Highlights from the 2023 IEEE SMC Brain-Machine Interface (BMI) Systems Workshop
Tiago H. Falk, Christoph Guger, Michael H. Smith, and Ljiljana Trajkovic
(2023 BMI Workshop General Co-Chairs)

The 13th IEEE SMC Brain-Machine Interface (BMI) Systems Workshop was held October 1-4, 2023, in Honolulu, Hawaii, USA as part of the annual Conference of the IEEE Systems, Man, and Cybernetics Society. Sarah Power, Ivan Volosyak, and Abdelkader Belkacem served on the Technical Program Committee, Yaoping Hu served as the Special Sessions Chair, and Jonas Vibell served as the Local Arrangements Chair. Thirty-four papers were accepted after a peer-review and were presented in six sessions entitled: Active BMIs, Passive BMIs, Machine Learning for BMIs, Emerging Applications of BMIs, Multimodal/Sensory BMIs, and Representations of Neural Data for BMIs. There was one poster and one virtual session.

Figure 1: 2023 BMI Workshop paper sessions.

The BMI Workshop featured three keynote speakers:
• Ming Hou (DRDC, Canada): "Frontiers of Brain-Inspired Autonomous Systems"
• Xiang Zhang (UNC Charlotte, USA): "Self-Supervised Contrastive Learning For EEG-Based Neurological Disorder Detection"
• Chris Ullrich (Cognixion, USA): "Clinical BCIs: Use Cases, Challenges, and Opportunities"
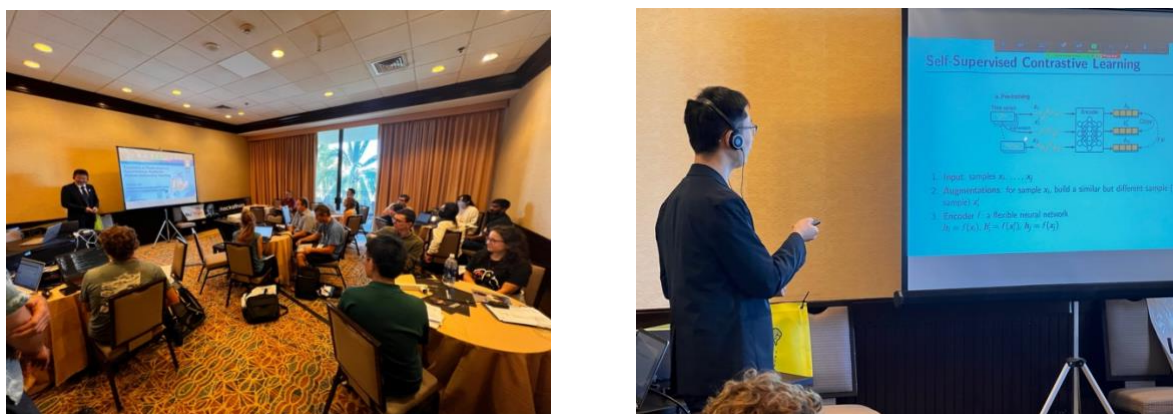

Figure 2: Ming Hou (left) and Xiang Zhang (right) delivering their keynote talks.

The BMI Workshop also hosted the BR41N.IO Brain-Computer Interface (BCI) Hackathon from October 1-2, 2023. 203 people participated in the Hackathon across 43 teams both in person and remotely. To support remote attendees, 10 institutes worldwide hosted students who accessed their labs and equipment: IEEE SMC Oahu (USA), Tilburg University (The Netherlands), g.tec (Austria), UAE University Abu Dhabi (United Arab Emirates), Machine Learning Club Turin (Italy), Aalborg University (Denmark), West University of Timisoara (Romania), Tec de Monterrey (Mexico), Rochester Institute of Technology (USA), and Union

College (USA). The IEEE Brain Technical Community 2.0 sponsored awards totaling USD $6,000 that were given to the top 3 teams across three categories: BCI Gaming, BCI Programming, and BCI Data Analysis. The names of winners and their video presentations are posted at https://www.br41n.io/IEEE-SMC-2023.
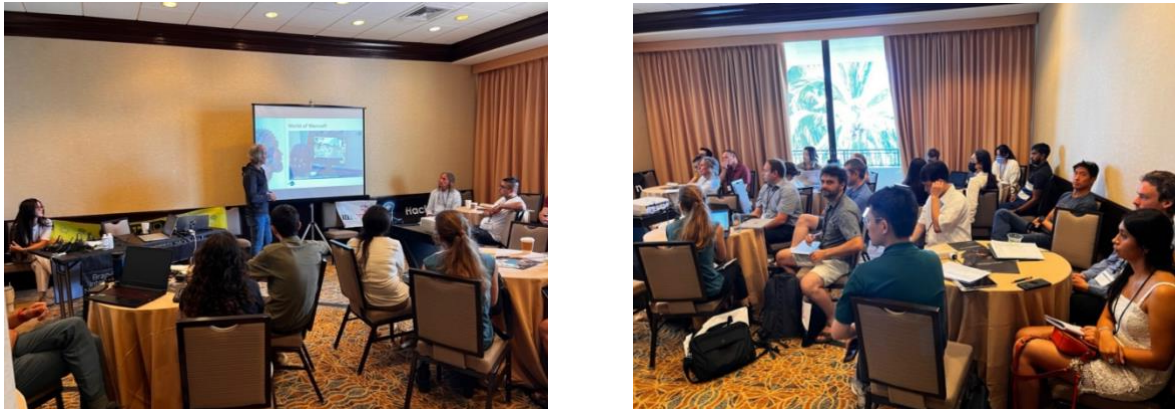

Figure 3. In-person BCI Hackathon participants and invited speakers.

On October 3, 2023, the Workshop hosted the International BCI Award Ceremony. The BCI Award recognizes outstanding and innovative research in the field of BCI. Twelve projects are nominated each year and the top 3 winners are announced at the BCI Award Ceremony. This year, over 80 research projects were submitted worldwide. The Chair of the jury, Dr. José M. Azorín, and five expert BCI reviewers selected the 12 nominated projects (87 authors from 36 institutions). The 1st place winner was Nicolas S. Card (and collaborators) from University of California (Davis, USA), the 2nd place winner was Sean Metzger (and collaborators) from University of California (San Francisco, USA), and the 3rd place winner was Charles Greenspon (and collaborators) from University of Chicago (USA). More than 160 attendees were present (in person and virtually) during the BCI Award Ceremony. Details about the 12 nominated projects and the three winning teams are posted at https://www.bci-award.com/2023.

The IEEE Brain Technical Community 2.0 financially sponsored a networking reception and the Best Paper and the Best Student Paper Awards (USD $500 prize each). Ten nominees presented to a jury of four BCI experts. The IEEE Brain Best Paper Award went out to Dion Kelly (and co-authors) for their paper entitled "Think BIG: Brain-Computer Interface Goals for Children with Quadriplegic Cerebral Palsy." The IEEE Brain Best Student Paper Award went to Sunghyun Kang (and co-authors) for their paper entitled "Achieving Effective Artifact Subspace Reconstruction in EEG Using Real-Time Video-Based Artifact Identification."
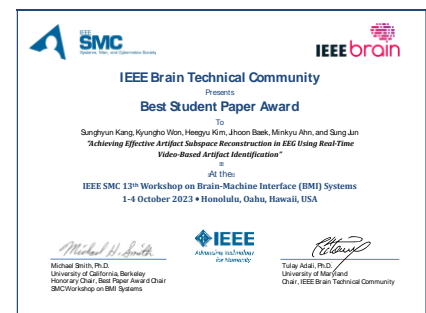

Figure 4. IEEE Brain Technical Community networking reception and copies of the Best Paper Awards certificates.

Preparations are already underway for the 2024 BMI Workshop and Hackathon to be held from October 7-10, 2024, in Kuching, Malaysia. We hope to see many of you in Kuching!