Guest Editorial

AFTER the tremendous clinical success of the cochlear implant over the last 20 years, neuroprosthetic systems are now being developed and applied for the blind. First results on implanted epiretinal arrays in humans are becoming available now and lead to clear suggestions of how to improve electrode design, device characteristics, and implant procedures. Besides implants in humans and animals, research on *in vitro* neuronal network systems is progressively expanding. Interesting combinations of multi-electrode array devices with microfluidic systems will allow pharmacological control of networks in a very precise way. Several papers in this Special Issue of the IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING are related to various neural neuroprosthetic systems.

Imaging has played an important role in understanding the mechanisms of neural systems and aiding clinical diagnosis and management of various neurological diseases. Of particular interest is functional neuroimaging which offers capabilities of probing spatio-temporal characteristics of the brain. Two papers in this Special Issue deal with functional near-infrared neuroimaging and laser speckle imaging.

Processing neural data has many aspects from the extraction of information in large neural cortical networks to the analysis and modeling of neural and behavioral responses in sensori-motor systems. The goal here is to understand the encoding of information and the evolution of motor strategies during active movement. In this issue, examples are drawn from retinal processes, visual tracking and respiratory control, together with techniques for feature extraction in large cortical networks.

A better understanding of neural control will eventually lead to more elegant solutions for prosthetics and support of patients with CNS lesions.

This Special Issue is a collective effort by active researchers who specialize in the field of neural engineering, and we hope it will provide a rich resource with regard to the state-of-the-art of neural engineering research. We are very grateful to a number of colleagues who graciously volunteered to review papers for the special issue during their busy schedules. We also wish to thank Dr. Robert Jaeger, Editor-in-Chief of the IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING, and Tracy Turner, Managing Editor, for their strong support and great effort, without which this Special Issue would not be possible.

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Dr. Thakor serves on the editorial boards of several journals, including the IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, and *Annals of Biomedical Engineering*. He is a recipient of a Research Career Development Award from the National Institutes of Health and a Presidential Young Investigator Award from the National Science Foundation, and is a Fellow of the American Institute of Medical and Biological Engineering. He is also a recipient of the Centennial Medal from the University of Wisconsin School of Engineering, recognition from the students of the Alpha Eta Mu Beta Biomedical Engineering student Honor Society, and the Distinguished Service Award from IIT Bombay.
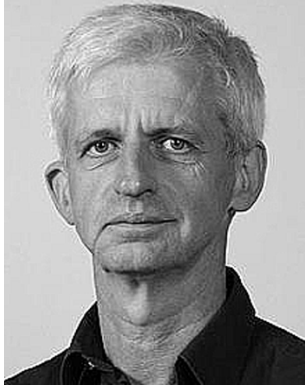
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