A Comprehensive Assistive System for Enhancing Independence in Individuals with Quadriplegia

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This project introduces an innovative assistive technology designed to significantly enhance the quality of life for individuals with quadriplegia. It presents a unified technology platform that integrates essential daily functions—communication, entertainment, mobility, and environmental control—into a single, user-friendly system. This unified system is navigated effortlessly through a face-controlled mouse, allowing users to direct the cursor with nose movements and perform clicking actions effortlessly using lips movements. Despite potential variations in the range of head movements among individuals with quadriplegia, the system effectively leverages even limited movement to facilitate interaction and control tasks efficiently. Furthermore, voice commands along with customizable facial gestures tailored to the user's needs can be incorporated for enhanced usability, where applicable. The system offers an advanced communication suite, featuring adaptable text-to-speech functionalities seamlessly integrated with the WhatsApp messaging application, ensuring a dependable communication channel. Entertainment options are readily available, including user-friendly media playback, and specially designed video games. Furthermore, the system introduces cutting-edge mobility solutions, allowing for accurate navigation of wheelchairs in any direction. It also includes comprehensive environmental control capabilities, enabling users to adjust various elements of their surroundings, such as lighting, with ease. Leveraging a pre-trained AI model for facial detection and tracking, the project ensures precise interaction and usability. The entire system operates on a laptop, foregoing the need for specialized equipment and thereby extending its accessibility to a broader audience.

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