Reconnecting the Hand and Arm to the Brain (ReHAB): BCI control of upper limb FES

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ABSTRACT

We have developed an implanted neuroprosthesis that uses functional electrical stimulation (FES) to activate the paralyzed muscles of the shoulder, arm, and hand in a coordinated manner to restore arm and hand function, and successfully deployed this system in three people with severe paralysis. We have more recently developed and deployed a FES system for the arm and hand that is controlled by the used via an intracortical brain-computer interface (BCI) to allow a user to direct the actions of their FES-restored arm and hand movements in an effective and intuitive manner. This presentation will describe the performance of a 192-electrode intracortical BCI in commanding arm and hand movements in a paralyzed individual with high cervical spinal cord injury whose movements were restored by functional electrical stimulation. Our next steps in the development of BCI-controlled FES will also be presented.