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Say It Well

A MINI-PROJECT REPORT

Submitted by

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ABSTRACT

The Speech Training Application is designed to help users improve their speech clarity, fluency, and confidence. However, many existing speech training solutions lack engaging user experiences and personalized feedback, making it difficult for users to track their progress effectively. This project focuses on developing a speech training application to enhance usability, accessibility, and overall user satisfaction. Using a user-centered design approach, we conducted a detailed analysis of user needs through surveys, interviews, and usability testing. The redesign emphasizes a streamlined interface, improved performance, and new features, including an intuitive speech practice system, real-time feedback, and personalized training recommendations. This paper explores the methodologies used in the development process, the implementation of key design principles, and the impact of these improvements on user engagement and speech development. This study contributes to speech therapy and digital learning by demonstrating how a structured, user-focused approach can enhance the accessibility and usability of speech training applications.

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CHAPTER 1

INTRODUCTION

Effective speech training is essential for improving communication skills, confidence, and fluency. However, many individuals face challenges in accessing structured and engaging speech practice tools. This project focuses on developing a Speech Training Application that enhances speech clarity and fluency through interactive exercises and real-life practice scenarios. By adopting a user-centered design approach, the project involved extensive user research, including surveys, interviews, and usability testing, to understand user needs and challenges. These insights guided the development of a structured training system that emphasizes personalized practice sessions, real-time feedback, and progress tracking to help users improve their speech over time. This paper outlines the development process of the Speech Training Application, highlighting the methodologies used for data collection, system design, and implementation to create an accessible and effective speech training tool.

CHAPTER 2

LITERATURE REVIEW

I.Stamurai

Stamurai is a speech therapy application designed to assist individuals who stutter by providing structured speech exercises, fluency-shaping techniques, and self-paced learning modules. It includes interactive speech drills, breathing exercises, and AI-driven feedback to track progress. The app follows a habit-based training model, encouraging daily practice to build confidence in speech fluency. While Stamurai is widely used for self-help, its effectiveness depends on user consistency, and it may lack real-time therapist intervention for more personalized feedback.

II.Articulation Station

Articulation Station is a speech therapy app that helps users improve their pronunciation and articulation of sounds through a structured, phonetic-based approach. It offers customizable practice sessions, interactive word and sentence-level drills, and engaging exercises for both children and adults. The app is commonly used by speech therapists and educators as a tool for structured learning. However, while it provides detailed phonetic breakdowns, it lacks adaptive learning capabilities, meaning it does not automatically adjust difficulty levels based on user progress. Additionally, the absence of real-time feedback may limit its effectiveness for independent learners.

III. Conversation Therapy

Conversation Therapy is designed to support individuals who struggle with social communication and fluency. It includes structured conversation prompts, real-life scenarios, and guided speaking exercises aimed at improving confidence in verbal interactions. The app is particularly useful for individuals recovering from speech impairments, such as those affected by aphasia or neurological conditions, and is frequently used in group therapy settings. However, the app primarily focuses on conversation-based speech enhancement rather than phonetic or articulation training, making it less suitable for users looking to improve specific speech sounds.

IV. Speech Tutor

Speech Tutor is a pronunciation training app that provides visual and auditory guidance to help users refine their speech. It features animated tongue and mouth positioning guides, which allow users to see how different sounds are produced. The app is particularly beneficial for self-learners and speech therapists, offering a detailed analysis of speech movements. However, while it is a powerful tool for learning articulation, it lacks interactive gamification elements, which could make speech practice more engaging. Additionally, it does not offer personalized feedback based on real-time speech recognition, limiting its adaptability .

CHAPTER 3

SOFTWARE USED - FLUTTER AND FIREBASE

In the development of the Say It Well application, several tools and technologies were utilized to ensure efficient design, seamless functionality, and smooth deployment. The following tools were integral to the project's success

Tool Selection

I. Flutter – Cross-Platform Development Framework

Flutter was the core framework used to build the Say It Well application. It is an open-source UI toolkit by Google that enables the development of natively compiled applications for Android, iOS, and web from a single codebase. The framework's hot reload feature allowed real-time code changes, boosting productivity. Flutter's custom widgets enabled the creation of a visually appealing and responsive UI. Additionally, its seamless Firebase integration facilitated efficient database operations and user authentication.

II. Firebase – Backend and Database Management

Firebase was used to manage the app's backend services and data operations. It provided a reliable cloud-based platform for storing and retrieving user profiles, scores, and game data. The Firebase Authentication service handled secure sign-ins and logouts, ensuring data privacy. Firestore Database stored the collection of words used during the speech exercises. Additionally, Firebase's real-time data sync allowed instant updates, enhancing the app's performance.

III. Flutter Speech-to-Text – Real-Time Voice Recognition

The application utilized Flutter's built-in Speech-to-Text feature for real-time voice analysis. This feature accurately converted spoken words into text for evaluation. It enabled the app to detect stuttering, pauses, and incorrect pronunciations, providing immediate feedback. The real-time speech recognition enhanced the interactive experience, allowing users to practice and improve their fluency. This functionality was essential for creating a dynamic and engaging learning environment.

IV. Figma – UI/UX Design Tool

Figma was used during the design phase to create the app's user interface and prototypes. Its vector editing capabilities enabled the creation of clean and scalable UI elements. The component-based design system ensured consistency across the app by reusing common UI elements. Figma's prototyping feature allowed the team to simulate the user flow and test interactions before development. Additionally, its real-time collaboration made it easy for the team to share and review design updates.

V. Visual Studio Code (VS Code) – IDE for Development

VS Code was the primary Integrated Development Environment (IDE) used for coding the application. Its lightweight and customizable interface made the development process smooth and efficient. The Flutter and Dart extensions provided essential tools for syntax highlighting, debugging, and real-time code suggestions. The terminal integration allowed for quick execution and testing of Flutter commands. Additionally, VS Code's version control integration with Git helped track changes and manage the project effectively.

VI. Outcome and Impact

The Speech Training Application enhances speech fluency and pronunciation through interactive exercises, real-time feedback, and personalized practice sessions. Users experience improved speech clarity, increased confidence, and better communication skills. By integrating adaptive learning techniques and engaging activities, the app promotes consistent practice and measurable progress, making speech training more effective, accessible, and user-friendly.



Fig 1: Logo of Say It Well.

CHAPTER 4

PRESENT TECHNOLOGY

The current state of technology in speech training applications incorporates several key components that enhance speech recognition, real-time feedback, and personalized learning experiences. This section provides an overview of the existing technologies used in speech training apps, focusing on software architecture, data processing, user interface design, and accessibility features.

Software Architecture

The Speech Training Application is built on a multi-layered architecture designed to efficiently handle speech input, processing, and feedback generation. This architecture typically includes:

Front End: The user interface is developed using Flutter to ensure cross-platform compatibility on Android and iOS. This enables seamless updates and a unified user experience.

Back End: The backend is implemented using Python with Flask or Firebase, ensuring scalable and real-time processing of speech data. It facilitates user authentication, speech analysis, and progress tracking.

Database: The application utilizes Firebase Firestore or SQLite to store user profiles, speech recordings, progress reports, and personalized recommendations. These databases ensure fast retrieval and efficient data management.

Speech Processing and Analysis

Flutter's Built-in Speech Analysis Features: The application leverages Flutter's built-in speech recognition capabilities to analyze pronunciation accuracy and fluency in real-time.

Instant Feedback Mechanism: The system provides real-time feedback on pronunciation and fluency, allowing users to make immediate corrections.

Adaptive Learning: The app dynamically adjusts exercises based on user progress, ensuring a personalized speech training experience.

User Interface and Experience

The user interface (UI) is designed for ease of use, engagement, and accessibility, incorporating:

Intuitive Navigation: A simple and user-friendly layout that allows users to quickly access lessons, progress reports, and practice exercises.

Gamification Elements: Interactive challenges and progress-tracking features encourage consistent practice and enhance motivation.

Accessibility Features: The app includes voice commands, text-to-speech support, and customizable UI settings to accommodate users with different needs.

Future Improvements

While the current technology used in speech training apps is effective, there is room for enhancement in real-time speech correction, deeper AI integration for personalized learning, and more immersive training experiences. Future advancements should focus on improving speech accuracy detection, integrating augmented reality for interactive learning, and expanding accessibility for diverse user groups.

4.1 LIMITATIONS

Limitations of the Current Speech Training Application Technology

While speech training applications offer various features to improve pronunciation, fluency, and communication skills, several limitations persist that impact their effectiveness, accessibility, and user engagement. Identifying these limitations is essential for guiding future improvements and technological advancements. Below, we discuss some key challenges currently faced by speech training applications:

I. Speech Recognition and Accuracy

The built-in speech analysis features in Flutter provide basic speech recognition but may not always offer a highly detailed phonetic breakdown. This limitation makes it difficult to detect subtle pronunciation errors, especially for users working on precise articulation. Additionally, the system may struggle with recognizing and assessing diverse accents and speech patterns, leading to inconsistent feedback for non-native speakers or users with regional variations in pronunciation. A more advanced AI-driven speech processing model could significantly enhance the accuracy of pronunciation analysis.

II. Accessibility

While the app includes basic speech recognition capabilities, it lacks comprehensive assistive features that could support users with speech disorders or disabilities. Features like real-time captioning, alternative input methods, and enhanced speech-to-text accuracy are crucial for making the app more inclusive. Furthermore, users require more customization options, such as adjustable speech difficulty levels, personalized pronunciation goals, and voice modulation training, to better cater to their individual learning needs. A more adaptive interface with accessibility enhancements could make the app more user-friendly for a diverse audience.

III. Real-Time Feedback and Engagement

Although the app provides instant feedback on pronunciation, the depth of this feedback remains limited. Users may receive generalized corrections rather than specific phonetic insights or suggestions for alternative pronunciations. Additionally, the lack of interactive learning elements reduces engagement, making it challenging for users to stay motivated. Incorporating role-playing exercises, AI-driven conversation simulations, and dynamic speech challenges could create a more immersive and engaging experience. A well-structured gamified reward system with progress tracking and competitive challenges could further enhance long-term user retention.

IV. Personalization and Progress Tracking

Currently, the app tracks user progress based on basic speech performance metrics, but it does not offer AI-driven personalized learning paths that adapt dynamically based on user strengths and weaknesses. A more tailored system could analyze individual speech patterns over time, adjusting exercises to focus on specific problem areas. Moreover, while the app incorporates gamification elements, they remain relatively simple. Introducing leaderboards, social challenges, and adaptive training recommendations could enhance motivation and learning retention. A more personalized experience with in-depth insights into user progress would significantly improve the effectiveness of the app.

CHAPTER 5

PROPOSED METHODOLOGY

In the proposed enhancements for the speech training application, our primary focus is to improve the user experience, speech recognition accuracy, and engagement through an intuitive and interactive interface. The design aims to provide seamless navigation, real-time speech feedback, and a gamified learning environment to make speech training more effective and enjoyable for users. We intend to integrate a cleaner interface with an adaptive learning dashboard, ensuring that users can easily access personalized speech exercises, track their progress, and receive instant feedback on pronunciation and fluency.

A key enhancement involves improving the speech recognition system by refining real-time phonetic analysis and expanding support for various accents and speech patterns. The app will offer customized training modules, where users can select difficulty levels and focus on specific problem areas, such as articulation, pacing, and fluency. Additionally, real-time visual feedback will be introduced, allowing users to see speech waveforms and phonetic breakdowns to understand their pronunciation errors better.

To boost accessibility, we plan to implement voice-guided navigation, adjustable speech difficulty settings, and multilingual support, ensuring that users from diverse linguistic backgrounds can benefit. The app will also include a personalized speech training dashboard, displaying user progress, practice history, and tailored daily exercises based on past performance. This dashboard will help users track improvements and stay motivated through an engaging, goal-oriented learning structure.

Moreover, gamification elements will be enhanced, introducing interactive challenges, reward-based progress tracking, and AI-driven conversational practice sessions. Users will have access to daily speech challenges and real-world conversation scenarios, reinforcing practical speech application in different social settings. By leveraging

Flutter's built-in speech analysis features and Firebase for real-time data synchronization, we aim to ensure seamless performance across multiple devices.

These improvements will significantly enhance speech training effectiveness, making the app more engaging, accessible, and impactful for users seeking to improve their communication skills.

The application currently struggles with recognizing subtle pronunciation differences, making it harder for users to receive precise corrections. Additionally, users have limited control over adjusting speech exercises based on their comfort level, reducing personalization. Some speech training apps focus only on pronunciation without providing real-life speaking scenarios, which limits their practical application. Many users also struggle to find structured progress tracking and motivational elements, leading to inconsistent practice. By introducing a structured training path, interactive pronunciation analysis, and personalized speech exercises, the application will provide a more effective and engaging learning experience for users looking to enhance their communication skills.

5.1 USER FLOW DIAGRAM:

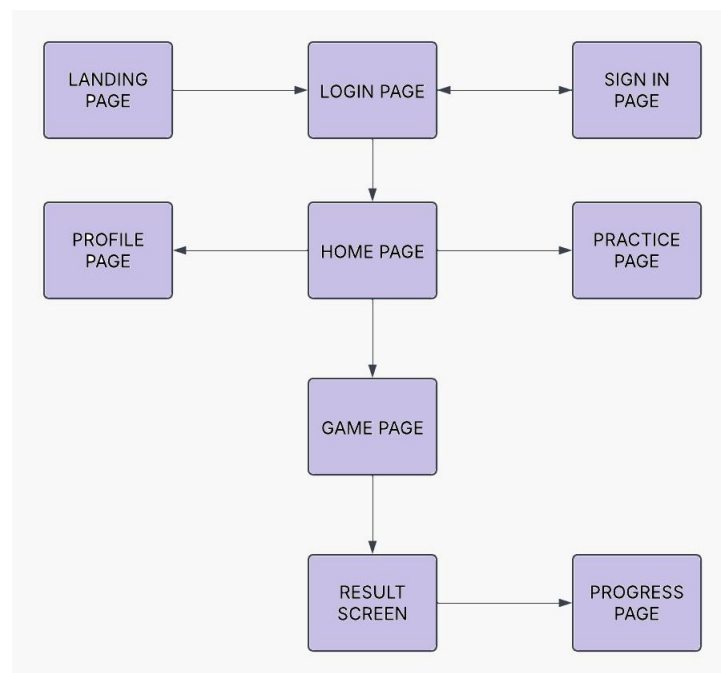


Fig 2: User Flow Diagram

5.2 ADVANTAGES

Advantages of Enhancing the Speech Training Application

Enhancing the speech training application brings numerous benefits, including improved user engagement, speech analysis accuracy, and overall learning effectiveness. By integrating advanced speech recognition, gamification, and personalized feedback, the application can offer a more efficient and enjoyable training experience for users looking to improve their speech fluency and articulation.

I. Improved Speech Training and User Experience

A more intuitive and interactive interface allows users to navigate effortlessly and engage in structured speech exercises. Real-time feedback helps users identify pronunciation errors instantly, making learning more effective. Additionally, personalized learning paths ensure that users receive customized exercises based on their progress, leading to faster and more consistent improvements in speech fluency.

II. Advanced Speech Recognition and Real-Time Analysis

By utilizing Flutter's built-in speech analysis features, the app can provide more accurate phonetic recognition, adapting to different accents and speech patterns. Real-time visualization of speech waveforms and pronunciation guides allows users to see where they need improvement. This enhances speech clarity, articulation, and confidence in real-world communication.

III. Increased Accessibility and Engagement through Gamification

Adding voice navigation, multilingual support, and adjustable difficulty levels makes the app more inclusive for users with diverse linguistic needs. Gamified elements, such as daily speech challenges, rewards, and AI-driven conversational scenarios, encourage regular practice and increase motivation by making learning feel like an engaging experience rather than a repetitive task.

IV. Scalable and Adaptive Learning Platform

With cloud-based progress tracking using Firebase, the app can seamlessly sync user data across multiple devices. This ensures continuity in training and allows users to track their speech improvement over time. The scalable infrastructure also enables future updates, such as advanced AI-driven pronunciation analysis and real-time speech coaching, making the app future-proof and adaptable to evolving speech training needs. Enhancing the speech training application is a strategic step toward making speech therapy and pronunciation improvement more accessible, efficient, and engaging. These advancements not only cater to individual users but also position the app as a powerful tool in speech training, education, and communication development.

CHAPTER 6

OUTPUT

PROJECT LINK

https://github.com/snakezz178/mini_project

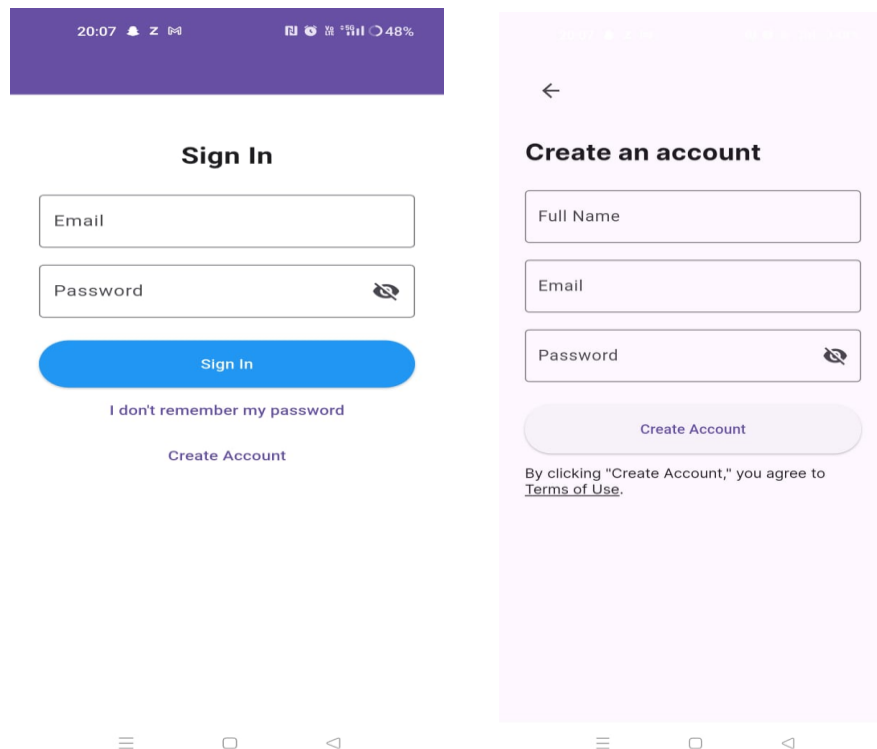


Fig 3: The Login Page.

The login and signup UI should have a clean, minimalistic design with easy-to-read input fields, clear labels, and accessible buttons for a seamless user experience.

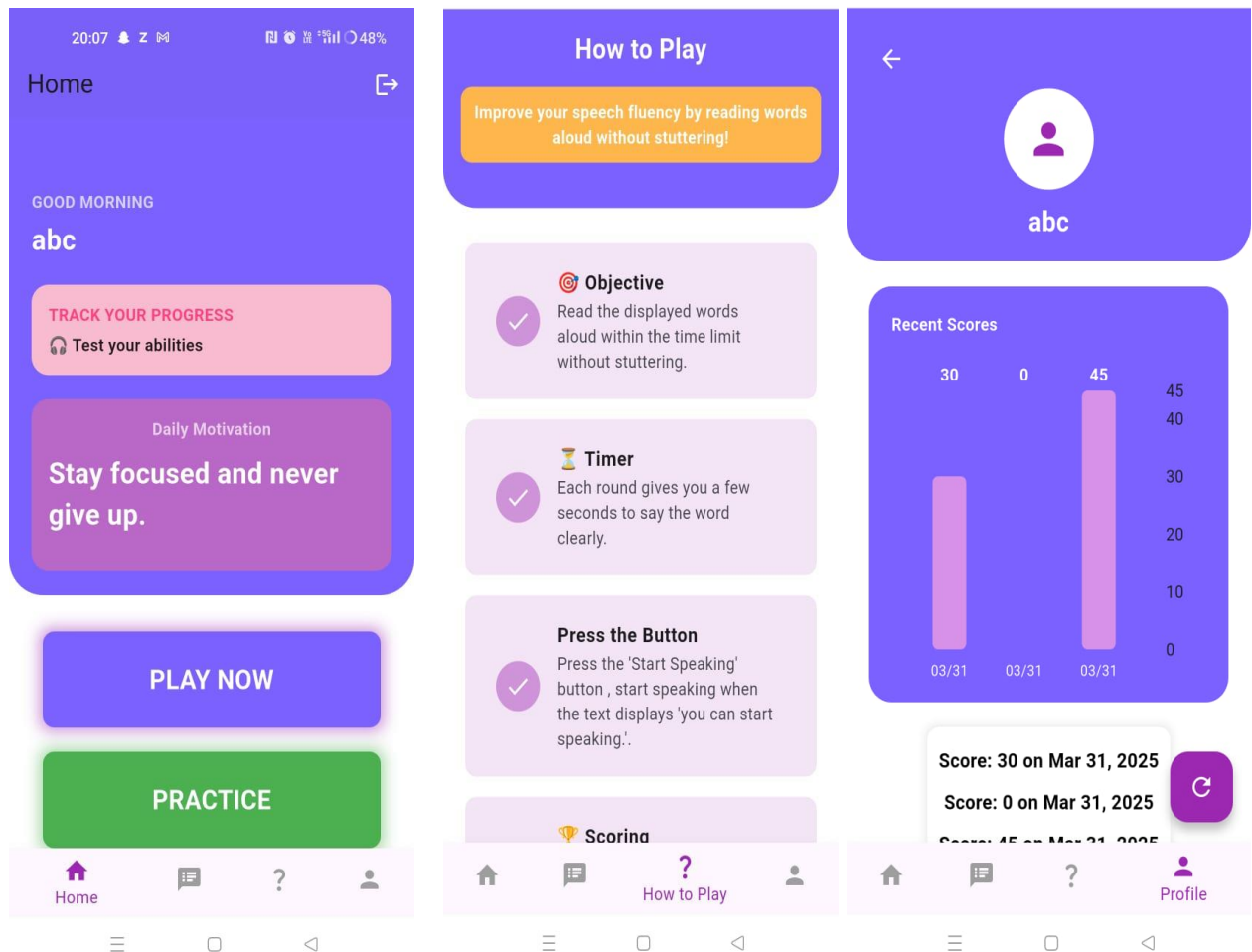


Fig 4: Home page

The home page provides a welcoming interface with easy navigation to practice sessions, progress tracking, and challenges, while the "How to Play" section offers a simple, step-by-step guide on using voice to control the game and improve speech skills

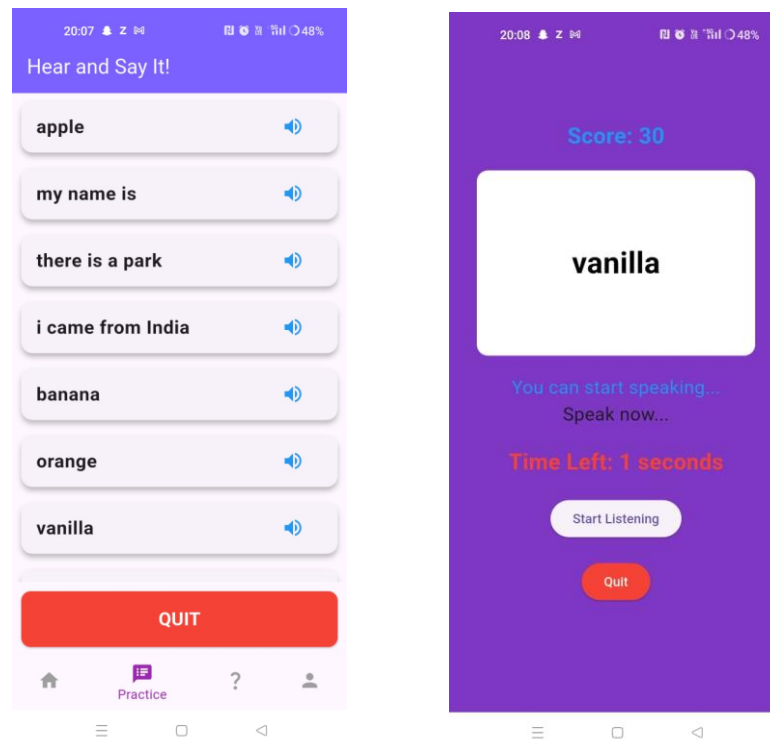


Fig 5: Game Page

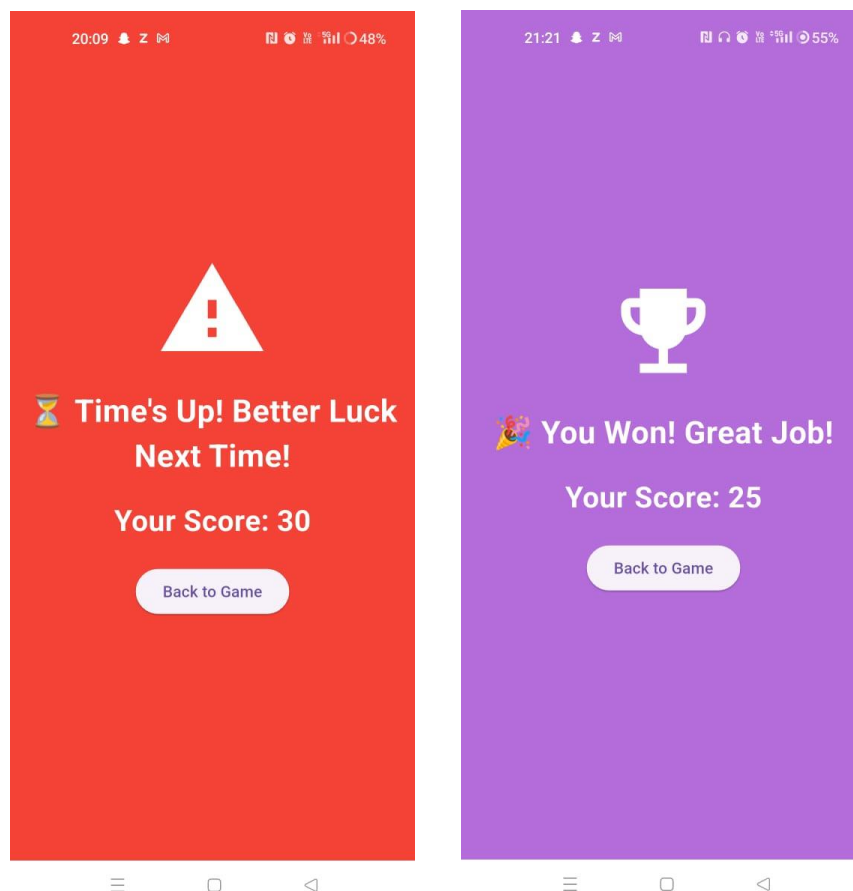


Fig 6: Scoreboard page

CHAPTER 7

CONCLUSION

The speech training application serves as a crucial tool in enhancing speech fluency, articulation, and overall communication skills, particularly for individuals facing speech-related challenges. While the current implementation leverages Flutter's built-in speech analysis features, there remain opportunities for further refinement in user interaction, real-time feedback accuracy, and accessibility.

The proposed enhancements focus on improving speech recognition precision, integrating gamified learning, and offering personalized feedback to create a more engaging and effective training experience. By incorporating AI-driven speech analysis, cloud-based progress tracking via Firebase, and multilingual support, the app can cater to a diverse range of users, making speech training more accessible and inclusive.

Additionally, these advancements will position the application as a leading tool in speech therapy and self-improvement, benefiting not only individuals seeking better pronunciation but also educators, therapists, and language learners. As digital platforms continue to evolve, ensuring that the speech training app remains adaptive, intuitive, and technologically advanced will be crucial for sustaining its relevance and impact.

In conclusion, refining and expanding the speech training application represents a strategic step towards making speech therapy more interactive, effective, and widely accessible. By addressing current limitations and integrating innovative speech analysis techniques, the application will not only enhance user experience but also empower individuals to communicate with greater confidence and clarity in real-life scenarios.

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