Recent Advances in Brain-controlled Prosthetics for Paralysis

[Friday Keynote]

Andrew Schwartz
Neurobiology
University of Pittsburgh
E1440 BSTWR, 200 Lothrop Street
Pittsburgh, PA 15213-2536
abs21@pitt.edu

ABSTRACT

Neurons encode many parameters simultaneously, but the encoding fidelity at the level of individual neurons is weak. In contrast, with a better understanding of neural population function we can now decode complex arm and hand movement. We have developed a simple extraction algorithm to capture arm movement data and shown that a paralyzed patient who cannot move any part of her body below her neck can control a high-performance "modular prosthetic limb" using 10 degrees-of-freedom simultaneously. The control of this artificial limb is intuitive, with coordinated, graceful motion, closely resembling natural arm and hand movement.

Categories and Subject Descriptors

A.0 [**General Literature**]: GENERAL—*Conference proceedings*

General Terms

Keynote

BIOGRAPHY

Dr. Schwartz received his Ph.D. in Physiology from the University of Minnesota in 1984. He then went on to a postdoctoral fellowship with Dr. Apostolos Georgopoulos, who was developing the concept of directional tuning and population-based movement representation in the motor cortex. After building research programs in Phoenix and San Diego, he moved to the University of Pittsburgh in 2002. Schwartz' research is centered on the exploration of cortical signals generated during volitional arm movements. This effort showed that a high-fidelity representation of movement intention could be decoded from the motor cortex and enabled technology now being used by paralyzed subjects to operate a high-performance prosthetic arm and hand.

GLSVLSI'15, May 20–22, 2015, Pittsburgh, PA, USA.
ACM 978-1-4503-3474-7/15/05.
http://dx.doi.org/10.1145/2742060.2742124.