

Development of a Voice-Controlled Front-End User Interface Using AI-Based Command Recognition

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Abstract

Artificial Intelligence (AI) innovations have revolutionized digital interactions, enhancing accessibility and usability in modern web applications. This project presents a voice-controlled front-end user interface (UI) integrating AI-based command recognition to overcome the limitations of manual navigation and enable hands-free operation. Such traditional cursor- or keyboard-based interfaces require continuous physical input, making them less accessible to differently abled users and inefficient for multitasking environments. To address this, a voice-enabled UI system was developed using React.js and the Web Speech API, allowing users to perform essential interface actions, including navigation, scrolling, page switching, and content interaction through natural language voice commands. The system was quantitatively evaluated, achieving high recognition accuracy with low response times. User satisfaction surveys further indicate practical usability and improved accessibility benefits. This hands-free approach particularly supports educational and research settings, where users with mobility impairments or multitasking demands require efficient, inclusive interaction methods. The methodology involved creating modular UI components, integrating real-time speech recognition, and mapping voice inputs to front-end behaviors through natural language processing and context-aware routing. The result is a functional front-end system replacing traditional mouse and keyboard inputs with intuitive voice commands, providing a scalable, intelligent interface model. The interface bridges accessibility gaps, simplifying digital interaction and meeting increasing global demand for smart, voice-driven web solutions. This research establishes a foundation for future AI-integrated web applications, demonstrating how voice-controlled UIs can enhance inclusivity, efficiency, and user experience in diverse contexts.

Keywords: Artificial Intelligence, Human Computer Interaction, Voice Recognition, WebSpeechAPI, Interaction