# Software Requirements Specification (SRS)

## Phone-based Lie Detector Using Speech Processing

**Version: 1.3**Prepared by: [Your Team Names Here]  
Date: December 6, 2024  
**Cankaya University**

[

# Table of Contents

1. Introduction  
 1.1 Purpose  
 1.2 Document Conventions  
 1.3 Intended Audience and Reading Suggestions  
 1.4 Product Scope  
 1.5 References  
2. Overall Description  
 2.1 Product Perspective  
 2.2 Product Functions  
 2.3 User Classes and Characteristics  
 2.4 Operating Environment  
 2.5 Design and Implementation Constraints  
 2.6 Assumptions and Dependencies  
3. System Features  
4. Functional Requirements  
5. Non-functional Requirements  
6. Limitations and Future Work  
7. Appendix A: Glossary  
8. Appendix B: Team Members

# 1. Introduction

## 1.1 Purpose

The purpose of this Software Requirements Specification (SRS) is to define the requirements for a phone-based lie detection system utilizing speech processing techniques. This system aims to provide a non-invasive, accessible, and accurate tool for detecting lies through speech analysis.

## 1.2 Document Conventions

This document follows the IEEE 830 standards for Software Requirements Specifications. All technical terms and abbreviations are explained in the Appendix A: Glossary section.

## 1.3 Intended Audience and Reading Suggestions

The document is structured for a diverse audience, including:  
- Developers: To understand the requirements and technical specifications.  
- Project Managers: To ensure that the scope and requirements align with project goals.  
- Testers: To create relevant test cases.  
- Stakeholders: To understand the project's capabilities and limitations.

## 1.4 Product Scope

The phone-based lie detection application will use advanced speech analysis algorithms to identify deceptive behaviors. The system will analyze acoustic, prosodic, and emotional speech features to provide real-time feedback. The primary application areas include security, psychology, and general public usage.

## 1.5 References

- Ekman, P. \*Telling Lies: Clues to Deceit in the Marketplace, Politics, and Marriage\* (2009).  
- Columbia SRI-Colorado Corpus Dataset.

# 2. Overall Description

## 2.1 Product Perspective

The application processes user-provided speech inputs to determine whether they are truthful or deceptive. It uses a combination of machine learning models to analyze speech features.

The system consists of a mobile app that collects audio input from users, which is then processed by backend services utilizing machine learning models. These models analyze features such as pitch, intonation, and pauses to determine if the speech is likely to be deceptive. Results are displayed on the user's device in an easy-to-understand format.

### Figure 1: System Architecture Overview

The following diagram provides an overview of the system's architecture:

[Placeholder: Add a system architecture diagram here, showing data flow from the user to the backend and back to the user.]

## 2.2 Product Functions

- Record or upload speech samples.  
- Process and analyze acoustic, prosodic, and emotional markers.  
- Provide feedback on the likelihood of deception.  
- Store previous analyses for user review.

## 2.3 User Classes and Characteristics

Target users include:  
- \*\*Psychologists\*\*: To assess the psychological state of individuals.  
- \*\*Law Enforcement Personnel\*\*: To assist in investigations by providing additional tools to detect deception.  
- \*\*General Users\*\*: For personal use or curiosity.

## 2.4 Operating Environment

The system operates on mobile platforms, including Android and iOS, and requires internet connectivity to process the speech samples using the backend server.

## 2.5 Design and Implementation Constraints

- \*\*Audio Quality\*\*: High-quality audio input is required for accurate processing.  
- \*\*Privacy\*\*: The system must comply with privacy regulations, ensuring user data is protected.

## 2.6 Assumptions and Dependencies

- Users have access to smartphones with sufficient processing power.  
- A reliable internet connection is available for backend processing.  
- Machine learning models are pre-trained on diverse datasets.

# 3. System Features

- \*\*Speech Feature Extraction\*\*: Extracts acoustic, prosodic, and emotional markers from the speech input.  
- \*\*Deception Analysis\*\*: Utilizes machine learning models to determine if the speech is deceptive.  
- \*\*Real-time Feedback\*\*: Provides immediate results on the likelihood of deception.  
- \*\*User-friendly Visualization\*\*: Displays results in a graphical form for easy understanding.

# 4. Functional Requirements

- Record and process audio input.  
- Provide deception analysis in under 5 seconds.  
- Display results clearly as 'Truthful' or 'Deceptive'.  
- Allow users to save and review previous analyses.

# 5. Non-functional Requirements

- \*\*Performance\*\*: The system must process audio within 5 seconds.  
- \*\*Accuracy\*\*: The application aims for an accuracy of 85% or higher.  
- \*\*Usability\*\*: The user interface should be intuitive and accessible.  
- \*\*Scalability\*\*: The system must handle concurrent user requests effectively.

# 6. Limitations and Future Work

## 6.1 Limitations

- Small dataset size limits model accuracy.  
- Cultural and linguistic differences impact generalization.

## 6.2 Future Work

- Expand datasets for greater diversity, including different languages and accents.  
- Integrate real-time analysis capabilities for live conversations.  
- Develop a desktop version of the application for expanded use cases.

# 7. Appendix A: Glossary

- \*\*AP (Acoustic Parameters)\*\*: Characteristics like pitch and volume.  
- \*\*RP (Rhythmic Parameters)\*\*: Features such as speech rate and pauses.  
- \*\*EM (Emotional Markers)\*\*: Stress and anxiety indicators in speech.  
- \*\*ML (Machine Learning)\*\*: Algorithms used for data analysis.  
- \*\*DL (Deep Learning)\*\*: Advanced models for processing complex datasets.

# 8. Appendix B: Project Team Members

# 8. Appendix B: Project Team Members

|  |  |  |
| --- | --- | --- |
| Name | Role | Contact Information |
| Çağrı Başaran | Developer | c2011015@student.cankaya.edu.tr |
| Onur Güven | Developer | 201611028@cankaya.edu.tr |
| Eray Yıkar | Developer | c2011074@student.cankaya.edu.tr |
| Melih | Developer | c2111070@student.cankaya.edu.tr |