ABC Robotics Monthly Seminar

Speaker: Prof. Noah Cowan, Department of Mechanical Engineering, Johns Hopkins University

Date: January 25, 2021

Time: 15:00-16:00

Location: via zoom

Title: Neuroscience in The Matrix: Closing the loop around the brain to understand how it controls the body

Abstract: The nervous system is a sophisticated control system, controlling equally sophisticated biomechanical "plant". Understanding how the nervous system (1) encodes and processes sensory information, (2) transforms it into meaningful intermediate representations in the brain, and (3) computes motor output, therefore, involves decoding a complex closed-loop control system.

This talk will present a research program devoted to developing and applying ideas in engineering to decode closed-loop neuromechanical control in animals (including humans). Central to this program is the novel ability to wrap artificial feedback systems around freely behaving animals—in some cases by "reading their minds," i.e. decoding neural activity in real time. Using this approach, the direct neural output is used to adjust sensory inputs on the fly in an effort to disentangle the interactions between the nervous system and the biomechanical plant that it controls.

Bio: Noah Cowan directs the Locomotion in Mechanical and Biological Systems (LIMBS) Laboratory at Johns Hopkins University where he is a Professor of Mechanical Engineering. The LIMBS Lab conducts experiments and computational analyses on both biological and robotic systems, with a focus on applying concepts from dynamical systems and control theory to garner new insights into the principles that underlie neural computation. Noah's research program was recognized by a Presidential Early Career Award in Science and Engineering (PECASE) in 2010 and a James S. McDonnell Complex Systems Scholar award in 2012, and his teaching and mentorship were recognized by the William H. Huggins Excellence in Teaching Award in 2005 and the Dunn Family Award in 2014. Noah received his BS in EE from Ohio State in 1995, before completing his PhD in EE at the University of Michigan. He then completed his postdoc at UC Berkeley in Integrative Biology and Computer Science, and in 2003 started his faculty career at Johns Hopkins where he has been ever since.

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