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D2 + TD2

Software Requirements Specification (SRS)

AI-Based Dementia Screening & Counselling System

1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) document describes the functional and non-functional requirements of the **AI-Based Dementia Screening & Counselling System**. The document is intended for developers, project evaluators, instructors, and stakeholders to understand system behavior, constraints, and implementation requirements.

1.2 Scope

The system is a web-based AI application that screens users for early signs of dementia using **cognitive tests and speech analysis**. It generates a **risk score**, optional **stage classification**, and provides **recommendations for medical consultation**. The system aims to be affordable, accessible, and usable by patients, caregivers, and healthcare professionals.

1.3 Definitions, Acronyms, and Abbreviations

Term	Description
AI	Artificial Intelligence
ML	Machine Learning
API	Application Programming Interface
UI	User Interface
STT	Speech-to-Text
SRS	Software Requirements Specification

2. Overall Description

2.1 Product Perspective

The system is a **standalone web application** consisting of:

- Frontend UI for tests and reports
- Backend API for processing and predictions
- ML models for dementia detection
- Database for secure data storage

It may optionally integrate with third-party APIs such as Google Maps for doctor recommendations.

2.2 Product Functions

- Conduct cognitive tests via web interface
- Record and analyze speech samples
- Predict dementia risk using ML models
- Display results through dashboards
- Recommend nearby specialists
- Store historical results securely

2.3 User Classes and Characteristics

User	Description
Patient	Takes tests and views results
Caregiver	Assists patients and views reports
Doctor	Reviews risk scores and reports
Admin	Manages system and data

2.4 Operating Environment

- Web browser (Chrome, Firefox, Edge)
- Backend: Python (Flask/FastAPI)
- Database: SQLite / MongoDB / PostgreSQL
- OS: Windows / Linux / macOS

2.5 Design and Implementation Constraints

- Limited access to real patient data
- Privacy and security requirements
- Model accuracy depends on dataset quality
- Internet required for API integrations

2.6 Assumptions and Dependencies

- Users provide accurate inputs
- Speech recordings are clear
- ML models trained on valid datasets
- APIs remain available

3. System Features and Requirements

3.1 User Authentication

Description: Secure login for users.

Functional Requirements

- FR-1: System shall allow users to register and log in
- FR-2: System shall restrict access to authorized users only

3.2 Cognitive Test Module

Description: Interactive cognitive assessment.

Functional Requirements

- FR-3: System shall present memory, attention, and problem-solving tests
- FR-4: System shall record accuracy and response time
- FR-5: System shall store test results in database

3.3 Speech Analysis Module

Description: Speech recording and processing.

Functional Requirements

- FR-6: System shall record voice samples via microphone

- FR-7: System shall extract speech features (pauses, rate, pitch)
- FR-8: System shall optionally convert speech to text

3.4 Machine Learning Prediction Module

Description: Dementia detection and scoring.

Functional Requirements

- FR-9: System shall classify dementia risk (Yes/No)
- FR-10: System shall generate a risk score (0–100%)
- FR-11: System shall optionally predict dementia stage

3.5 Result Visualization Module

Description: Dashboard for results.

Functional Requirements

- FR-12: System shall display risk scores graphically
- FR-13: System shall show historical trends
- FR-14: System shall generate downloadable reports (optional)

3.6 Recommendation System

Description: Doctor recommendations.

Functional Requirements

- FR-15: System shall suggest nearby specialists using location
- FR-16: System shall provide counselling recommendations

4. External Interface Requirements

4.1 User Interface

- Web-based responsive dashboard
- Simple and accessible design
- Supports multi-language input (optional)

4.2 Hardware Interfaces

- Microphone for speech input

- Standard desktop or mobile device

4.3 Software Interfaces

- Google Maps API (doctor recommendation)
- Speech recognition APIs (Whisper/Vosk)

4.4 Communication Interfaces

- HTTPS for secure data transmission
- REST APIs for frontend-backend communication

5. Non-Functional Requirements

5.1 Performance

- Predictions generated within 3–5 seconds
- Supports multiple concurrent users

5.2 Security

- Encrypted data storage
- Anonymized patient data
- Secure authentication

5.3 Usability

- Easy-to-use interface
- Minimal technical knowledge required

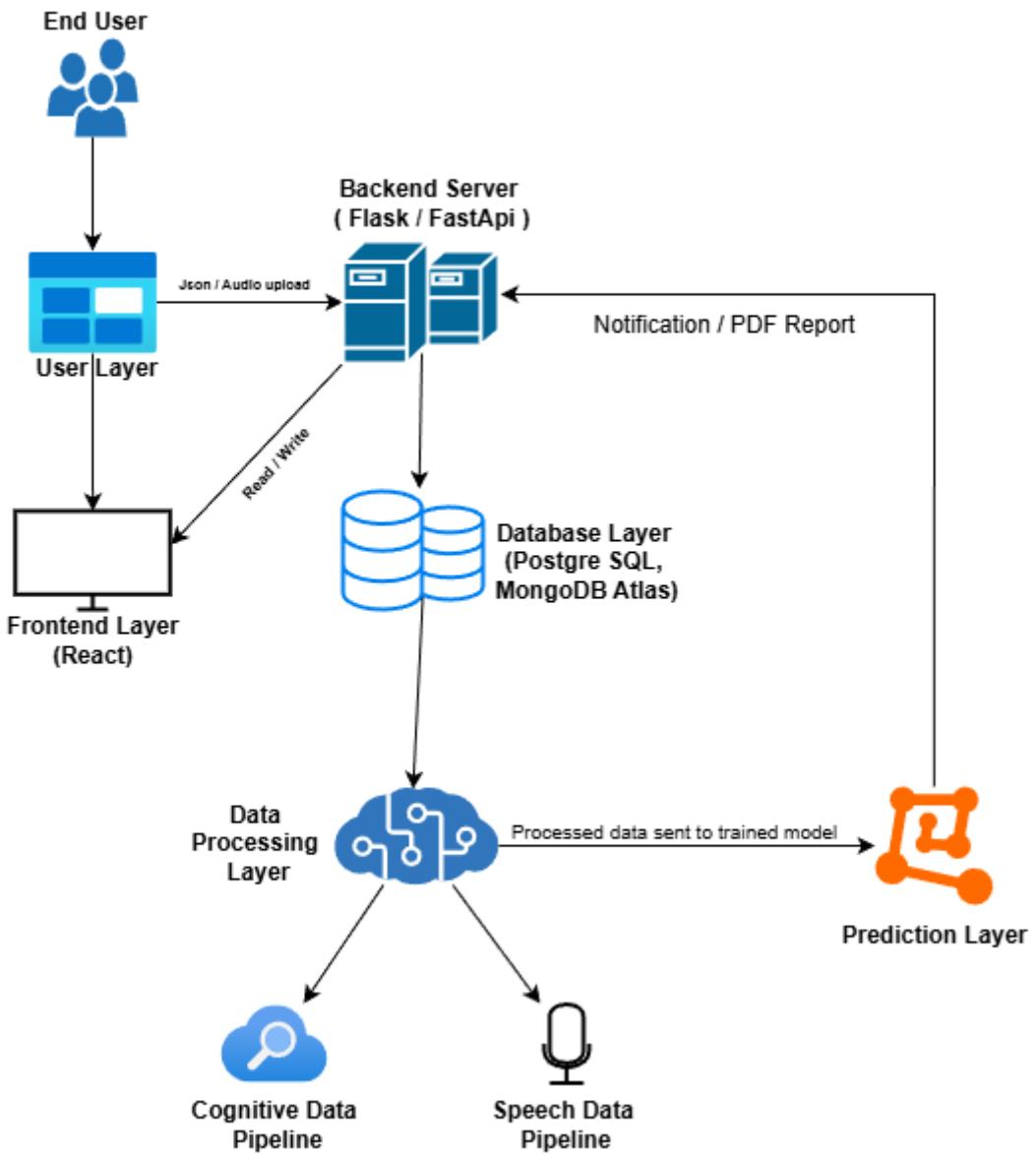
5.4 Reliability

- System uptime $\geq 95\%$
- Graceful error handling

5.5 Scalability

- Can scale to larger datasets and users

6. Architecture Overview



7. Future Enhancements

- MRI/CT scan integration
- Wearable device data
- Longitudinal patient tracking

8. Conclusion

The AI-Based Dementia Screening & Counselling System provides a scalable, cost-effective, and accessible solution for early dementia detection. By combining cognitive testing, speech analysis, and machine learning, the system supports early intervention and improves healthcare outcomes.