EMBC Workshop Proposal

Workshop Type (select one):

- [ ] Full Day Workshop
- [x] Half Day Workshop

Workshop Title:

The Fast-Changing Landscape of Electroencephalography

Workshop Organizer Name & Affiliation:

Walter Besio, Electrical Computer, and Biomedical Engineering & Interdisciplinary Neuroscien Program, University of Rhode Island, Kingston, RI USA

Workshop Organizer/Speaker Name & Affiliation 1:

Sridhar Sunderam, Biomedical Engineering, Univeristy of Kentucky, Lexington, KY USA

Workshop Organizer/Speaker Name & Affiliation 2:

Lucia Schiatti, Unit for Visually Impaired People (U-VIP), Istituto Italiano di Tecnologia, Genoa,

Workshop Organizer/Speaker Name & Affiliation 3:

Preben Kidmose, Department of Engineering, Aarhus University, Aarhus, Denmark

Workshop Organizer/Speaker Name & Affiliation 4:

Mike Chi, CGX, San Diego, CA USA

Workshop Organizer/Speaker Name & Affiliation 5:

Alan Macy, Research and Development, BioPac,

Workshop Organizer/Speaker Name & Affiliation 6:

Nicola Soldati, Brain Products GmbH, Gilching, Germany / Christoph Guger, gtec GmbH, Graz Austria

Theme (Select one):

- ○ 01. Biomedical Signal Processing
- ○ 02. Biomedical Imaging and Image Processing
- ○ 03. Micro/Nano-bioengineering; Cellular/Tissue Engineering & Biomaterials
- ○ 04. Computational Systems & Synthetic Biology; Multiscale modeling
- ○ 05. Cardiovascular and Respiratory Systems Engineering
- ○ 06. Neural and Rehabilitation Engineering
- ◉ 07. Biomedical Sensors and Wearable Systems
- ○ 08. Biorobotics and Biomechanics
- ○ 09. Therapeutic & Diagnostic Systems and Technologies
- ○ 10. Biomedical & Health Informatics
- ○ 11. Biomedical Engineering Education and Society
- ○ 12. Translational Engineering for Healthcare Innovation and Commercialization

Workshop Synopsis— Max 2000 Characters

This workshop is designed to give both novice and experienced electroencephalography (EEG) users a synopsis of the latest innovations in EEG and related areas. We will have talks about EEG sensor development and use:
Sridhar Sunderam, PhD: Me and my EEG: Reflections on neurotechnology in our personal space
Lucia Schiatti, PhD: Open-source material to develop customized research-grade brain-computer interfaces at low cost
Preben Kidmose, PhD: Ear-EEG – a method for long-term brain monitoring in real-life
Walt Besio, PhD: bi-directional brain communication using concentric electrodes
Mike Chi, PhD: The state of high-quality dry and 'almost-dry' EEG electrodes
Alan J. Macy, MS: EEG measures and processing in multivariate recording
Nicola Soldati, PhD: Flexible EEG solutions for every research question
Christoph Guger, PhD: Current and future applications of BCIs
Finally, we will have hands on demonstrations of the technologies. EEG is the recording of brain electrical activity from the scalp. The EEG measures the difference in potentials between electrodes generated by ionic currents flowing within neurons of the brain. For many years EEG has had limited use due to poor signal quality, low spatial resolution, and non-portability. Even with these limitations EEG is still a standard practice in clinical settings such as diagnosis of epilepsy and for research such as brain computer interfacing. In recent years electrodes, signal acquisition hardware, and signal processing software have undergone major improvements allowing new and improved applications of EEG. These talks will illustrate some of the latest technologies for acquiring EEG. Further, Dr. Besio will discuss bi-directional brain communication, injecting signals to alter the brain state. The target audience of the workshop is the whole community of the IEEE EMBS Society interested in brain research.