**Software Requirements Specification**

**AI-Powered Virtual Assessment Platform**

**V 1.0**

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**1. Introduction**

**1.1 Purpose**

The purpose of this SRS is to define the functionalities, features, and behavior of the AI-powered virtual assessment platform, which automates the process of conducting virtual vivas and providing feedback, scores, and reports. The intended audience includes interviewers, students, system developers, and management teams.

**1.2 Scope**

The AI-powered virtual assessment platform aims to streamline virtual assessments by automating question generation, answer evaluation, feedback generation, and report creation. It reduces the manual effort of interviewers and improves the overall experience for interviewees.

The platform includes:

1. Speech-to-speech assessment
2. Automated answer feedback
3. Score assignment and feedback
4. Viva report generation
5. Database handling with three types of question input methods (manual, file-based, AI-generated)
6. Frontend for interviewer and interviewee

**1.3 Definitions, Acronyms, or Abbreviations**

* **AI**: Artificial Intelligence
* **CSV**: Comma-Separated Values
* **Viva**: Oral examination or assessment

**1.4 References**

1. IEEE 830-1998: IEEE Recommended Practice for Software Requirements Specifications
2. ISO/IEC 9126: Software Product Quality
3. TensorFlow Documentation
4. Django Documentation: <https://docs.djangoproject.com>
5. ReactJS Documentation: <https://reactjs.org/docs>
6. MongoDB Documentation: https://www.mongodb.com/docs/

**1.5 Overview**

The project focuses on creating a comprehensive speech-based assessment system with several key features. First, it includes a speech-to-speech assessment system that evaluates spoken answers. The system also acts as an automated answer feedback generator, providing feedback on strengths, weaknesses, and areas for improvement. Additionally, the system features an automated score assigner, offering feedback based on assigned scores. It can also generate individual answer reports and a full viva assessment report automatically. The document also includes system architecture details through class diagrams and visual representations of user interactions via use case diagrams. Overall, this SRS serves as a foundational guide, ensuring that all stakeholders have a unified understanding of the project’s scope, features, and development approach.

**2. Overall Description**

**2.1 Product Perspective**

The AI Powered Virtual Assessment Platform is designed as an innovative educational tool to streamline oral examinations using AI technology. It integrates with AI models to facilitate the generation of questions, evaluate responses, provide feedback, and generate comprehensive reports, serving as a seamless interface between interviewers and interviewees. The platform targets educational institutions, interviewers, and students, ensuring efficiency and accuracy in the assessment process.

The product is built to manage various forms of data input, including manual interviewer entry, CSV-based batch uploads, and AI-generated questions and answers, all stored in a structured database. It also features distinct frontends for interviewers (including a dashboard for managing student profiles and assessments) and interviewees (for tracking their progress and reports).

The system aims to reduce the manual workload involved in conducting viva examinations while enhancing the quality of feedback and analysis. By automating the scoring and feedback process, it enables a consistent and thorough assessment of each candidate’s strengths, weaknesses, and areas for improvement. Additionally, the platform supports the generation of individual question-wise feedback as well as comprehensive viva reports, which can be accessed by both interviewers and interviewees through their respective portals.

This product integrates seamlessly with the assessment ecosystem of institutions, offering real-time data storage, accessibility, and the ability to scale AI-driven oral assessments, positioning it as a modern solution for educational and professional evaluation.

**2.2 Product Functions**

* **Speech-to-Speech Assessment**: Conducts viva via voice input.
* **Answer Feedback**: Automatically evaluates answers and provides strengths, weaknesses, and areas of improvement.
* **Score Assignment**: Scores are assigned based on predefined criteria and AI-generated assessments.
* **Report Generation**: Individual answer feedback and full viva session reports are generated and stored in the database.
* **Database Handling**: Questions are input via manual input, file-based input (CSV), or AI-generated input by the assessor/interviewer in the assessor’s UI.
* **Viva Assessor Panel:** Dashboard of candidates who have given the assessment, for qualification/selection them in the next round.
* **Candidate Panel:**  Individual candidate dashboard, candidate profile and candidate reports

**2.3 User Characteristics**

The platform serves three main user groups:

The AI-powered virtual assistant interview website serves a diverse group of users, each interacting with the system for different purposes. The primary user groups include:

1. End Users (Students/Job Seekers):  
   These users will undergo virtual interviews facilitated by the AI assistant. They will access the website to start the interview, respond to questions using voice input, and receive an assessment report. Since the users may vary in technical proficiency, the interface must be intuitive and easy to navigate. Their primary activities involve clicking the “Start Interview” button, answering questions via voice input, and reviewing reports. Basic familiarity with web applications and voice input functionalities is expected.
2. Interviewers:  
   Interviewers will review the reports generated from the interviews, which include individual question analysis and an overall assessment. They will also receive the student’s profile details. These users are expected to have an intermediate understanding of digital platforms and be comfortable navigating through reports and profiles.
3. Administrators:  
   Administrators will manage the website’s operations, which includes managing user profiles, setting up interviews, monitoring AI performance, and updating data. These users require advanced technical skills and a solid understanding of backend systems, data management, and user permissions.
4. Technical Support and Development Team:  
   This group includes developers, system administrators, and engineers who ensure the seamless functioning of the website. Their tasks involve managing the website's performance, integrating the AI model, maintaining databases, resolving technical issues, and rolling out updates. Expertise in web development, database management, AI integration, and system administration is essential.

**2.4 General Constraints**

The AI-powered interview website is designed to function efficiently across various environments and devices. Below are the general constraints for optimal performance:

* Hardware Platform:  
  The website is platform-independent and optimized for desktops, laptops, and mobile devices. The system is expected to perform efficiently on devices with the following minimum hardware specifications:
  + Processor: Intel Core i3 or equivalent
  + Memory: 4 GB RAM (minimum); 8 GB RAM or higher recommended
  + Storage: SSD storage recommended for faster load times
  + Display: Minimum resolution of 1366x768 pixels for desktops, 720x1280 for mobile devices

The system should handle concurrent user sessions, real-time AI processing, and voice input/output without performance degradation.

* Operating System:  
  The system supports a variety of operating systems, ensuring compatibility for all users:
  + Windows: Windows 10 or later
  + macOS: macOS 10.15 Catalina or later
  + Linux: Ubuntu 18.04 LTS or later
  + Mobile Platforms: iOS 12 or later (for iPhone and iPad), Android 9 Pie or later (for smartphones and tablets)
* Web Browser Compatibility:  
  The website must be compatible with modern browsers, including:
  + Google Chrome (latest version)
  + Mozilla Firefox (latest version)
  + Microsoft Edge (latest version)
  + Safari (latest version)

The system should support HTML5, CSS3, and JavaScript to ensure a seamless user experience across all browsers.

* Web Server and Database:  
  For optimal performance, the recommended web server and database configurations are:
  + Web Server: Nginx 1.18 or later, Apache 2.4 or later
  + Database: MongoDB 4.0 or later (for user profiles, reports, and session data)
  + Backend: Django 3.2 or later for managing the application logic and integration with AI services
  + AI Framework: CrewAI integrated with the LLaMA 3-8B-8192 pre-trained model and Google Serper for question-answer assessment
* Other Software Components:  
  The website will interact with other software components or services, such as:
  + Speech-to-Text: For processing user voice inputs into text for analysis
  + Text-to-Speech: For the AI to deliver questions audibly to the user
* Platform must support integration with speech recognition and natural language processing systems.

**2.5 Assumptions and Dependencies**

* **Assumptions**:

1. **Internet Connectivity**:  
   It is assumed that all users, including students and interviewers, will have stable internet connections for seamless voice interaction and real-time processing.
2. **Compatible Devices**:  
   The users will access the website through devices that meet the necessary hardware and software requirements, including functional microphones for voice input.
3. **Browser Compatibility**:  
   The system assumes that users will access the website using modern, updated browsers that support HTML5, CSS3, JavaScript, and WebRTC for real-time communication.
4. **Server Availability**:  
   The system assumes a robust hosting environment with minimal downtime, ensuring high availability for all users.
5. **User Authentication**:  
   All users (students, interviewers, admins) are required to authenticate themselves using valid credentials before accessing the system’s features.
6. **Data Security**:  
   All user data, including voice inputs, reports, and personal details, will be securely stored and transmitted according to data protection regulations, such as GDPR.

* **Dependencies**:

1. **External Speech-to-Text Services**:  
   The system depends on third-party speech-to-text services to convert user voice input into text. Any changes or disruptions in these services may affect system functionality.
2. **AI Model**:  
   The pre-trained LLaMA 3-8B-8192 model is a key dependency for evaluating user responses. Any updates or performance issues with this model may affect the accuracy of the assessments.
3. **Web Hosting and Database Services**:  
   The availability and performance of the website depend on web hosting and database service providers. Issues such as downtime or performance limitations could hinder the website’s functionality.
4. **Legal and Compliance**:  
   The system is dependent on adhering to data protection and privacy regulations (e.g., GDPR). Changes in these laws may require updates to how data is handled, stored, or transmitted.

**3. Specific Requirements**

**3.1 Functional Requirements**

**3.1.1 User Registration and Authentication**

Organisation will take care for the user registration and authorisation

**3.1.2 Initiating the Interview**

3.1.2.1 Introduction

This functional requirement allows users to begin the AI-powered interview process by clicking a "Start Interview" button.

3.1.2.2 Inputs

* Click on the "Start Interview" button.

3.1.2.3 Processing

* Upon clicking the button, the system initiates the assessment session.
* The AI model speaks out and displays the questions.
* The user's voice responses are captured and transcribed for further processing.

3.1.2.4 Outputs

* AI generates and presents the questions audibly and textually.
* The user's responses are processed and analyzed in real-time.

3.1.3 Answer Evaluation and Feedback

3.1.3.1 Introduction

This functional requirement covers the assessment of user answers by the AI model and the generation of feedback based on predefined metrics.

3.1.3.2 Inputs

* User's voice response to questions.

3.1.3.3 Processing

* The machine learning model (LLaMA 3-8B-8192) assesses the user responses.
* The system store the individual feedback, highlighting strengths, weaknesses, and areas of improvement.
* The system will process and generate a short response for the answer given by the candidate.

3.1.3.4 Outputs

* A detailed report per question that includes:
  + Individual score
  + Strengths and weaknesses
  + Suggestions for improvement
* Overall report summarizing the entire session.
* Reports sent to both the student and the interviewer.

3.1.4 User Profile and Report Access

3.1.4.1 Introduction

This functional requirement covers the ability for users to view their profiles, access assessment reports, and for interviewers to view student profiles.

3.1.4.2 Inputs

* Updated profile information (e.g., name, contact number).
* Request to view past assessment reports.

3.1.4.3 Processing

* The system retrieves and displays user profiles and reports.
* Users can update their profiles.
* Interviewers can view both the student's profile and reports.

3.1.4.4 Outputs

* Success or error messages after updating profile information.
* Display of updated profile and historical reports.

3.2 External Interface Requirements

3.2.1 User Interface

* The website will have a clean layout, with easy access to key functionalities like starting interviews, viewing reports, and managing profiles.
* It will feature a student and interviewer dashboard.
* A responsive design will ensure usability across devices, including desktop, tablet, and mobile.

3.2.2 Hardware Interface

* Standard input devices like keyboard, mouse, and microphone for voice input should be supported.
* The system should be compatible with common hardware, including desktops and mobile devices.

3.2.3 Software Interface

* Integration with third-party speech recognition APIs to capture and transcribe user responses.
* Use of Django for backend functionality and MongoDB for storing user profiles, reports, and assessments.

3.2.4 Communication Interface

* The system should support HTTP/HTTPS for secure communication.
* RESTful APIs will be used for data exchange between the frontend and backend.
* The system will use WebSockets for real-time processing and report generation.

3.3 Performance Requirements

* The system should handle up to 1,000 concurrent users during peak periods without performance degradation.
* The voice recognition and question-response system should respond within 5 seconds to maintain flow.
* Report generation for individual and overall assessments should be completed within 5 seconds of completing the session.

3.4 Design Constraints

3.4.1 Standards Compliance

* The website should adhere to HTML5, CSS3, JavaScript ES6 standards.
* PCI-DSS compliance for handling sensitive data.
* Adherence to GDPR for data protection and privacy.

3.4.2 Hardware Limitations

* The system must run on commonly available devices (e.g., Intel Core i5 processors or higher, 8 GB RAM).
* Server hosting must support concurrent users and real-time processing.

3.5 Attributes

3.5.1 Security

* HTTPS will be enforced for secure communication.
* The system should protect against SQL injection, XSS, and DoS attacks.

3.5.2 Maintainability

* The system should use modular architecture for ease of updates and maintenance.
* Code should follow proper documentation and naming conventions.

3.6 Database

* The database will store user information, assessment questions, answers, and reports.
* MongoDB will be used to handle both structured and unstructured data.
* Data backup mechanisms should be automated to ensure data availability.

**4. System Architecture**

**4.1 Class Diagram**

**5. System Models**

**5.1 Use Case Diagram**

**6. Appendices**

**A. Data Dictionary**

Defines the structure of the data stored in the system, including question types, user data, and reports.

**B. Use Case Analysis**

Details all use cases, including automated feedback and question generation processes.

**C. Screens and Reports Navigation Matrix**

A navigation matrix for the frontend components.

**D. Scenario Analysis Table**

A table outlining different user scenarios and expected system behavior.

**E. Prototype**

Initial wireframes for the interviewer and interviewee dashboards.