption

AI/ML Stack:

- **Severity Prediction:** Ensemble of Logistic Regression + Random Forest
- **Hotspot Detection:** DBSCAN clustering with temporal weighting
- **Pattern Analysis:** Time-series forecasting (Prophet algorithm)
- **Risk Scoring:** Custom algorithm combining 15+ factors

Integration Ecosystem:

- Google Maps Platform (Navigation, Geocoding)
- Weather APIs (Live condition integration)
- Firebase Services (Auth, Storage, Realtime DB)

Future Integrations:

- Department of Meteorology API (Sri Lanka)
- Emergency Services (119 integration)
- Insurance Company APIs

Data Pipeline:

1. Authority upload → 2. AI validation → 3. Pattern analysis → 4. Risk scoring → 5. Public alert generation

9. Implementation

From Concept to Life-Saving Reality

Phase 1: Foundation & Setup

- Environment setup: GitHub, Firebase, development tools
- Database design: PostgreSQL schema with spatial support
- Core API development: Node.js REST endpoints
- Frontend foundation: React.js dashboard basic layout

Phase 2: Core Features

- Authority dashboard: Accident reporting interface
- Map integration: Google Maps with accident plotting
- AI/ML foundation: Data collection and model training
- Initial testing: End-to-end workflow verification

Phase 3: Mobile Platform & AI

- Mobile app development: Flutter with navigation
- Advanced AI integration: Enhanced models and analytics
- Alert system: Real-time notifications and warnings
- System integration: Connect all components

Phase 4: Testing & Refinement

- User testing: Internal testing and feedback collection
- Security hardening: Authentication and validation
- Performance optimization: Speed and stability improvements
- Demo preparation: Presentation materials and live demo

Risk Mitigation:

- **Data Quality & Security:** Automated validation rules + encryption + sample datasets
- **Technical Reliability:** Modular architecture + daily backups + load testing
- **Timeline Management:** MVP prioritization + agile sprints + contingency buffers
- **Team & Adoption:** Clear role definitions + user training + phased rollout

During the initial implementation phase, the system will be developed and validated using simulated and anonymized datasets. Real-world API integrations will be introduced after successful pilot evaluation and stakeholder approval.

10. User Scenario

A Day in the Life of AcciNex

6:45 PM - Rainy Evening in Colombo:

Scene 1: Authority Action

Traffic Officer Kamal arrives at an accident on Baseline Road. He opens AcciNex on his tablet, selects "New Report," and:

- Uploads photos (automatically GPS-tagged)
- Enters details: "Major accident, rainy conditions, 2 injuries"
- System immediately:
 - Validates location accuracy
 - Predicts "High Severity" with 87% confidence
 - Updates hotspot analysis for Baseline Road
 - Flags "High risk during rainy evenings at this location"

Scene 2: Public Protection (30 minutes later)

Delivery driver Anoma is using AcciNex for her evening routes. As she approaches Baseline Road:

AcciNex: "Warning: High-risk zone ahead. 70% of accidents here occur during rainy evenings. Heavy vehicles turning - speed down to 30km/h."

Her screen displays:

- Red overlay on the upcoming intersection
- Flashing warning symbol
- Safer alternative route highlighted

Anoma slows down, takes the safer route, and avoids a near-accident with a turning truck.

Scene 3: Morning Analysis

Road Safety Director Priya logs into her dashboard to see:

- Overnight reports processed automatically
- 3 new high-risk zones identified
- AI-generated report for morning briefing
- Prediction: "Expect 40% increase in accidents during tomorrow's expected rain"

Impact Metric: From accident to actionable prevention in **under 1 hour**.

11. Team Details



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12. Additional Information

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Research Basis

- **Problem Scale:** 1,870 deaths (2025), 12,140 (5-year), 779 high-risk zones
- **Solution Validation:** Scikit-learn ML, DBSCAN clustering, Google Maps API
- **National Priority:** Cabinet-approved Road Safety Action Plan 2025-2026

Unique Value

First predictive road safety platform for Sri Lanka

1. **Real-time authority-public safety bridge**
2. **Scalable from Colombo pilot to national deployment**
3. **Proven technology stack** adapted for local context

Impact: Starting with Colombo's high-risk zones, aiming for 30% accident reduction.

--- End of the Proposal---