

Uyir Hackathon - 2025

Level 2 Online Presentation

Guardians of the Roads

“Empowering road safety with advanced technology to predict risks, prevent accidents, and protect lives.”

UYIR - Hackathon2k25 ID: UH_STUD_0834

Category: Students

Team Name: Undefined Pair

Team Leader: Akanksha Priyadarshinee Rath

Team Members' Names: Alok Gupta



Venue & Organizing Partner



Sri Krishna College of
Engineering & Technology,
Coimbatore, Tamilnadu

Knowledge Partner

IEEE INDIA
COUNCIL



Problem Statement & Objective



Problem Statement:

Coimbatore is a rapidly growing urban hub, but this growth has brought challenges like frequent road accidents due to:

1. **High Traffic Volume:** Increased vehicular density on narrow roads.
2. **Complex Intersections:** Poorly designed junctions that lead to confusion and accidents.
3. **Lack of Real-Time Monitoring:** Limited data-driven solutions to anticipate risks.

Why It Matters:

1. **Human Cost:** Road accidents claim over 11 lives daily in Tamil Nadu alone (source: NCRB).
2. **Economic Loss:** Accidents cost 3-5% of India's GDP annually due to healthcare expenses, productivity loss, and infrastructure damage.
3. **Urban Mobility Challenges:** Inefficient traffic management reduces the quality of life for citizens.

Objective:

To create a predictive and preventive road safety system that:

1. **Identifies Accident Hotspots:** Leverages AI and IoT for accurate and real-time predictions.
2. **Prevents Accidents:** Provides actionable insights to drivers and traffic authorities.
3. **Engages Communities:** Encourages public participation in road safety reporting and awareness campaigns.



Methodology



1. Data Collection:

- Partner with **Coimbatore Traffic Police** and **Tamil Nadu State Transport Corporation** for historical accident and traffic data.
- Deploy IoT devices like cameras and speed sensors in collaboration with **Bosch India** and **Hikvision**.

2. Prediction Model:

- Develop ML models using algorithms like Gradient Boosting and Random Forest with support from **IIT Madras** and startups like **Fractal Analytics**.

3. Real-Time Monitoring:

- Integrate IoT-enabled devices for speed, vehicle density, and environmental monitoring.
- Use **Google Maps APIs** for live traffic analysis.

4. Prevention Systems:

- Install smart traffic lights and adaptive warning systems with **Schneider Electric**.
- Create a mobile app with **MapmyIndia** for driver alerts and hazard reports.

5. Community Reporting:

- Launch a gamified citizen reporting feature integrated with popular apps like **Ola** and **Uber**.



Novelty /Contribution & Expected Outcome



Novelty /Contribution:

1. **AI-Powered Predictions:** Unlike traditional methods, our system leverages machine learning algorithms like Random Forest and Gradient Boosting to predict accident hotspots dynamically, factoring in variables such as traffic density, weather, time, and road conditions.
2. **Real-Time Decision Making:** Incorporating IoT-enabled sensors and edge computing allows instantaneous detection and response, reducing reaction times to road incidents.
3. **Community-Driven Adaptive Infrastructure:** A unique citizen-reporting feature empowers the public to contribute data, which, combined with dynamic traffic systems and smart warning signs, enhancing accuracy and reducing accidents effectively.

Expected Outcomes:

1. **Reduction in Accidents:** Aims to decrease accident rates by 30-40% at key hotspots.
2. **Improved Driver Awareness:** 40% more informed drivers through real-time notifications and educational alerts.
3. **Enhanced Infrastructure:** Facilitates 20% more efficient resource allocation for road improvement projects.
4. **Faster Incident Response:** 50% quicker reaction times enabled by live monitoring and IoT alerts.
5. **Broader Impact:** Scalable framework adaptable to other Indian cities, aligning with nationwide road safety initiatives.

Expected Difficulties:

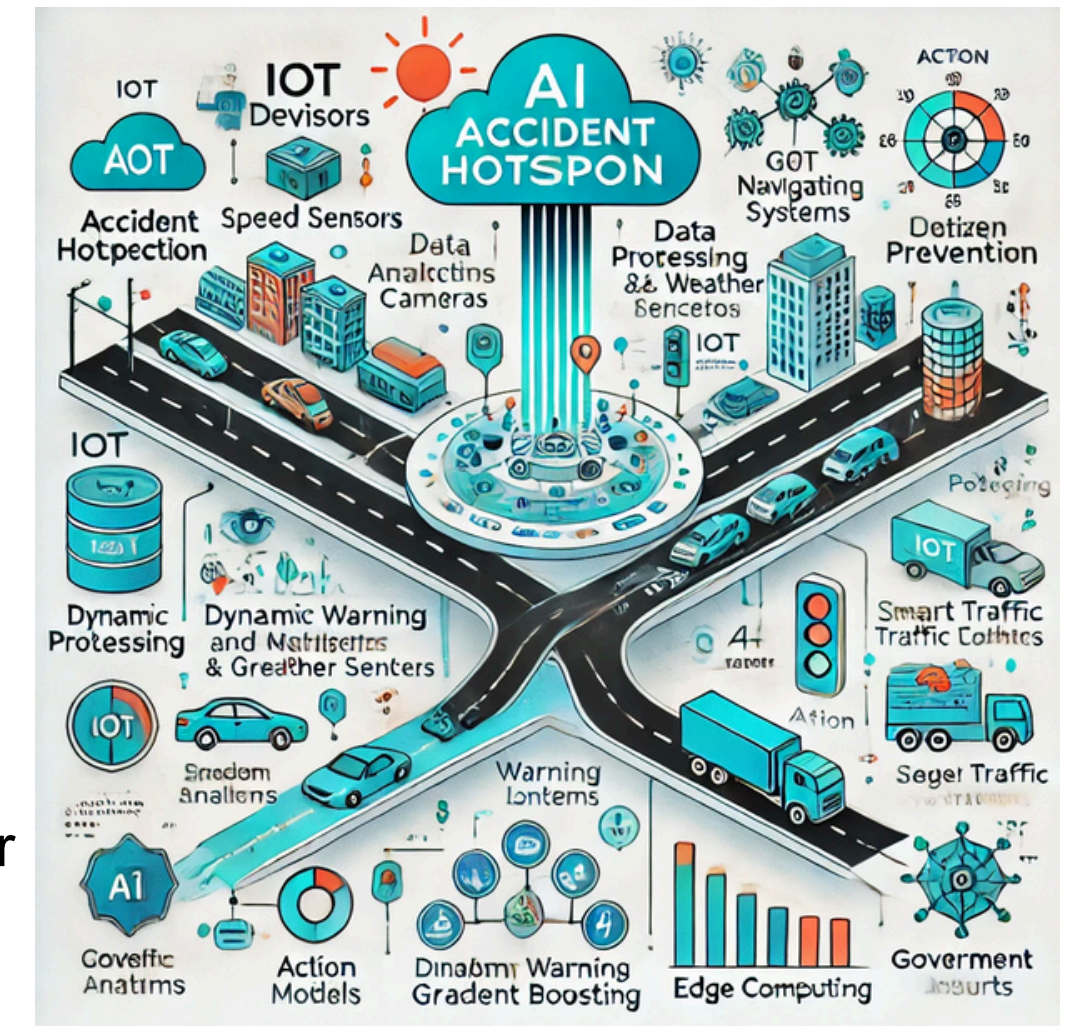
1. Synchronizing diverse data sources from IoT devices.
2. Overcoming resistance to new technologies among stakeholders.



Architecture Diagram

Key Elements:

- **IoT Devices**- Collect real-time data (traffic density, speed, and environmental factors) via sensors, cameras, and GPS devices.
- **Cloud Processing**-High-volume data is stored and analyzed on cloud platforms to extract actionable insights.
- **ML-Algorithm**- Algorithms predict accident hotspots based on historical and real-time inputs like weather and traffic flow.
- **Dynamic Alert Systems**- IoT-enabled warning boards and smart traffic lights provide real-time alerts to drivers.
- **Mobile App**- Sends drivers location-specific safety notifications and updates.
- **Government Dashboard**- Offers heatmaps, traffic analytics, and recommendations for improving road safety.



TRL (Technology Readiness Level):

1. **Current Level (TRL 6)**: Prototype demonstrated in a simulated urban setting with real-time traffic scenarios.
2. **Future Goal (TRL 9)**: Fully operational implementation across Coimbatore and other Indian cities with scalability for nationwide adoption.

Approximate Cost Estimate & Key Benefits



Approximate Cost Estimate:

1. **IoT Devices and Sensors:** ₹8,00,000 (via *Bosch India, Hikvision*).
2. **AI Model Development:** ₹4,00,000 (collaborate with *IIT Madras*).
3. **Mobile App Development:** ₹3,00,000
 - a. **Tech Stack:** Flutter or React Native will enable cost-effective, cross-platform app development.
 - b. Partnerships with local tech firms such as *Zoho Corp* (based in Tamil Nadu) to streamline development and maintenance.
4. **Community Awareness Campaign:** ₹2,00,000 (partner with local NGOs like *CAG* or *Civic Action Group* or *Thozhan*).
5. **Total:** ₹17,00,000 (*Cost-effective solution leveraging public-private partnerships and academic collaboration.*)

Key Benefits:

1. **Prevent Over 500 Fatalities Annually:**
 - a. Targeting accident-prone hotspots with dynamic interventions to significantly reduce casualties.
2. **Reduce Economic Losses by ₹10 Crore Per Year:**
 - a. Avoid medical expenses, repair costs, and productivity losses associated with road accidents.
3. **Improve Traffic Flow:**
 - a. Enhancing road safety and optimizing traffic management will reduce idle emissions by over 15-20%, improving air quality.
4. **Replicable and Scalable Model:**
 - a. This initiative serves as a blueprint for other Indian cities aiming for smart and sustainable urban road safety solutions.

