Introduction

The Quran Listening Web Platform is an interactive online system designed to facilitate Quran recitation assessment for students through two main modes: supervised sessions with a Sheikh and AI-based automatic evaluation. The platform provides an efficient and user-friendly environment for learners to recite, practice, and improve their Quran reading accuracy and Tajweed.

In the first mode, students can browse available Sheikhs, schedule sessions, and attend live recitation meetings where a certified Sheikh listens, evaluates, and provides feedback. Both students and Sheikhs have personal accounts, performance statistics, and history records for continuous progress tracking.

In the second mode, the platform utilizes artificial intelligence to analyze the student's recitation automatically. The audio input is preprocessed through an audio filtering stage to enhance sound quality and remove noise. The AI model then performs speech-to-text conversion with diacritics, compares the recognized text with the authentic Quranic text, and generates a detailed error report highlighting pronunciation and Tajweed mistakes.

The system aims to provide a reliable, accessible, and scalable learning experience for Quran students worldwide. By integrating both human supervision and advanced AI capabilities, the platform ensures accuracy, consistency, and continuous improvement in Quran recitation skills.

Functional Requirements

The Quran Listening Web Platform consists of two main modules:

(1) Supervised Recitation with Sheikh, and

(2) AI-Based Recitation Evaluation System.

The following functional requirements describe the essential functions that the system must perform.

1. User Account Management

1.1 The system shall allow users (students and Sheikhs) to create new accounts by providing basic information such as name, email, and password.

1.2 The system shall allow users to log in and log out securely.

1.3 The system shall allow users to update their personal profiles.

1.4 The system shall allow the admin to approve or reject new user accounts.

1.5 The system shall store and display user statistics such as number of sessions, accuracy rate, and progress.

2. Sheikh Session Management

2.1 The system shall allow students to browse a list of available Sheikhs.

2.2 The system shall allow students to select a Sheikh and request a session.

2.3 The system shall notify the Sheikh about new session requests.

2.4 The system shall allow payment for approved sessions through an online payment gateway.

2.5 The system shall enable both Sheikh and student to join a live audio/video session for recitation.

2.6 The system shall store session details for later reference.

3. AI-Based Recitation (Speech-to-Text) Evaluation

3.1 The system shall allow a student to record or upload a Quran recitation audio file.

3.2 The system shall apply audio filtering (noise reduction, normalization, and silence trimming) to enhance input quality.

3.3 The system shall use an ASR model (Automatic Speech Recognition) to convert the audio into a fully diacritized Arabic text.

3.4 The system shall compare the recognized text with the authentic Quranic verse text from the database.

3.5 The system shall detect errors in pronunciation, wording, or diacritics.

3.6 The system shall calculate evaluation metrics such as accuracy percentage and error rate.

3.7 The system shall generate a detailed performance report for the student.

4. Progress and Reporting

4.1 The system shall allow students to request a progress report at any time.

4.2 The system shall display reports showing correct and incorrect words, highlighting differences in text.

4.3 The system shall allow Sheikhs to view student performance reports and provide manual feedback.

4.4 The system shall visualize statistics over time (graphs or tables) showing improvement trends.

5. Administrative Functions

5.1 The admin shall be able to manage user accounts (approve, suspend, or delete).

5.2 The admin shall monitor session requests, payments, and activity logs.

5.3 The admin shall manage Quranic text datasets used for AI comparison.

5.4 The admin shall monitor the accuracy and performance of the AI module.

6. System Interaction

6.1 The system shall provide clear notifications and confirmations (e.g., session approved, report generated).

6.2 The system shall handle failed actions gracefully (e.g., payment failure, network error).

6.3 The system shall ensure that all interactions occur in real time over the web.

Non-Functional Requirements

The following non-functional requirements describe the overall characteristics, performance, and quality standards that the Quran Listening Web Platform must satisfy to ensure reliability, usability, and scalability.

1. Performance Requirements

1.1 The system shall process audio recordings and generate the AI evaluation report within 3–7 minutes for an average-length recitation.

1.2 The website shall respond to user actions (e.g., login, browsing, session requests) within 20 seconds under normal load.

1.3 The AI model shall achieve at least 95% accuracy in Quranic speech-to-text transcription for clear audio.

1.4 The system shall support simultaneous access by multiple users without performance degradation.

2. Usability Requirements

2.1 The user interface shall be simple, intuitive, and designed for users of all ages.

2.2 The system shall provide a responsive design that works smoothly on both desktop and mobile browsers.

2.3 All navigation menus, icons, and buttons shall be labeled clearly and consistently.

2.4 The system shall provide multilingual support (Arabic and English).

2.5 Help guides and tooltips shall be available to explain system functions to new users.

3. Security Requirements

3.1 User passwords and sensitive data shall be encrypted using modern security standards (e.g., SHA-256, SSL/TLS).

3.2 Access to administrative functions shall be restricted to authorized users only.

3.3 The system shall protect all personal data and recitations according to data-privacy standards (e.g., GDPR principles).

3.4 Secure payment processing shall be implemented using trusted third-party payment gateways.

3.5 The system shall implement session timeout and account-locking mechanisms after multiple failed logins.

4. Reliability and Availability

4.1 The system shall maintain an uptime of at least 99% during operational hours.

4.2 Regular data backups shall be performed automatically to prevent data loss.

4.3 In case of system failure, recovery shall occur within 5 minutes using backup servers.

4.4 The AI model shall be hosted on reliable cloud infrastructure with high availability (e.g., AWS, Google Cloud, or Hugging Face Spaces).

5. Scalability

5.1 The system shall be capable of handling increasing numbers of users, Sheikhs, and AI evaluations without major redesign.

5.2 The database and backend shall support modular expansion for future features (e.g., leaderboard, reward system, or new evaluation types).

5.3 The AI model shall be deployable in distributed or containerized environments (e.g., Docker).

6. Maintainability

6.1 The system codebase shall follow a clean modular structure to facilitate future updates.

6.2 Proper documentation and version control (e.g., GitHub or GitLab) shall be maintained.

6.3 All major components shall include logs and monitoring tools for debugging and analytics.

7. Compatibility

7.1 The platform shall be compatible with all major browsers (Chrome, Edge, Firefox, Safari).

7.2 Audio input shall support common formats such as .wav, .mp3, and .m4a.

7.3 The AI evaluation service shall integrate seamlessly with the web platform through REST or WebSocket APIs.

8. Ethical and Cultural Considerations

8.1 The system shall ensure that Quranic text and audio data are handled respectfully and securely.

8.2 AI-generated feedback shall follow proper linguistic and Tajweed standards without distortion of Quranic content.

8.3 The platform shall include disclaimers that AI feedback is supportive, not a substitute for certified human supervision.