**Prosthetics and AI**

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Abstract

Interfacing the central nervous system with external devices has the potential to revolutionize health care and how we use technology. For example, motor brain-machine interfaces use neural activity to control a prosthetic device, thereby bypassing an injury to restore movement to paralyzed people. Since their first proof of concept demonstrations in the late 1990's, these motor brain-machine interfaces have now restored basic motor functions to people with severe paralysis from things like spinal cord injuries and stroke. In the past decade, existing technologies like myoelectric prostheses have rapidly improved, and new technologies like neuromodulation for neurological disorders have emerged, sparking tremendous excitement in academia and industry alike.

The rapid advancement of neural interface technologies has been fueled in part by parallel revolutions in hardware and software. Advanced neurotechnologies allow us to measure and manipulate the nervous system with increasing precision. Artificial Intelligence provides powerful tools to leverage data. Despite this progress, neural interface technologies have yet to come to widespread use. Significant barriers remain to develop devices that work reliably for a wide range of users. The challenges span hardware and software: there is a tremendous need for devices that can interface with the nervous system chronically, as well as algorithms that can provide stable performance despite variability in the interface or across users.

Addressing these challenges to create the next-generation of commercially viable neural interface devices will require work at the intersection of AI, neuroscience, and prosthetics. In this session, we will survey some of advances in hardware and software for neural interfaces.


Speakers

*Ultra-flexible Electrodes for Long-lasting, Large-sale, Bi-directional Neural Interface*
Lan Luan, Rice University
https://profiles.rice.edu/faculty/lan-luan

*Machine Learning Algorithms for Neural Decoding*
Chetham Pandarinath, Georgia Institute of Technology
https://bme.gatech.edu/bme/faculty/Chethan-Pandarinath

*Soft Bionic Limbs: From Research to Real World*
Cristina Piazza, Technical University Münich
https://www.professoren.tum.de/en/piazza-cristina