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Progressive Mobile Application For Visually Impaired People

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***Abstract*— The Progressive Mobile Application for Visually Impaired People aims to enhance accessibility in vocational training through an intuitive, voice-enabled digital platform. Despite the availability of vocational programs, visually impaired individuals face challenges in accessing resources due to a lack of tailored digital solutions. This project introduces an assistive mobile application integrating voice navigation, interactive learning modules, and AI-powered accessibility features to enable self-reliant skill acquisition. Developed using Reactnative, Firebase, and Gemini AI, the app offers functionalities such as pronunciation guides, audio-based courses, quizzes, and educational games. The project follows a three-phase methodology: research, development, and testing. User trials conducted with visually impaired individuals help refine the app's usability. By eliminating linguistic and technological barriers, the application fosters independence, enhances employability, and promotes workforce inclusion for visually impaired individuals, offering a scalable, accessible, and user-friendly vocational training solution.**

Keywords— Accessibility, Vocational Training, Voice Navigation, AI Assistance, Visually Impaired, Mobile Application.

I. INTRODUCTION

Access to vocational training plays a crucial role in skill development and employability. However, visually impaired individuals face significant challenges in accessing training programs due to the lack of digitally inclusive platforms. Most vocational courses rely heavily on visual elements such as text-based study materials, graphical content, and video demonstrations, making them inaccessible to those with visual impairments. While assistive technologies like screen readers and Braille-based systems offer some support, they lack interactivity and engagement, limiting independent learning opportunities. This gap in accessibility prevents visually impaired individuals from acquiring essential skills and contributing effectively to the workforce.

To address these challenges, this paper presents the Progressive Mobile Application for Visually Impaired People, a digital platform designed to provide accessible, self-reliant vocational training. The application integrates voice navigation, interactive learning modules, pronunciation assistance, and AI-powered accessibility features, making skill acquisition seamless and engaging for visually impaired users. Built using Reactnative for cross-platform development, Firebase for real-time data management, and Gemini AI for voice control, the app offers a smooth user experience without requiring external assistance.Unlike traditional learning methods that often require physical guidance or specialized hardware, this application is designed to function on standard smartphones, making it an affordable and scalable solution. The voice-enabled interface allows users tonavigate the app hands-free, while audio-based learning materials, interactive quizzes, and gamified educational activities keep users engaged. The app's AI-driven adaptability personalizes the learning experience by recommending relevant modules based on user progress.

By eliminating linguistic, technological, and accessibility barriers, the application fosters independence, confidence, and skill- building for visually impaired individuals. This initiative aims to bridge the digital divide in vocational education by

offering an inclusive and accessible learning environment. By leveraging the power of AI and voice-assisted navigation, the Progressive Mobile Application for Visually Impaired People empowers users to gain vocational skills, thereby enhancing their employability and social inclusion in an increasingly digital world..

II. LITERATURE SURVEY

The integration of assistive technologies for visually impaired individuals has significantly improved their ability to navigate, communicate, and interact with their surroundings. However, substantial gaps remain in accessibility, affordability, and usability of these technologies. This review explores existing research on assistive technologies, smartphone-based accessibility, AI- powered solutions, voice assistants, interface design guidelines, and social inclusion strategies for visually impaired individuals.

A comprehensive review of assistive technologies has been presented by the authors, categorizing them based on their applications and evolution over time. The study discusses how these technologies have advanced to enhance navigation, obstacle detection, and overall safety for visually impaired individuals. It also highlights the role of renewable energy sources in developing sustainable assistive devices and the impact of COVID-19 on the industry. This paper provides a foundation for understanding the progression and current trends in assistive technologies, supporting the development of advanced solutions.[1]

The authors discusses the role of smartphones as assistive tools, emphasizing their accessibility features and applications tailored for visually impaired users. The study highlights the benefits of built-in accessibility options, such as voice commands and haptic feedback, while addressing the challenges of user adoption due to a lack of awareness and training. This research emphasizes the need for improving accessibility features in smartphones to enhance usability and functionality for visually impaired individuals.[2]The paper explores the effectiveness of AI-powered assistive technologies in improving accessibility. The study reveals

that AI-based solutions significantly enhance user satisfaction, communication efficiency, and task completion rates compared to traditional assistive technologies. The findings indicate that AI-driven systems have the potential to provide adaptive and personalized support for visually impaired individuals, ensuring more efficient and responsive assistance.[3]

The authors have examined the growing use of digital voice assistants such as Google Assistant, Alexa, and Siri for visually impaired users. This study discusses how these technologies allow users to interact with their devices using speech-to-text functionalities. However, high costs remain a barrier to widespread adoption. The research highlights the importance of developing affordable voice-assisted systems that offer essential functionalities for visually impaired individuals, improving accessibility without financial constraints.[4]

The author has focused on the challenges faced by visually impaired individuals in interacting with smartphone interfaces. The study includes interviews with visually impaired users to identify common accessibility barriers and roposes newly designed guidelines to address these challenges. It emphasizes the importance of inclusive design in mobile applications, ensuring that interfaces are intuitive and user-friendly for individuals with visual impairments.[5] This paper explores the role of peer support arrangements in improving social interactions for visually impaired students in inclusive classrooms. The study demonstrates that structured peer interactions lead to higher levels of engagement and a more inclusive educational environment. The research suggests that fostering social inclusion through structured peer support arrangements can enhance the educational experiences of visually impaired students.[6]

III. PROBLEM DEFINITION

Visually impaired individuals face significant challenges in accessing vocational training programs due to the lack of digital platforms tailored to their needs. Most existing vocational courses rely on visual content, making them difficult to navigate without external assistance. Traditional assistive technologies like Braille books and screen readers provide limited interactivity and do not offer a comprehensive learning experience. Additionally, many vocational training programs lack voice navigation, audio-based interactive content, and user-friendly accessibility features, making it difficult for visually impaired individuals to engage independently. Communication and linguistic barriers further hinder their participation, as many training materials are not adapted for speech-based interaction. Without proper assistive technologies, visually impaired learners struggle to access educational resources, limiting their skill development and employment opportunities. Therefore, there is a pressing need for a fully accessible, voice-enabled digital solution that empowers visually impaired individuals to acquire vocational skills independently and efficiently.

IV.PROPOSED SYSTEM

Voice Navigation and Interactive Learning: The application incorporates text-to-speech to enable hands-free voice navigation, allowing users to browse courses, take quizzes, and interact with content without needing visual assistance. Audio- based learning modules replace

text-heavy content, providing structured vocational training through step-by-step voice instructions.

Additionally, pronunciation assistance helps users improve spoken language skills, ensuring effective communication. Gamified elements like storytelling exercises and sound recognition activities further enhance engagement and knowledge retention as shown in Figure 4.1

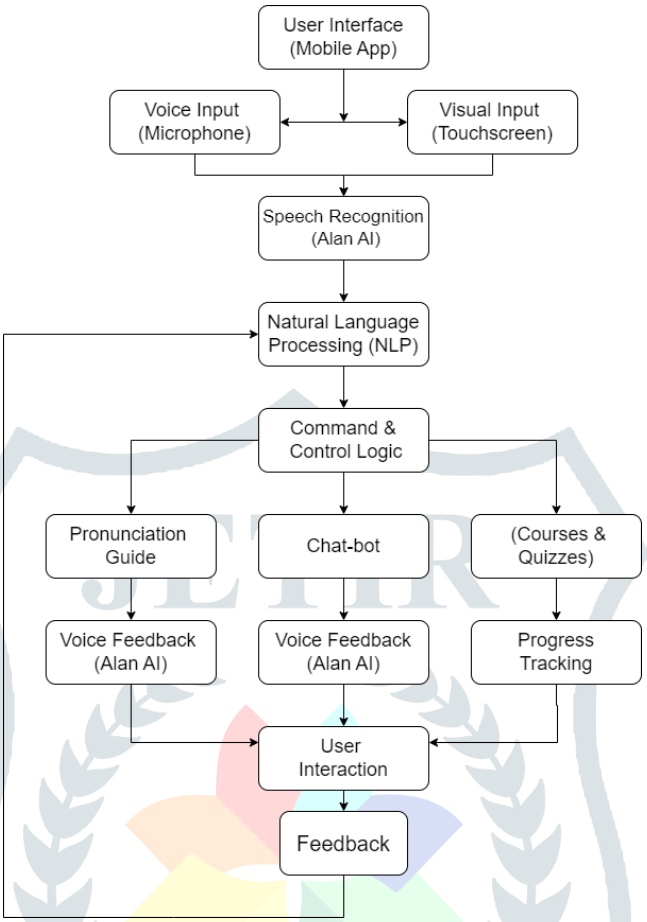

Figure 4.1 Flow of progressive mobile application

AI-Powered Personalization and Accessibility: The application uses AI algorithms to personalize the learning experience by adjusting the difficulty level of modules and suggesting relevant content. Firebase real-time data synchronization ensures users can track progress across devices, while Node.js and Express.js manage secure data processing. The React native-based front end offers an intuitive interface designed for accessibility, with minimal reliance on visual cues.

By integrating voice-first interaction, AI-driven adaptability, and interactive learning, this solution bridges the accessibility gap in vocational training. The application fosters independence, confidence, and employability for visually impaired individuals making skill development more engaging ,scalable and inclusive.

V.RESULTS AND DISCUSSION

The Progressive Mobile Application for Visually Impaired People has been developed to enhance accessibility in vocational training as shown in Figure 5.1.The results obtained from initial testing demonstrate the app's effectiveness in voice navigation, interactive learning, and accessibility.

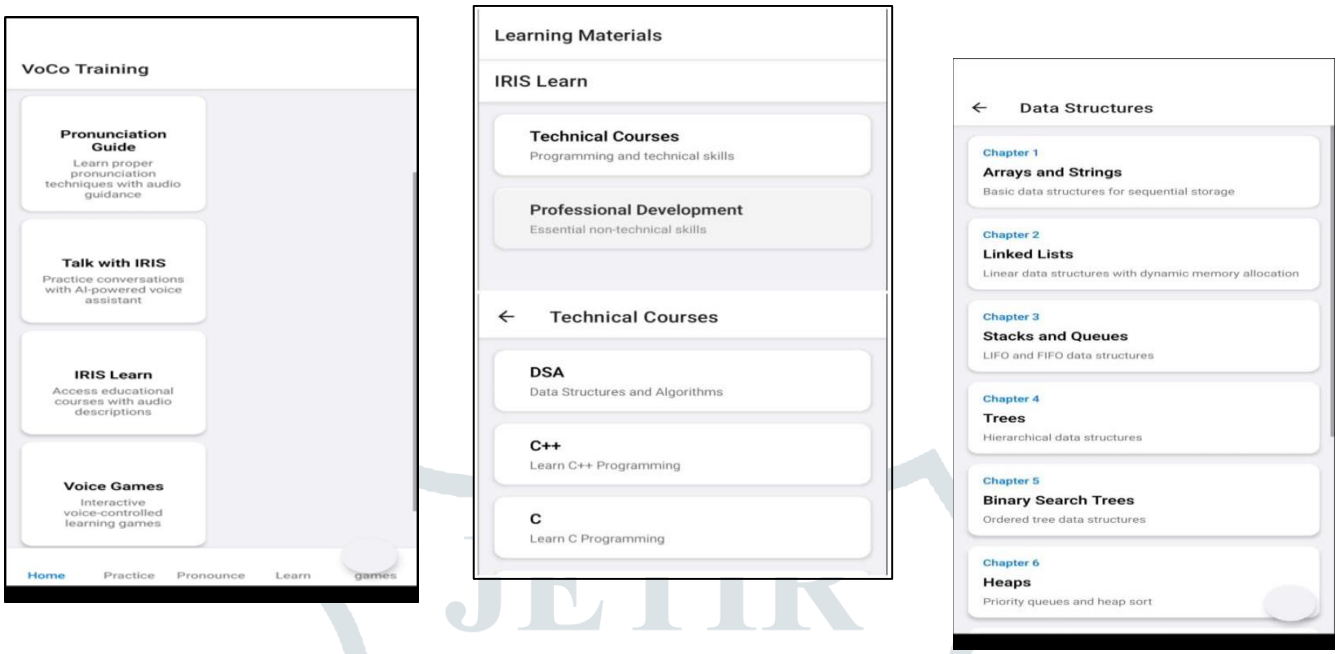

Figure 5.1 Progressive Mobile App with home page ,Cover page, Course page

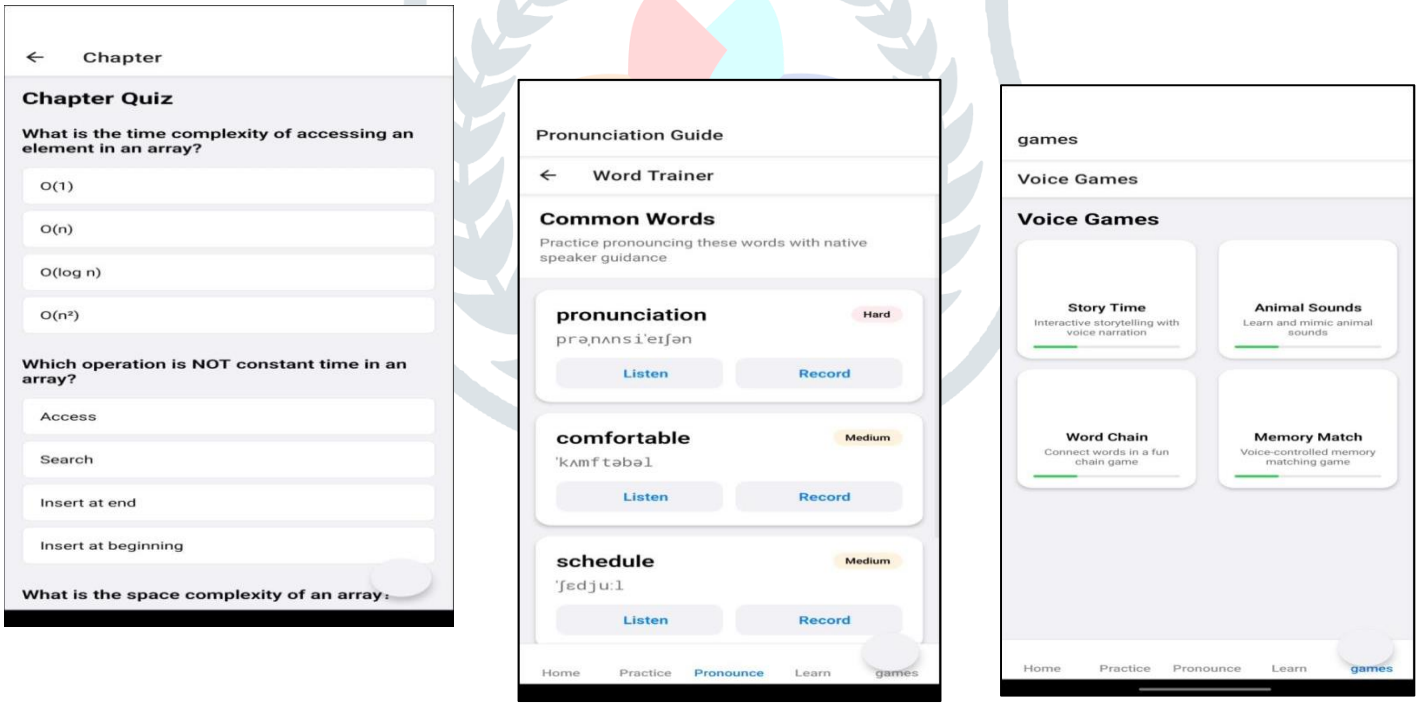

Figure 5.2 Chapter & Quiz, Pronunciation Guide & Entertainment Games

The application follows a minimalist and accessible UI design, adhering to WCAG 2.0 accessibility guidelines. The home screen features large, high-contrast buttons with simple labels for easy navigation. The entire app is voice-controlled, allowing users to interact hands-free.

The main dashboard provides quick access to learning modules, quizzes, pronunciation guides, and games. Each section is accompanied by audio prompts, ensuring that visually impaired users receive real-time guidance without needing screen-based navigation

VI.CONCLUSION

The Progressive Mobile Application for Visually Impaired People enhances accessibility in vocational training through voice navigation, AI-driven learning, and interactive modules. By eliminating visual and linguistic barriers, the app fosters independence, confidence, and skill-building for visually impaired users. Initial testing has demonstrated improved usability and engagement, with future enhancements planned for better speech recognition and personalized learning experiences. This project serves as a scalable, inclusive solution, empowering visually impaired individuals to gain vocational skills and improve their employability and social integration.

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