

IEEE Transactions on Systems, Man and Cybernetics – Part B

Special Issue: Shared Control in Brain-Machine Interfaces

Scope: Brain-machine interfaces (BMI) offer the possibility of a new generation of technologies that allow users to directly control devices directly via the nervous system. BMIs can be used to develop new communication pathways to restore and augment sensory and motor function in disabled individuals. At the core of BMI system design is a controller that must accommodate the seamless interaction between systems of neurons with electronics and robotics. This special issue focuses on innovations in signal processing, controls, and robotics to revolutionize information handling between the nervous system and computing machines.

The concept of “sharing control” between humans and machines has its roots back to the early history of Cybernetics. Compared to that early history, the challenges for BMIs involves developing control systems capable of handling biological signals that are sparse, noisy and dynamic in nature. Moreover, these systems are operating in a wide variety of dynamic environments encountered in the activities of daily life. One of the goals of this special issue is to identify leading advancements in Cybernetics theory that can improve performance in BMIs through cooperative control. Several examples of such systems include intelligent robotics that can assist with obstacle avoidance or accurate grasping, and adaptive algorithms that can learn the robot’s optimal behavior from the user’s nonstationary brain signals.

Of particular interest in this special issue are the principles that allow bi-directional communication and assistance between the user’s nervous system and the device being controlled as well as how to support the dynamic sharing of roles and responsibilities of a control task. In addition, topics sought include the design of collaborative, cognitive workspaces and signal analysis that supports a shared understanding of the task and environment.

Schedule:

Deadline for submissions:	October 31 st , 2010
Notification of first review:	December 15 th , 2010
Revised submissions due:	February 15 th , 2011
Notification of final review:	March 31 st , 2011
Final manuscript due:	May 31 st , 2011
Expected publication:	Late 2011

Guest Editors:

Dr. José del R. Millán, Defitech Professor
Defitech Chair in Non-Invasive Brain-Machine Interface
Center for Neuroprosthetics
School of Engineering
Swiss Federal Institute of Technology Lausanne (EPFL)
EPFL STI-CNBI
ELB 138. Station 11
CH-1015 Lausanne
Switzerland
<http://people.epfl.ch/jose.millan>

Jose M. Carmena, Ph.D.
Assistant Professor
Dept. of Electrical Engineering & Computer Sciences
Helen Wills Neuroscience Institute
Program in Cognitive Science
University of California, Berkeley
754 Sutardja Dai Hall, Berkeley, CA 94720-1764, USA
<http://www.eecs.berkeley.edu/~carmena>

Justin C. Sanchez, Ph.D.
Assistant Professor
Departments of Pediatrics, Neuroscience, and Biomedical Engineering
P.O. Box 100296
Ph: 1-352-846-2180
Neuroprosthetics Research Group
Lab: HD-410
University of Florida
Gainesville, FL 32610
<http://nrg.mbi.ufl.edu>