A Novel Eye Blinking Based HCI with Statistical Prediction for Wearable Computing

Wang, Jenny

One of the key challenges of wearable computing is to increase the efficiency and usability of human–computer communication, without burdening people with keyboards. This project proposed a novel concept: using eye blinking EEG signals as an effective Human Computer Interaction (HCI). EEG power spikes in the delta band that corresponded to eye blinks were identified using statistical pattern recognition techniques. Combined with visual stimulation, eye blinking was used as a BCI (brain computer interface) for humans to interact with computing devices. To overcome the inefficiency of the current static 6 by 6 alphabetical visual stimulation based speller for text input, a Markov chain based predictive method was created to enhance letter selection and input speed. This method was based on the observation that the 100 most frequently used English words make up about half of all written material. The Markov transition statistics at each letter position were calculated and used for letter prediction, resulting in a maximum of 300% increase in text input efficiency. An android based prototype was created to demonstrate the feasibility of this groundbreaking HCI and its great potential for offering hands-free, silent and portable human computer interactions.

Awards Won:

Second Award of $2,000