Project Proposal: Lookout - Driver Drowsiness Detection System

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1 Project Objective

The driver drowsiness detection application, named **Lookout**, aims to enhance road safety by developing a mobile system that detects driver drowsiness in real-time using smartphone camera-based eye tracking and notifies emergency contacts via SMS. The project focuses on building a robust Spring Boot backend with advanced features beyond basic CRUD operations, integrated with a minimal Kotlin-based Android frontend, to provide a scalable and secure solution for preventing drowsy driving accidents.

2 Features

- User registration and login with secure JWT-based authentication.
- Emergency contact management for storing and updating contact details.
- Real-time drowsiness event logging with timestamp and GPS coordinates.
- Asynchronous SMS notifications to emergency contacts using the Twilio API.
- Alert history retrieval for users to review past drowsiness events.
- Minimal Android frontend with a button to simulate drowsiness detection and trigger backend API calls.
- Optional real-time eye tracking using MediaPipe (stretch goal, time permitting).

3 Technologies Used

- **Frontend**: Kotlin, Android Studio, CameraX, MediaPipe (optional for eye tracking).
- **Backend**: Spring Boot (Java), Spring Security (JWT), Spring Data JPA, Spring Async.
- **Database**: PostgreSQL.
- **Other**: Twilio API (SMS notifications), Retrofit (API calls), Heroku (deployment).

4 Expected Outcome

The final product, **Lookout**, will be a secure and scalable Spring Boot REST API integrated with a minimal Kotlin-based Android application. The backend, implemented in Java, will support user registration, contact management, and drowsiness event logging, featuring advanced functionalities such as asynchronous Twilio SMS notifications and JWT-based authentication.

The Android app will provide a simple interface to simulate drowsiness detection and trigger API calls, logging events and sending notifications to emergency contacts. The system will be deployable on Heroku and tested with PostgreSQL, demonstrating a practical solution for driver safety. If time permits, basic eye tracking using MediaPipe will be integrated to showcase real-time drowsiness detection.