DEPARTMENT OF MECHANICAL ENGINEERING COLLOQUIUM

UNIVERSITY OF CALIFORNIA
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The Department of
Mechanical Engineering
PRESENTS

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Friday, October 19, 2018
Winston Chung Hall 205/206
11:10-12:00PM

Advanced human-robot control and interaction interfaces

Abstract:
This talk will focus on control and interaction interfaces between humans and robotic platforms. The first part of the talk will present current work at the Human-Oriented Robotics and Control (HORC) Lab in ASU on myoelectric control interfaces used for controlling robotic devices. A novel method for robust myoelectric control of robots will be presented. This work supports a shift in myoelectric control schemes towards proportional simultaneous controls learned through development of unique muscle synergies. The ability to enhance, retain, and generalize control, without needing to recalibrate or retrain the system, supports control schemes promoting synergy development, not necessarily user-specific decoders trained on a subset of existing synergies, for efficient myoelectric interfaces designed for long-term use. The second part of the talk will focus on a novel approach to robotic interventions, which takes advantage of mechanisms of inter-limb coordination, using a novel robotic system, called Variable Stiffness Treadmill (VST) developed in the HORC Lab in ASU. The methods and results of the presented approach will lay the foundation for model-based rehabilitation strategies for impaired walkers, which is supported by a mathematical model that accurately describes the relationship between the magnitude of the stiffness perturbation and the evoked muscle activity. Finally, a novel control interface between humans and multi-agent systems will be presented. The human user will be in control of a swarm of Unmanned aerial vehicles (UAVs) and will be able to provide high-level commands to these agents. The proposed brain-machine interface between the swarm and the user will allow for research on swarm high-level information perception, leading to augmentation of decision capabilities for the state-of-the-art systems.

About the Speaker:
Panagiotis (Panos) Artemiadis received the Diploma and the Ph.D. degree in mechanical engineering from the National Technical University of Athens, Athens, Greece, in 2003 and 2009, respectively. From 2007-2009 he worked as Visiting Researcher in Brown University and the Toyota Technological Institute in Chicago. From 2009 to 2011, he was a Postdoctoral Research Associate in the Mechanical Engineering Department, Massachusetts Institute of Technology (MIT). Since 2011, he has been with Arizona State University, where he is currently an Associate Professor in the Mechanical and Aerospace Engineering Department, and the Director of the Human-Oriented Robotics and Control Laboratory (http://horc.engineering.asu.edu/). He is also the Graduate Program Chair for the new MS Degree in Robotics and Autonomous Systems at ASU. His research interests include the areas of robotics, control systems, system identification, brain–machine interfaces and human–swarm interaction. He serves as Editor-in-Chief and Associate Editor in many scientific journals and scientific committees, three of his papers have been nominated or awarded best paper awards, while he has received many awards for his research and teaching (more info at http://www.public.asu.edu/~partemia/.). He is the recipient of the 2014 DARPA Young Faculty Award and the 2014 AFOSR Young Investigator Award, as well as the 2017 ASU Fulton Exemplar Faculty Award. He has the (co-)author of over 80 papers in scientific journals and peer-reviewed conferences, as well as 9 patents (3 issued, 6 pending).