IEM SEMINAR SERIES

TUESDAY
September 20th, 2016

Concentric Electrodes for Bi-Directional Brain Machine Interfacing

Institute for Engineering in Medicine

University of Minnesota
Driven to Discover℠

Dr. Walter G. Besio
Associate Professor of Electrical, Computer, and Biomedical Engineering
University of Rhode Island

FREE event, no registration required.

Pizza and soft drinks will be provided from 11:45 am

12:00PM - 1:00PM
Mayo Memorial Building
Room 3-100

For additional information on Dr. Besio's presentation please contact:
scot0353@umn.edu

The Institute for Engineering in Medicine (IEM) is pleased to announce a seminar by Dr. Walter G. Besio, "Concentric Electrodes for Bi-Directional Brain Machine Interfacing."

Electroencephalography (EEG) signals are spatio-temporal in nature. EEG has very good temporal resolution but typically does not possess high spatial resolution. The surface Laplacian enhances the spatial resolution and selectivity of the surface electrical activity recording. Concentric ring electrodes have been shown to estimate the surface Laplacian directly with significantly better spatial resolution than conventional electrodes. Further, EEG at times has poor signal quality. The EEG signals recorded with the tri-polar concentric ring electrode (TCRE) system, tEEG, have significantly higher SNR than from bipolar concentric ring electrode and conventional disc electrode emulations. The tri-polar electrodes have also shown significantly higher spatial resolution (10x) as well as mutual information (0.1x). Further, we have found high-frequency oscillations (HFOs) in the tEEG prior to seizures in 12 patients which were not present in concurrent EEG. We have also shown that tEEG was significantly better for real-time center-out cursor control. In the opposite direction, we have shown that transcranial focal electrical stimulation (TFS) via the TCREs from the scalp surface has stopped: penicillin, pilocarpine, and pentylenetetrazol induced seizures, protected the brain, increased GABA, decreased glutamate, and prevented/delayed brains from becoming epileptic.

Dr. Besio is a Professor in the Department of Electrical, Computer, and Biomedical Engineering at the University of Rhode Island (URI). Dr. Besio received his M.S. and Ph.D. degrees in biomedical engineering from the University of Miami and a B.S. in electrical engineering from the University of Central Florida. Prior to joining academia, Dr. Besio worked 12+ years in the biomedical device and electronics industries. Dr. Besio specializes in research to develop innovative biomedical instrumentation for diagnosis and therapies for enhancing the lives of persons with neurological disease and disability.

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