FIU Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

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FES neuroprosthesis for the restoration of grasp function in a monkey model of spinal cord injury

Dr. Christian Ethier
Northwestern University

Friday, Wednesday 23rd, 2014
LECTURE: 9:00 AM - 10:00 AM

ENGINEERING CENTER
ROOM EC 1105
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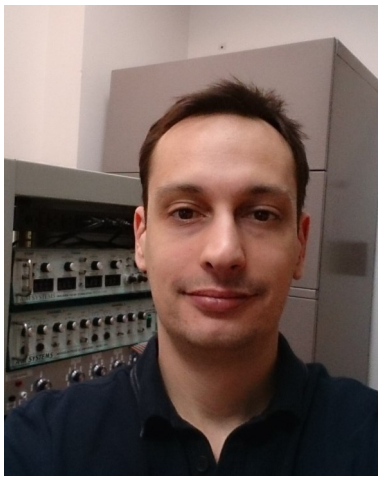

Abstract: We have developed a neuroprosthesis that allows monkey subjects to pick up and move objects despite a peripheral nerve block causing complete paralysis of the flexor muscles below the elbow. The restored voluntary movement was achieved using signals recorded from approximately 100 neurons in the primary motor cortex to control electrical stimulation of the paralyzed muscles. After nerve block, the monkeys were able to use the neuroprosthesis to perform a functional grasping task with a success rate approaching their normal performance, whereas they were essentially unable to complete this task without assistance. We are now investigating adaptive decoders to facilitate the implementation and improve the performance of this neuroprosthetic system in chronically paralyzed subjects. In human spinal cord injured patients, such a system could provide natural control of arm and hand movements through normal cognitive processes, and greatly enhance the patients' independence and overall well-being.

Biography: I completed an both my graduate and undergraduate studies at Laval University, in Québec City, Canada. After a degree in electrical engineering, I joined the Neurobiology program, to study the functional and anatomical organization of the motor cortex in the cat with Dr. Charles Capaday. I obtained my Ph.D. in 2007, and then joined Dr. Lee E. Miller's laboratory at Northwestern University to develop a brain-machine interface for the restoration of grasp function in a primate model of spinal cord injury. My general research interests are the organization and functions of the motor cortex and investigations of neuroprosthetic applications not only for the restoration of function, but also for their potential to induce neural plasticity and motor recovery following lesions to the nervous system.

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