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The effect of myoelectric computer interface training on arm kinematics and function after stroke

Ishaar Ganesan[1], **Siva Nalabothu**[1] and **Torin Kovach**[2]

[1]Illinois Math and Science Academy, USA

[2]Northwestern University, USA

First reported in the 1900s, irregular muscle coactivation is prevalent in many stroke cases, and a rehabilitation method for this muscle coactivation is imperative. A new technology overcoming motor-based impairments faced by stroke survivors, brain-neural computer interaction systems connect the external world to the brain via electoral and other biosignals in a manner that engenders extreme restorations of motor functions. The Myoelectric Computer Interface (MCI) is a pertinent system that uses electromyographic signals attached to the muscle to communicate with a computer and project programmable visual-auditory representation feedback of the irregular coactivation of muscles. Tomic et al. initially designed a paradigm utilizing a game controlled by the MCI to be conducive in the reduction of abnormal coactivation of muscles in stroke survivors. Resulting in improvements in arm function, strength, and range of motion in participants, the MCI proved successful in the Tomic et al. study. However, this MCI training only allowed for responses and recordings of a singular pair of arm muscles, leading to the patients having to switch many times between each muscle pair during their training program. As brain-machine interfaces and brain-neural interaction systems implementing more than two muscles or biosignals have been shown to be effective in refining motor control and kinematics, the MCI has been redesigned to implement three EMG signals from three different muscles at once. Our method of conveying feedback is using a three-dimensional game comprising an X, Y, and Z axis, with each muscle controlling its respective dimension. We are evaluating the effects of MCI training on coactivation, arm kinematics, and motor function using patients exhibiting abnormal coactivation by comparing this novel system to the previous training.

Biography

Ishaar Ganesan has his expertise in computational neuroscience, coding, and data analysis. With their group, they developed a new Myoelectric Computer Interface on the basis of the previous, flagship study on the MCI. After more than a year of experience in this field and working on this project, the final product is nearing completion. The foundation for this project is based on the paradigm initially designed by Tomic et al. that effectively utilized a game controlled by the MCI to reduce abnormal coactivation of muscles in stroke survivors [5]. This foundation has allowed creating a device that can play a pivotal role in bringing severe stroke patients around the world an easier, more efficient method of rehabilitation.

snalabothu@imsa.edu

iganesan@imsa.edu