PROJECT PROPOSAL REPORT

EEY4189

SMART ROAD SAFETY & DRIVER COMPLIANCE MOBILE SYSTEM FOR SRI LANKA

Group - 69

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1. Introduction & Background

Road accidents continue to be one of the leading causes of fatalities and injuries in Sri Lanka, with thousands of cases reported annually. The major contributing factors include **over speeding, reckless driving, poor awareness of accident-prone zones, adverse weather conditions, roadblocks, and expired vehicle or driver documentation**.

While advanced vehicle safety technologies such as **collision avoidance, lane departure warnings, and automatic emergency braking** are becoming common in high-end cars globally, most vehicles in Sri Lanka are standard models lacking these features. Consequently, drivers do not have sufficient real-time support to prevent accidents.

Smartphones, however, are widely available across Sri Lanka and possess multiple built-in sensors such as **GPS, accelerometer, and gyroscope**, as well as internet connectivity. This makes them ideal candidates for providing **low-cost, accessible road safety solutions**. Through the development of a mobile application, it is possible to monitor driving behavior, detect hazards, provide real-time alerts, and remind drivers of compliance deadlines such as **license renewal, insurance validity, and emission testing**.

By combining **accident prevention, emergency response, hazard alerts, compliance tracking, and roadblock notifications**, the proposed system aims to significantly reduce road accidents and improve the driving culture in Sri Lanka.

2. Problem Statement & Project Objectives

Problem Statement

Despite existing traffic regulations and navigation apps, accidents in Sri Lanka remain frequent due to:

- **Excessive speed and poor speed awareness.**
- **Lack of real-time alerts about accident-prone zones and temporary roadblocks.**
- **Adverse weather conditions that drivers are often unaware of in time.**
- **Negligence regarding license, insurance, or vehicle emission expiries.**
- **Limited availability of high-end vehicle safety systems to the majority of drivers.**

There is a clear need for a **mobile-based solution** that provides **real-time safety monitoring, hazard alerts, compliance reminders, and emergency support,** all in one platform.

Project Objectives

- **Develop a mobile application that monitors driving behavior, including speed and location, and provides real-time alerts for over speeding, accident hotspots, roadblocks, and adverse weather conditions.**

- **Implement an emergency SOS system that automatically notifies pre-defined contacts with the driver's location in case of a crash.**

- **Provide a compliance management system that reminds users of upcoming expirations for licenses, insurance, emissions, and vehicle services, reducing legal violations and ensuring safe operation.**

- **Enable crowd sourced reporting of roadblocks and hazards to keep drivers informed in real time.**

3. Introduction to Similar Systems

Several systems exist globally and locally, but each has limitations:

- **Google Maps / Waze:** These applications provide traffic updates, route planning, and user-reported hazards. However, they do not proactively monitor driving behavior, detect over speeding, or provide compliance reminders specific to Sri Lanka.
- **Vehicle-to-Vehicle (V2V) Communication Systems:** Found in modern vehicles, these systems allow cars to share collision and hazard information. While effective, they are restricted to expensive vehicles and not applicable to the majority of Sri Lankan drivers.
- **Government Traffic Systems:** The Department of Motor Traffic in Sri Lanka manages licenses, insurance, and vehicle registrations. However, it does not provide proactive notifications or real-time hazard alerts.

The proposed system integrates multiple safety features into a single **mobile platform**, making it accessible and practical for the majority of drivers. By leveraging crowdsourcing, real-time sensor data, and cloud-based communication, this system provides comprehensive **accident prevention, emergency response, and compliance management**.

4. Proposed Solution

The **Smart Road Safety & Driver Compliance Mobile App** integrates multiple features to improve driving safety and compliance in Sri Lanka.

Key Components:

1. **Over speed Warning:**

- Measures vehicle speed via GPS and alerts drivers through vibration, sound, or visual cues when exceeding set limits.
- Configurable for different road types (city, highway, and school zones).

2. **Emergency SOS:**

- Detects crashes using accelerometer/gyroscope sensors.
- Sends automatic alerts with location to emergency contacts.
- Optionally integrates with nearby hospitals/ambulances.

3. **Weather & Road Alerts:**

- Fetches real-time weather data (OpenWeather API).
- Warns about rain, fog, floods, or hazardous roads.
- Suggests safer routes or speed adjustments.

4. **Accident Hotspot Alerts:**

- Uses official or crowdsourced data to notify drivers near accident-prone areas.
- Provides visual and audio alerts for better awareness.

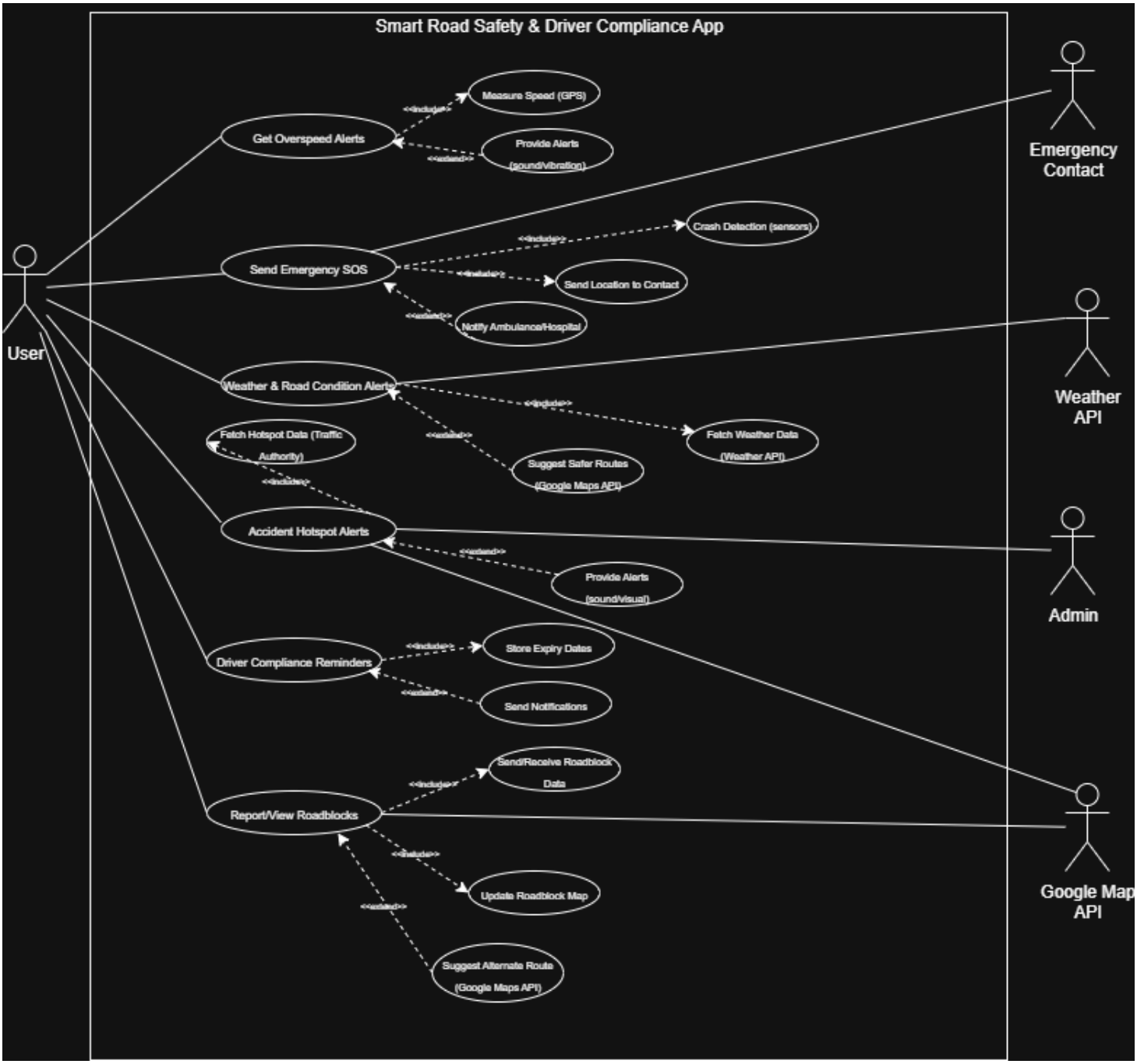
5. **Compliance Reminders:**

- Tracks license, insurance, emission, and vehicle service expiry.
- Sends push notifications in advance to prevent violations.

6. **Roadblock Live Updates:**

- Allows drivers to report temporary roadblocks (police, floods, construction).
- Shared in real-time with nearby drivers.
- Auto-expires after a set time; rerouting suggested via Google Maps API.

High-Level Use Case Diagram



This design allows **real-time, interactive, and automated safety management**, combining multiple aspects of driver support in a single platform.

5. Technology Planning

Frontend:

- Flutter framework for cross-platform Android/iOS development.
- UI/UX designed in Figma for easy navigation and alert visibility.
- Push notifications via Firebase Cloud Messaging.

Backend:

- Firebase Firestore for real-time data storage and retrieval.
- Node.js REST APIs to handle hazard reporting, alert management, and roadblock updates.

APIs:

- Google Maps API for navigation, route calculation, and accident hotspot mapping.
- OpenWeather API for weather and road condition alerts.

Data Processing:

- **GPS & Accelerometer/Gyroscope** for speed detection and crash monitoring.
- **Push notification scheduler** for compliance reminders.
- **Crowdsourced hazard management** for roadblock reporting and hotspot verification.

This architecture ensures **low latency, real-time alerts, and scalable data management**, suitable for Sri Lankan road conditions.

6. Project Timeline & Conclusion

Proposed Timeline (6 months):

Phase	Duration	Description
Requirement Analysis & Design	1 month	Gather accident and compliance data, UI/UX design, database schema
Development Phase 1	3 months	Implement overspeed monitoring, SOS, compliance reminder system
Development Phase 2	2 months	Integrate weather alerts, accident hotspot alerts, roadblock live updates
Testing & Deployment	1 month	Conduct simulation testing, beta release, collect feedback, final release

Conclusion

The **Smart Road Safety & Driver Compliance Mobile App** is a comprehensive solution designed to reduce road accidents, improve compliance, and provide real-time hazard awareness in Sri Lanka. By integrating **over speed warnings, emergency SOS, weather and accident alerts, compliance reminders, and live roadblock updates**, this system empowers drivers to make safer decisions, avoid legal issues, and respond to emergencies more effectively. The accessibility of smartphones ensures that this solution can reach a wide population, promoting a safer and more responsible driving culture across the country.

-Thank You-