TECHNOLOGY

Method for Controlling Dexterous Upper Limb Neuromotor Prostheses/Orthoses with Multiple Degrees of Freedom from Neural Activity in Humans

OVERVIEW

Recent developments in the fields of robotic prostheses have made it possible to build devices that mimic the human hand in its ability to manipulate multiple degrees of freedom simultaneously. These devices could be important rehabilitation tools in paralyzed patients, in patients after brain injury, or to enhance human motor performance, if they could be brain/thought/mind controlled. Currently, there has been research done in this field utilizing invasive procedures to measure neural signals.

Researchers at the University of Maryland's School of Public Health's Kinesiology Department have identified a method for deciphering hand movement intentions from neural data streams in humans. The inputs to the method consist of neural signals from the human brain and the outputs are the desired kinematic parameter trajectories such as finger joint angles and velocities in a prosthetic or orthotic hand for medical rehabilitation training. The breakthrough that the researches have proposed lies in the neural signals being obtained by noninvasive scalp electro-encephalography (EEG) signals that can achieve brain-machine confluence and utilizing EEG decoding methods that allow the desired control signal to be extracted or decoded continuously.

This invention considerably expands methods originally disclosed in PS-2010-051: Time Domain-based Decoding Methods of Noninvasive Brain-Machine Interfaces; Provisional Patent Application No. 61/331,664 filed on May 5, 2010.

Applications:
· Controlling robotic exoskeletons for performing hand gestures in:
o paralyzed patients
o as a rehabilitation tool after brain surgery
o to enhance motor performance, e.g. "super soldier"

Advantages:
· Enables extraction of movement kinematics during hand motion from noninvasive scalp EEG signal.
· EEG decoding method allows the desired control signal to be extracted continuously, avoiding signal averaging

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Bioengineering

EXTERNAL RESOURCES

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