Neuroprostheses for amputees and patients with spinal cord injuries

ABSTRACT
Recent technological innovations such as functional neuro-muscular stimulation (FNS) offer considerable benefits to paralyzed individuals. FNS can produce movement in paralyzed muscles by the application of electrical stimuli to the nerves innervating the muscles. The first part of this talk will describe how smooth muscle movements can be evoked using electrical stimulation via electrode arrays inserted into peripheral nerves. Animal experiments demonstrating the feasibility of the method will be described. The second part of this talk will describe efforts to interpret human motor intent from bioelectrical signals. Machine learning algorithms for accomplishing this objective will be presented. The decoded information can then be used to evoke desired movements of paralyzed muscles or to control prosthetic devices in patients with limb loss. Results of experiments involving human amputee subjects will be described and discussed.

SPEAKER BIO
V John Mathews is a professor in the School of Electrical Engineering and Computer Science at the Oregon State University. He received his Ph.D. and M.S. degrees in electrical and computer engineering from the University of Iowa, Iowa City, Iowa in 1984 and 1981, respectively, and the B.E. (Hons.) degree in electronics and communication engineering from the Regional Engineering College (now National Institute of Technology), Tiruchirappalli, India in 1980. He was with the Department of Electrical and Computer Engineering at the University of Utah from 1985 until 2015. He served as the chairman of the ECE department at Utah from 1999 to 2003, and as the head of the School of EECS from 2015 to 2017.

Mathews’ research interests are in the theory and applications of signal processing and machine learning techniques in neural engineering, biomedicine, and structural health management.

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Talk: 11:00-11:30 AM Pacific
Q/A: 11:30-11:45
Zoom: beav.es/tech-talk
Info: eecs.oregonstate.edu/
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