Software Requirements Specification (SRS) Document

Project Title: Road Sign and Road State Mobile Notification Application

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1. Introduction

1.1 Purpose

This document provides a detailed description of the functional and non-functional requirements for a mobile application aimed at improving road safety by delivering real-time notifications of road signs, road states, and hazards to drivers. The system is designed to enhance awareness, encourage

proactive driving behavior, and provide localized information using GPS, real-time update, and user-reported incidents. It will serve as a reference for stakeholders, designers, developers, and testers throughout the project lifecycle.

1.2 Scope

This mobile application is aimed at improving road safety in Cameroon by providing real-time updates about road signs, road states, and hazards to drivers. It will leverage GPS, mobile notifications, real-time data feeds, and user-reported inputs to inform road users effectively.

1.3 Intended Audience

- Road Users (Drivers, Riders, Pedestrians)
- Road Safety Agencies
- Transport Authorities
- System Developers and Testers
- Product Stakeholders

1.4 Definitions and Acronyms

- **GPS:** Global Positioning System
- **API:** Application Programming Interface
- **UI/UX:** User Interface/User Experience
- **FCM:** Firebase Cloud Messaging
- **TTS:** Text-to-Speech
- **RTD:** Real-Time Data

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2. Overall Description

2.1 Product Perspective

The application is an independent system but may interact with third-party APIs such as Google Maps, Firebase, and government data portals.

2.2 Product Functions

- GPS-based location tracking
- Real-time alerts on road conditions and road signs
- Customizable alert preferences
- Customizable alert type(voice pop-up or vibration)
- Crowdsourced reporting module
- Offline road sign library
- Admin panel for moderation and feedback

2.3 User Classes and Characteristics

- **Regular Users:** Drivers or pedestrians who use the app for alerts
- **Admin Users:** Moderate user reports and manage road sign data
- **Government Agencies:** Use data analytics and reporting features

2.4 Operating Environment

- Stable Internet connectivity for real-time data sync
- Offline functionality for road signs references
- Android 8+ and iOS 12+
- GPS and notification permissions
- Third-party APIs (with rate limits and uptime SLAs)
- RESTful API backend, deployed on Docker containers

2.5 Design and Implementation Constraints

- Limited access to real-time APIs in Cameroon
- Language diversity (English & French and local diellets)
- Dependence on mobile data and GPS coverage

2.6 Assumptions and Dependencies

- Users have smartphones with GPS
- Firebase and Google Maps APIs are available
- User engagement will fuel crowdsourced features

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3. System Features (functional requirements)

3.1 User Authentication (Optional)

- Register/Login using phone/email
- Guest access allowed

3.2 GPS Location Tracking

- Uses device GPS to determine user position
- Automatically updates in background

3.3 Road Sign Notifications

- Preloaded database of Cameroon road signs
- Alerts when approaching a known sign (200m range)
- Displays sign image and interpretation

3.4 Real-Time Road Condition Alerts

- Integrates with traffic feeds (where available)

- Crowdsourced alerts on traffic, accidents, roadworks
- Push of voice notifications and map overlays

3.5 Crowdsourced Reporting

- Submit photo, description, and location
- Limited to 3-step process for ease
- Moderated via admin dashboard

3.6 Custom Alerts & Notification Settings

- User defines alert types and range (500m - 5km)
- Voice alerts supported via TTS
- Silent mode or DND available

3.7 Offline Sign Access

- Access to road sign database offline
- Searchable and categorized by type

3.8 Navigation Integration

- Launches Google Maps with pinned alerts
- Floating widget overlay (if feasible)

3.9 Multilingual Support

- English and French language support
- Language auto-detected and selectable in settings

3.10 Feedback and Reporting

- Report app bugs or suggestions
- Optional screenshot/log upload

3.11 Admin Panel

- Approve, reject, or edit user reports
- View user activity logs
- Manage database of road signs

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4. Non-Functional Requirements

4.1 Performance Requirements

- App should respond within 2 seconds for all UI actions
- Location update rate: every 10 seconds
- Push alert delivery: under 3 seconds

4.2 Security Requirements

- Use secure authentication (OAuth2, JWT)
- End-to-end encryption for all user data
- Firebase rules for secure DB access

4.3 Usability Requirements

- Clean, intuitive UI for drivers (use of icons, voice prompts)
- Large buttons for in-vehicle use
- Accessible design (color contrast, font size)

4.4 Reliability & Availability

- App uptime: 99.5% (hosted on Firebase backend)
- Works with intermittent network; uses local caching

4.5 Maintainability

- Modular codebase (MVVM or Clean Architecture)
- Documented APIs and code comments

4.6 Localization

- Supports both official languages of Cameroon
- Date, time, and currency localized

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5. External Interface Requirements

5.1 User Interfaces

- Splash screen
- Dashboard (map with real-time alerts)
- Report form
- Notification settings
- Road sign dashboard
- Admin panel (web or restricted mobile access)

5.2 Hardware Interfaces

- GPS sensor
- Mobile camera for crowdsourced reports
- Internet Connectivity Module (WiFi/Cellular) Required for fetching real-time data, sending reports, and receiving push notifications.

5.3 Software Interfaces

- Google Maps SDK

- Firebase Cloud Messaging For sending real-time push notifications to users.
- Firebase Realtime Database or Firestore For storing user reports, road state updates, and system logs.

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6. Appendices

A. References

- Cameroon Highway Code
- Android Development Guidelines
- Google Maps Platform Docs
- Firebase Documentation

B. Glossary

- **Crowdsourcing:** Gathering input or data from a large group of users
- **TTS:** Text-to-Speech
- **Overlay:** A visual layer on top of another application

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7. Approval and Sign-Off

Role	Name	Signature	Date
Developers	Fouyou Chinjeh Braya Kang Jevis Visemih Janice Abang Blessing		
Stakeholder Rep	DR. NKEMENI VALERY		