IEEE/EMBS NER 2023

11th International IEEE EMBS Conference on Neural Engineering
April 25-27, 2023 | Baltimore, MD, USA

IEEE NER 2023 CONFERENCE PROGRAM

Please visit our website
for more information!
2023.ieee-ner.org

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IEEE

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Baltimore Convention Center - Level 300 52

ClevelandFES

The Cleveland FES (Functional Electrical Stimulation) Center is a transdisciplinary alliance specializing in the fields of biomedical engineering, neural research, and rehabilitation. We embrace open-door, collaborative, compassionate, and inquisitive engagement. Together, we are solving real medical problems that impact the veteran and civilian population.

VA | U.S. Department of Veterans Affairs
Veterans Health Administration
Office of Research & Development

Case Western Reserve University EST. 1826 | MetroHealth | University Hospitals | Cleveland Clinic

Editor's Note

The Neural Engineering Conference of the IEEE Engineering in Medicine and Biology Society hosted an electronic paper submission process for the conference. It was the responsibility of the submitting author to ensure the document was viewable and without errors that would prevent the Conference from including the paper in the Digital Proceedings in IEEE Xplore or the Website.

All conference papers were peer-reviewed by experts chosen by the NER Conference Technical Program Board for all contributed and one-page abstract papers.

Code of Ethics
The EMBS AdCom approved the following Code of Ethics to provide a guideline of ethical consideration for all members and to establish its support for ethical conduct in research.

Patients and Human Subjects
1. Respect human dignity and privacy of patients and human subjects.

Information
2. Ensure proper safeguarding of all confidential information, including information pertinent to patients, subjects, commercial entities, and trade secrets.

Environment
3. Promote a culture of cost-effectiveness.
4. Support the preservation of a healthy environment.

Research
5. Engage in research aimed at advancing the contribution of science and technology to improving health- care provision.
6. Report research results with scientific integrity and proper due credit.
7. Observe the rights of human research subjects and strive for a balance between benefits and potential harm.
8. Ensure a responsible and humane use of animals in research.
9. Conduct clinical research studies in accordance with Good Laboratory Practices (GLP) and Good Clinical Practices (GCP).

Profession
10. Hold in high regard the inter-disciplinary nature of healthcare delivery and research. Foster collegial inter-disciplinary relationships. Respect, value, and acknowledge the contribution of others.
11. Encourage a culture of knowledge exchange and mentorship.
12. Avoid or properly disclose conflicts of interest.

The IEEE Engineering in Medicine and Biology Society advances the application of engineering sciences and technology to medicine and biology, promotes the profession, and provides global leadership for the benefit of its members and humanity by disseminating knowledge, setting standards, fostering professional development, and recognizing excellence.

The field of interest of the IEEE Engineering in Medicine and Biology Society is the application of the concepts and methods of the physical and engineering sciences in biology and medicine. This covers a very broad spectrum ranging from formalized mathematical theory through experimental science and technological development to practical clinical applications. It includes support of scientific, technological and educational activities.

Publications
IEEE PULSE: A Magazine of the IEEE Engineering in Medicine and Biology Society
Transactions on Biomedical Engineering
Transactions on Neural Systems and Rehabilitation Engineering
Transactions on Medical Imaging
Transactions on NanoBioscience
Transactions on Biomedical Circuits and Systems Transactions on Computational Imaging
Transactions on Radiation and Plasma Medical Sciences Transactions in Medical Robotics
Reviews on Biomedical Engineering
Journal on Translational Engineering in Health & Medicine Journal of Biomedical and Health Informatics
Journal on Electromagnetic; RF & Microwaves in Medicine and Biology

Electronic Products
EMBS Electronic Resource (117,000+ documents)

Conferences
Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) IEEE EMBS Special Topic Conference on Neural Engineering (NER)
International Symposium on Biomedical Imaging (ISBI)
International Conference on Biomedical Robotics and Biomechatronics (BIOROB) International Conference on Rehabilitation Robotics (ICORR)
Healthcare Innovation and Point-Of-Care Healthcare Technologies Conference (HICPT) EMBS Micro and Nanotechnology in Medicine (MNM)
IEEE EMBS International Conference on Body Sensor Networks (BSN)
IEEE EMBS International Conference on Biomedical and Health Informatics (BHI) IEEE EMBS Student Conferences: For Students, By Students
IEEE Life Sciences Conference

Summer Schools
International Summer School on Biomedical Signal Processing International Summer School on Biocomplexity, Biodesign and Bioinnova International Summer School on Information Technology in Biomedicine
International Summer School on Emerging Technologies and Applications in Telemedicine International Summer School on Neural Engineering
International Summer School on Computer Modeling in Medicine
International Summer School on Medical Devices and Biosensors

NER'23 Organizing Committee

Conference Chair:
Pedro Irazoqui, *Johns Hopkins University*

Conference Co-Chair:
Najim Dehak, *Johns Hopkins University*

Program Co-Chairs:
David Blodgett, *Johns Hopkins University*
Erika Ross, *Onward Medical*
Nitish Thakor, *Johns Hopkins University*
Archana Venkataraman, *Johns Hopkins University*

Executive Office:
Janice Sandler, *IEEE EMBS*
Nancy Zimmerman, *IEEE EMBS*

Vice President of Conferences:
May Wang, *IEEE EMBS*

Honorary Chair:
James Weiland, *University of Michigan, Ann Arbor*

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Welcome Message

Dear Colleagues,

It is our pleasure to welcome you to Charm City – Baltimore for the 11th International IEEE EMBS Conference on Neural Engineering (NER).

The theme of this year's conference is artificial intelligence in neural engineering. When we began thinking about hosting this conference as an organizing committee, we wanted to go beyond traditional NER themes of electrodes and interfaces, and look at closing the loop, new technologies, sensing and actuating modalities, and future directions for our field.

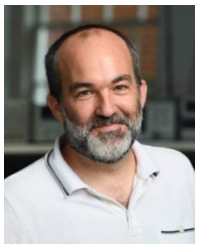
In our call for submissions, we highlighted four distinct quadrants: a) Responsive neuroengineering; b) Innovation in High-Resolution Neuroimaging; c) the Brain as a part of a complex environment; and d) Impact in neuroengineering. Each distinct quadrant revolved around our central theme, and included a number of sub-categories.

We have been delighted and amazed with the breadth and extraordinary quality of submissions, and agonized over which to include, and which to highlight with podium talks and plenary presentations. In the end our podium sessions coalesced around: 1) Transducers for actuating a neural response; 2) Novel sensing, image analysis, and data extraction; 3) Transducers for sensing neural and broader physiological activity; 4) Closed-loop prostheses; 5) Brain-computer and brain-machine interfaces; and 6) going beyond the neural interface. We think of sessions 1 and 3 as falling in quadrant a; session 2, in quadrant b; sessions 4 and 5, in quadrant c; and session 6 in quadrant d.

Accompanying and thematically adjacent Mounya Elhilali will present her work on closing the loop between sensory and cognitive systems on Tuesday morning. In the afternoon, Amadeu Llebaria will present his work on photopharmacology as a novel transducer for neural control. Wednesday morning features Jacob Robinson presenting his work using magnetic and optical technologies in neural interfaces. Wednesday afternoon, Tim Denison will introduce us to his thinking in the role of biological rhythms on the design and operation of neural interfaces.

We are particularly delighted in both the strength and incredible diversity of our keynote, and podium speakers, and poster presenters. We very much hope you will be as well, with opportunities to interact with new generations of wonderful neural engineers hailing from all over the world.

On behalf of the Organizing Committee, we welcome you to Charm City! We are confident you will learn, have new ideas, meet great colleagues, and form new collaborations over the coming three days. Thank you for attending NER 23, and we look forward to interacting with you personally over the course of the conference!



Pedro Irazoqui
NER 2023 Conference Chair
The Johns Hopkins University

Najim Dehak
NER 2023 Conference Co-Chair
The Johns Hopkins University

General Conference Information

Registration
Registration is located on level 300 of the Baltimore Convention Center outside of rooms 307-310 and will be open from Monday, 24 April through Thursday, 27 April. Staff will be able to assist you during the following times.

Monday, 24 April	08:00 am – 5:00 pm
Tuesday, 25 April	08:00 am – 5:00 pm
Wednesday, 26 April	08:00 am – 5:00 pm
Thursday, 27 April	08:00 am – 3:00 pm

*Attendees must wear their badges at all times to gain access to the conference.

Food Functions
Coffee breaks are provided on Monday - Thursday for conference attendees. Attendees will be on their own for all lunches. There will be a variety of vendors on site to purchase meals, and there are also multiple options close to the venue.

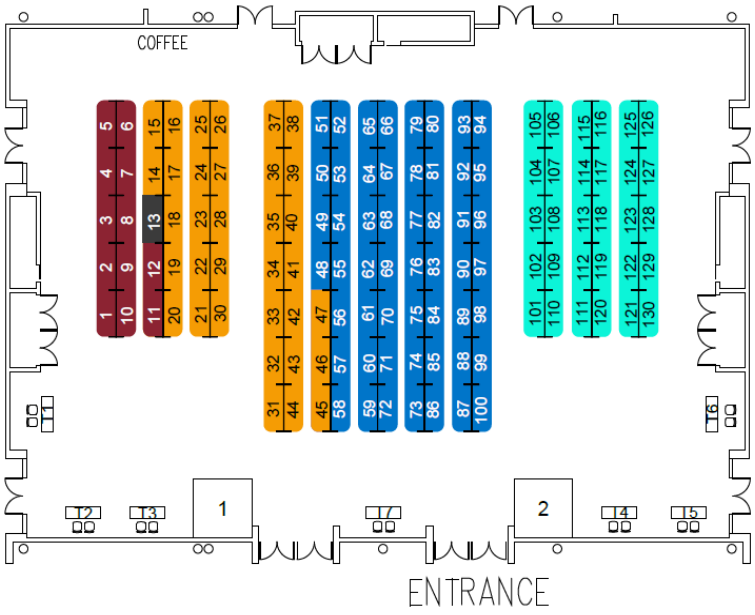
The Tuesday evening welcome reception is included in the registration fee and is walking distance from the Baltimore Convention Center at the National Aquarium (501 E Pratt St., Baltimore, MD 21202). Guest tickets are available for the Welcome Reception through the registration site or can be purchased at the registration desk for $75. Guests will also be issued a name badge to get into the welcome event at the National Aquarium in Baltimore. Two drink tickets/attendee and heavy hors d'oeuvres will be provided.

NOTE: All attendees are required to present their name badge to enter the aquarium.

Poster Sessions
All posters will be on display Tuesday – Thursday during the conference. Please hang your poster up by 9:30 am the day of your sessions. Authors are **required** to be standing by and presenting their posters during their scheduled time slots. A map of the poster area can be found on the following pages, and an ID slip will be placed with your paper ID in your designated spot on the poster board. Please remove your poster immediately after your last session is over.

CONFlux
This year, we will be providing a mobile web app to see who will be presenting at IEEE NER 2023! Credentials and details to log in to the app will be sent on 23 April. You will be able to browse presentations, attendees, and create your own personalized agenda.

Tuesday Poster Assignments



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T1 NATIONAL INSTITUTES OF HEALTH
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T2 SPRINGER NATURE
T3 WEARABLE SENSING
T4 DIAGNOSTIC BIOCHIPS
T5 IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY (EMBS)
T6 USC POLYMER IMPLANTABLE ELECTRODE FOUNDRY
T7 U.S. FOOD AND DRUG ADMINISTRATION

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AI FOR IMAGE RECONSTRUCTION, SYNTHESIS, AND BIOMARKER EXTRACTION
CLINICAL TRIAL TO HDE
EXTERNAL INPUTS TO THE NS
NEURAL MODELING
NOVEL INFORMATION EXTRACTION FROM TRADITIONAL IMAGING MODALITIES

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TUESDAY POSTERS

AI for image reconstruction, synthesis, and biomarker extraction

1. 1570859324
2. 1570867145
3. 1570869425
4. 1570869475
5. 1570869504
6. 1570869630
7. 1570869743
8. 1570869744
9. 1570869758
10. 1570869772
11. 1570881600
12. 1570881787

Clinical trial to HDE

13. 1570881871

External Inputs to the NS

14. 1570866830
15. 1570869231
16. 1570869252
17. 1570869356
18. 1570869401
19. 1570869500
20. 1570869634
21. 1570869667
22. 1570869732
23. 1570869733
24. 1570869798
25. 1570869813
26. 1570874706
27. 1570880903
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45. 1570881914
46. 1570889494
47. 1570890289

Neural Modeling

48. 1570861953
49. 1570866842
50. 1570868346
51. 1570868400
52. 1570868543
53. 1570868709
54. 1570868832
55. 1570869202
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73. 1570869783
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96. 1570881854
97. 1570881891
98. 1570889973
99. 1570890045
100. 1570890257

Novel information extraction from traditional imaging modalities

101. 1570868818
102. 1570869244
103. 1570869305
104. 1570869346
105. 1570869446
106. 1570869479
107. 1570869510
108. 1570869549
109. 1570869574
110. 1570869682
111. 1570869704
112. 1570869705
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122. 1570881830
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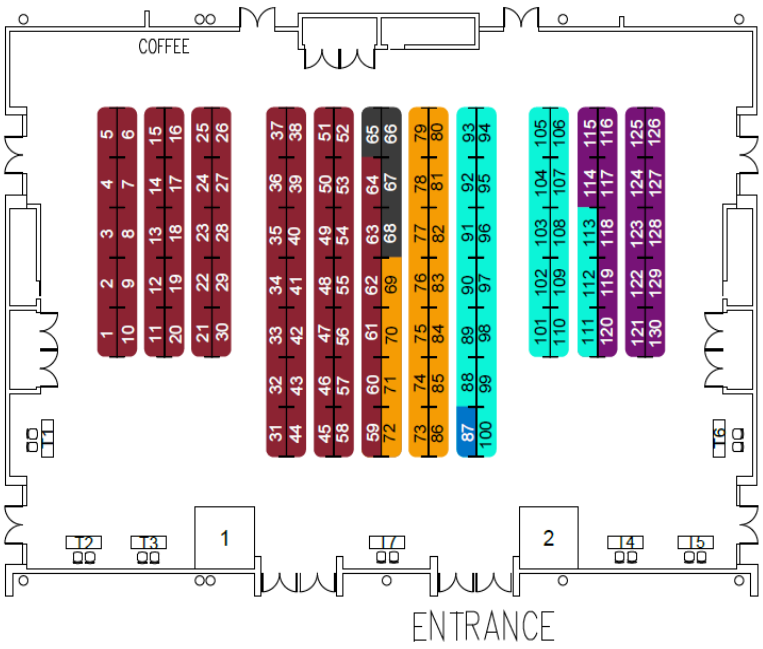
124. 1570881905
125. 1570885129
126. 1570890056
127. 1570890248

Wednesday Poster Assignments



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DECODING AND ENCODING ALGORITHMS

INTERNAL INPUTS TO THE NS

MULTIMODAL IMAGING AND ANALYSIS

NEUROETHICS

PRE-CLINICAL WORK TO CLINICAL

REINFORCEMENT LEARNING IN NER

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WEDNESDAY POSTERS

Decoding and encoding algorithms

1. 1570863307
2. 1570864535
3. 1570866360
4. 1570866492
5. 1570867015
6. 1570867021
7. 1570867241
8. 1570867461
9. 1570867773
10. 1570869009
11. 1570869157
12. 1570869332
13. 1570869362
14. 1570869375
15. 1570869447
16. 1570869452
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18. 1570869462
19. 1570869470
20. 1570869476
21. 1570869497
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42. 1570869768
43. 1570869777
44. 1570869791
45. 1570869817
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60. 1570881779
61. 1570881800
62. 1570881898
63. 1570889081
64. 1570890234

Internal inputs to the NS

65. 1570863202
66. 1570879797
67. 1570881138
68. 1570881396

Multimodal imaging and analysis

69. 1570867216
70. 1570869074
71. 1570869416
72. 1570869473
73. 1570869609
74. 1570869683
75. 1570869748
76. 1570875851
77. 1570878670
78. 1570879721
79. 1570880710
80. 1570881333
81. 1570881542
82. 1570881683
83. 1570881723
84. 1570881774
85. 1570881911
86. 1570890277

Neuroethics

87. 1570869525

Pre-clinical work to clinical

88. 1570869016
89. 1570869306
90. 1570869354
91. 1570869378
92. 1570869527
93. 1570869545
94. 1570869586
95. 1570869691
96. 1570869778
97. 1570879713
98. 1570880235
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102. 1570881435
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108. 1570881795
109. 1570881817
110. 1570885082
111. 1570887928
112. 1570890079
113. 1570890229

Reinforcement learning in NER

114. 1570866327
115. 1570866671
116. 1570869364
117. 1570869587
118. 1570869801
119. 1570869825
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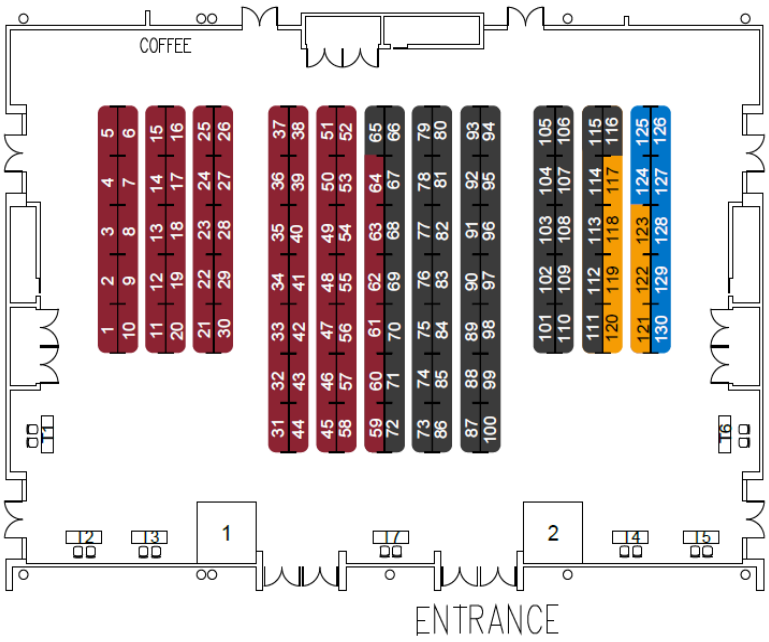
Thursday Poster Assignments



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CLOSING THE LOOP IN NEURAL PROSTHESES
NEUROREHABILITATION
PERIPHERAL NERVE INPUTS TO THE CENTRAL NS
SPECKLE AND COHERENT OPTICAL IMAGING

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THURSDAY POSTERS

Closing the loop in neural prostheses

1. 1570865996
2. 1570867022
3. 1570869055
4. 1570869064
5. 1570869262
6. 1570869314
7. 1570869334
8. 1570869352
9. 1570869426
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61. 1570881915
62. 1570881962
63. 1570885141
64. 1570890256

Peripheral nerve inputs to the central NS

117. 1570869727
118. 1570881645
119. 1570881692
120. 1570881853
121. 1570890031
122. 1570890274
123. 1570890279

Speckle and coherent optical imaging

124. 1570869355
125. 1570888468

Neurorehabilitation

65. 1570866860
66. 1570869281
67. 1570869331
68. 1570869358
69. 1570869440
70. 1570869443
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113. 1570890250
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115. 1570890286
116. 1570890288

Program at-a-Glance

Workshop Day Monday, April 24		Day 1 Tuesday, April 25		Day 2 Wednesday, April 26		Day 3 Thursday, April 27	
9:00-10:15	Workshops	9:00-9:15	Opening Remarks	9:00-10:00	Podium Talks: 3. Transducers - sensing	9:00-10:00	Podium Talks: 5. BCI/BMI
		9:15-10:15	Plenary Keynote: Mounya Elhilali				
10:15-10:45	Coffee Break	10:15-11:00	Poster & Exhibit Viewing and Coffee Break	10:00-11:00	Poster & Exhibit Viewing and Coffee Break	10:00-11:00	Poster & Exhibit Viewing and Coffee Break
10:45-12:00	Workshops	11:00-12:00	Podium Talks: 1. Transducers - actuating	11:00-12:00	Plenary Keynote: Jacob Robinson	11:00-12:00	IEEE Brain Panel
12:00-13:00	Lunch - on your own	12:00-13:00	Lunch - on your own	12:00-13:00	Lunch - on your own	12:00-13:00	Lunch - on your own
13:00-14:15	Workshops	13:00-14:00	Poster & Exhibit Viewing	13:00-14:00	Poster & Exhibit Viewing	13:00-14:00	Poster & Exhibit Viewing
14:15-14:45	Coffee Break	14:00-15:30	Podium Talks: 2. Novel sensing, image analysis, and data extraction	14:00-15:30	Podium Talks: 4. Closed-loop Prostheses	14:00-15:00	Podium Talks: 6. Beyond the neural interface
14:45-17:00	Workshops	15:30-16:00	Coffee Break	15:30-16:00	Coffee Break	15:00-15:15	Closing Remarks
		16:00-17:00	Plenary Keynote: Amadeu Llebaria	16:00-17:00	Plenary Keynote: Tim Denison		
		19:00-22:00	Welcome Reception				

Keynote Speaker - Mounya Elhilali, PhD

Tuesday, April 25, 9:15-10:15 EDT
Room 307-310
Moderator: Najim Dehak, Johns Hopkins University

Mounya Elhilali, PhD
Johns Hopkins University, USA

Perspectives on Hearing Technologies: Closing the Loop Between Sensory and Cognitive Systems

Advances in audio technologies are opening new frontiers in human-human and human-machine communications both for normal users and those with communication disorders. Yet, intelligent processing of our auditory surrounds is a nontrivial feat that has to balance the state of the system (e.g., pathophysiology), with the observed sensory signal as well as our goals, expectations, and attentional state (what we hear, what we want to hear, what we expect to hear).

The brain faces a similar feat with complex sensory signals constantly impinging on its senses; and biology evolved a neural infrastructure that enables intelligent processing of its sensory surrounds. Our sense of hearing holds deep and powerful engineering lessons for adaptive processing of sounds in everyday life. This talk presents research that reverse engineers the intricate brain circuitry engaged in processing dynamic soundscapes to balance sensory and cognitive functions; and discusses implications for audio technologies to improve communication.

Biography

Mounya Elhilali is a professor of Electrical and Computer Engineering at the Johns Hopkins University with a joint appointment in the department of Psychology and Brain Sciences. She directs the Laboratory for Computational Audio Perception and is affiliated with the Center for Speech and Language Processing and the Center for Hearing and Balance. Her research examines sound processing by humans and machines in noisy soundscapes and investigates reverse engineering intelligent processing of sounds by brain networks with applications to speech and audio technologies as well as medical listening systems. She received her Ph.D. degree in Electrical and Computer Engineering from the University of Maryland, College Park. Dr. Elhilali was named the Charles Renn faculty scholar in 2015, received the Johns Hopkins catalyst award in 2017 and was recognized as outstanding women innovator in 2020. She is the recipient of the prestigious National Science Foundation career award in 2009 as well as the Office of Naval Research young investigator award in 2012.

Keynote Speaker - Amadeu Llebaria, PhD

Tuesday, April 25, 16:00-17:00 EDT
Room 307-310
Moderator: Pedro Irazoqui, Johns Hopkins University

Amadeu Llebaria, PhD
IQAC-CSIC, Spain

Photopharmacology: Using Light for A Precise Spatiotemporal Control of Drug Activity

The administration of a photocontrolled ligand in combination with illumination that is patterned in space and time can provide a novel degree of control and regulation of receptor activity. This method would allow precisely focusing the action of the ligand controlling the location and the temporal extension of its effects. When applied in vivo, the use of photoregulation can reduce side effects by targeting receptors located in target tissues, establishing personalized drug schedules to patient needs. We have recently developed light-regulated negative allosteric modulators for metabotropic glutamate receptors (mGluRs). These include Alloswitch-1[1] and related phenylazopyridines with NAM activity in mGlu5 and OptoGluNAM4.1, the first mGlu4 NAM active in vivo[2]. These photopharmacological tools are based in photoswitchable azobenzene scaffolds that serve for the real-time control of the receptors in cell assays. The molecules show a robust activity dependent of the illumination conditions allowing the real-time regulation of the intracellular effects of these GPCRs.[3] Moreover, when the molecules are applied in vivo and combined with external or internal light sources, we can register interesting light dependent behavioral effects in zebra fish embryos, tadpoles and rodents, including some pain models. We have shown that localized (in)activation with light of a specific area in the amygdala of live mice results in a control of chronic pain.[4] The key experiment for this uses a mGlu4 photoswitchable azobenzene ligand to control activity of endogenous receptors in vivo with light. With this molecule, we rapidly and reversibly inhibited chronic pain behavioral symptoms after illumination in the amygdala of rodent brain while measuring the painful response in the periphery. We have also developed molecules for the photocontrol of adrenergic receptors, [5] and a derivative to release locally morphine in vivo to control pain avoiding opioid side-effects. [6] Photopharmacology approaches are effective to study the dynamic response of localized receptors and show potential for spatiotemporal regulation of drugs.

References:

1. Pittolo et al (2014) Nat Chem Biol.10:813-5.
2. Rovira et al Cell Chem Biol. 23):929-34
3. Gómez-Santacana et al ACS Cent Sci (2016) Dec 19, DOI:10.1021/acscentsci.6b00353
4. Zussy C, et al. Mol Psychiatry. (2016) Dec 20. doi: 10.1038/mp.2016.223.
5. Duran-Corbella et al, Angew Chem Int Ed Engl. 2022 Jul 25;61(30):e202203449. doi: 10.1002/anie.202203449.
6. Lopez-Cano et al Br J Pharmacol. 2021 Aug 6. doi: 10.1111/bph.15645.

Biography

Amadeu Llebaria is Professor and head group at IQAC-CSIC in Barcelona (Spain). He graduated in chemical engineering at Institut Químic de Sarrià (IQS, Barcelona) and in chemistry at Universitat Autònoma de Barcelona (UAB). He obtained a PhD in chemical engineering (IQS, 1990) and a PhD in chemistry (University of Barcelona, 1992) working in organic synthesis methods mediated by transition metals. After a postdoctoral period in Germany as Humboldt fellow with Armin de Meijere (Goettingen) he obtained a scientist permanent position at CSIC (Spanish National High Research Council) where he has developed his scientific career. During this time he has been working in different fields related to the synthesis and optimization of bioactive molecules. He has lead several basic research and applied projects financed by public and private sources. Dr. Llebaria interests are related to the design and synthesis of molecules with biological activity. He is now working in different drug development projects in collaboration with biotech and pharmaceutical companies. The basic current research activities of Dr. Llebaria at CSIC within the Medicinal Chemistry Lab include research on photopharmacology, light control of protein activity by means of small-molecule photoswitches or photolabile caged compounds. The molecules developed have use as pharmacological tools in basic neuroscience and aim to define novel and more precise potential therapeutic treatments for difficult-to-treat disorders. Other research lines are related to selective protein labeling based on bioortogonal click-chemical reactions and light-operated molecular probes. He has a large experience in multidisciplinary collaborative research at the interface between chemistry and biology and in the development of molecules for biological and therapeutic applications.

Keynote Speaker - Jacob Robinson, PhD

Wednesday, April 26, 11:00-12:00 EDT
Room 307-310
Moderator: David Blodgett, Johns Hopkins University

Jacob Robinson, PhD
Rice University, USA

Toward Minimally Invasive Neurotech: Magnetic and Optical Technologies to Miniaturize Neural Interfaces

Miniature implanted devices capable of manipulating and recording biological signals promise to improve the way we study biology and the way we diagnose and treat disease; however, to create an effective bioelectronic network we must overcome a myriad of engineering challenges. In this talk, I will describe how we can leverage unique device physics and material properties to overcome some of these challenges. Specifically, I will show how magnetoelectric materials allow us to effectively transmit data and power to mm-sized devices deep inside the body. I will also describe how we can create compact wearable and implantable fluorescent imaging systems by combining photonic technology with computational imaging. Overall, these technologies provide a suite of miniature magnetic and optical neural interfaces that could support next-generation brain-computer interfaces and closed-loop electronic medicine.

Biography

Jacob Robinson is an Associate Professor in Electrical & Computer Engineering and Bioengineering at Rice University and an Adjunct Associate Professor in Neuroscience at Baylor College of Medicine. His research group uses nanofabrication technology to create miniature devices to manipulate and monitor neural circuit activity. He received a B.S. in Physics from UCLA in 2003 and a Ph.D. in Applied Physics from Cornell University in 2008. He then began a postdoctoral research position in the Department of Chemistry and Chemical Biology at Harvard University, where he created silicon nanowire devices to probe the electrical and chemical activity of living cells. In 2012, he joined the ECE and BioE departments at Rice. Dr. Robinson is a performer on several DARPA neurotech and bioelectronics programs and currently leads one of the N3 teams creating non-surgical neural interfaces. Dr. Robinson is the recipient of the DARPA Young Faculty Award, the Materials Today Rising Star Award, and is a Senior Member of IEEE. He previously served as the co-chair of the IEEE Brain Initiative and a core member of the IEEE Brain Neuroethics working group. He is also CEO and Co-Founder of Motif Neurotech.

Keynote Speaker - Timothy Denison, PhD

Wednesday, April 26, 16:00-17:00 EDT
Room 307-310
Moderator: Nitish Thakor, Johns Hopkins University

Timothy Denison, PhD
University of Oxford, United Kingdom

"Bioelectronic Zeitgebers?" Considering how biological rhythms should factor into the design and deployment of neural interfaces

Implantable bioelectronic systems that stimulate the nervous system are an effective adjunct therapy for Parkinson's disease, epilepsy, heart arrhythmia/failure, and chronic pain. Clinical studies are underway currently for inflammation, sleep apnea, and mixed urinary incontinence.

Most existing bioelectronic devices run a fixed stimulation method without consideration of time of day. However, many aspects of our physiology vary in a diurnal and/or circadian manner. In particular, symptoms for many disorders as well as treatment efficacy can vary with time of day, and sleep disturbances remain a common comorbidity of chronic disease. Conversely, nervous system stimulation therapies have the potential to affect physiological rhythms including our sleep/wake cycle. The chronic sensing capabilities of next-generation devices are providing a unique scientific window into the impact of rhythms on therapeutic efficacy, and likewise into therapy's influence on rhythm-related symptoms and physiology. I will describe the design of these investigational research systems and report pilot results from feasibility trials. In particular, I will provide examples how stimulation can be timed to symptoms, and how the stimulation pattern can help drive temporal physiology processes – i.e. the bioelectronic equivalent of a "zeitgeber" from a circadian perspective.

Early results suggest that to maximize potential clinical benefits, neural engineers should more carefully consider how to integrate chronobiology into future therapy designs, research protocols, and ultimately clinical deployment. I will then summarize the emerging opportunity to recognize, and potentially promote, healthier biological rhythms, in order to optimize treatment options for chronic conditions.

Biography

Professor Denison holds a joint appointment in Engineering Science and Clinical Neurosciences at Oxford, where he explores the fundamentals of physiologic closed-loop systems in collaboration with the MRC Brain Network Dynamics Unit. Tim also serves as an advisor to several governments and industry boards on the field of translational medical devices; in particular, he helps define strategies for mapping scientific discovery to product development roadmaps within the regulatory and economic constraints of medical systems. Prior to Oxford, Tim was a Technical Fellow at Medtronic PLC and Vice President of Research & Core Technology for the Restorative Therapies Group, where he helped oversee the design of next-generation neural interface and algorithm technologies for the treatment of chronic neurological disease. In 2015, he was elected to the College of Fellows for the American Institute of Medical and Biological Engineering (AIMBE). He has an MS and PhD from MIT in electrical engineering, an AB in Physics, and MBA from the University of Chicago.

Workshop - Enabling Neurotechnology Translation

Room 302

Two NIH-funded national hubs, NTH (jointly between Johns Hopkins University and Howard University) and CINTA (Massachusetts General Hospital), hold spring and fall funding opportunities up to $500k per year seeking innovators to address unmet needs for clinical conditions impacted by the nervous system. This workshop will address the common challenges innovators face on their path towards creating a market ready product. We will describe how funding and mentorship from the hubs aims to accelerate neurotechnology translation and to open pathways for new and traditionally under-represented innovators. Attendees will have opportunities to hear from speakers with experience in commercialization, inclusive innovation, and FDA regulatory guidance.

Workshop objectives

There are unique learning objectives and benefits for the attendees

1. Participants will learn about the journey to translate scientific findings and to bring forward solutions that impact human health for all.
2. Participants will understand the innovation support available from the Blueprint Medtech Incubator hubs to accelerate the development of early-stage neurotech solutions for first-in-human testing.
3. Participants will be presented several case studies that illustrate the challenges faced when translating novel ideas to the bedside.

Workshop agenda:

Challenges identifying revolutionary ideas and the most promising solutions: Innovators will be assessing cutting edge technologies and selecting those with the highest potential for impact on neurological health. The challenge is complex, because potential for impact depends on key areas of risks: (i) risks to commercial viability, (ii) risks to technical development, and (iii) team risks. Within each of these, many further risks reside. For example, commercial viability depends on a wide range of factors, such as value proposition, regulatory pathway, barriers to entry, and competitive landscape, including medical workarounds. NTH and CINTA can work with innovators to ensure the proposed solution thoroughly evaluated and provide the support and resources to create a feasible plan to achieve milestones and deliverables.

Agenda - April 24, 2023

- 9am-9:15am - Workshop Introduction, Neurotechnology hubs (NTH and CINTA) and roadmap to sponsoring and achieving translation (Nitish Thakor, PhD Program Committee NER 2023)

- 9:15am-9:45am - Planning your Translation Pathway - University to Start-up (Youseph Yazdi, PhD - Executive Director, Center for Bioengineering Innovation and Design at JHU

(15 min break)

- 10:00am-10:30am - Equitech & Inclusive Innovation (Jamie McDonald, CEO UpSurge)

- 10:45am-11:45am Blueprint Medtech Incubator Hub process & resources (Santosh Venkatesha, Operations Director NTH, Penny Carleton, Director Clinical Innovation CINTA, & NIH Program Officers)

- 12pm-1pm - Lunch – on your own

- 1pm-2pm - NeuroTech Innovation Stakeholder Speaker: David McMullen, MD Office Director, Office of Neurological and Physical Medicine Devices, CDRH, FDA

- 2pm-3:30pm - Showcase of cutting edge emerging neurotech solutions
    - 2:00-2:15 - Team 1: Development of wearable ultrasound/photoacoustic device for real-time, non-invasive intrapartum fetal and labor assessment
    - 2:15-2:30 - Team 2: Device for safe and effective treatment of major depression
    - 2:30-2:45 - Team 3: Full-brain image-guided phased-array TMS system with built-in MRI, targeting autism spectrum disorder (ASD) as the first indication
    - 2:45-3:00 - Team 4: Subgaleal Hyper-chronic EEG Monitoring Platform
    - 3:00-3:15 - Team 5: EEG Signal and Intrinsic Imaging for Blood Flow and Oxygenation: An Optrode for Use in Epilepsy Neurosurgery
    - 3:15-3:30 - Team 6: Photoacoustic Retinal Prosthesis
    - 3:30-3:45 - Team7: Development and Testing of BlueStem Dual Nerve Stimulation Device for Acute Ischemic Stroke
- 3:45 pm-4:30pm - Panel (David McMullen, NTH & CINTA Leadership, NIH Program Officers)

Chairs:

Nitish Thakor
Professor, Biomedical Engineering
Whiting School of Engineering
Johns Hopkins University
701 Traylor Building
nthakor@bme.jhu.edu

Sridevi V. Sarma
Vice Dean for Graduate Education
Associate Professor of Biomedical Engineering, Institute for Computational Medicine
PI of Neuromedical Control Systems Group (https://sarmalab.icm.jhu.edu)
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Workshop - BCI: State of the Art and Art of the Possible

Room 303

This workshop will engage members from all areas of the neurotechnology community – from students to PIs, from regulators to CEOs, and investors and other funders, in a review of the current trends and breakthroughs in BCI technology. Presenters include Blackrock Neurotech, Motif Neurotech, Paradromics, Precision Neuroscience, and Synchron. Senior executive representatives from each company will provide their respective visions for a patient-centric future of brain-computer interfaces and how to achieve that vision from a technical perspective.

Agenda

9:00-10:15am – State of the Art: brief technology overviews from each of the participating companies
10:15-10:30am – Coffee Break
10:30am-12:00pm – The Art of the Possible: a panel discussion of the executives to address the following:

1. Endpoints for BCI clinical trials
2. What are unique considerations for technology translation and scalability for BCI? How to engage early with payers to ensure successful commercial translation of BCI?
3. How can the collective onstage here, work together to advance translation in terms of collective bargaining for regulatory and reimbursement strategy, ethics, and other challenges that the field will face?
4. How do we grow the talent pool for the BCI industry?
5. What topics in mainstream media coverage of BCIs should we be legitimately concerned about?

Objectives

The objective of this workshop is to inform and engage with participants/contributors in the field of BCI development and commercialization. The organizers will identify a scribe to capture the proceedings and develop a white paper for dissemination and endorsement by the presenters as well as the attendees. We will seek a publication partner for wide distribution.

Outcomes

Presenters and participants will get updates on the state of the art of commercial BCIs as well as understand and provide feedback on important challenges facing the field today and in the near future.

Speakers

- Blackrock Neurotech: Marcus Gerhardt, Co-Founder and CEO and Rob Franklin, Director of Brain Computer Interfaces
- Motif Neurotech: Jacob Robinson, Co-Founder and CEO
- Precision Neuroscience: Michael Mager, Co-Founder and CEO and Craig Mermel, President and Chief Product Officer
- Paradromics: Matt Angle, CEO
- Synchron: Riki Banerjee, Vice President, Research and Development
- FDA: Julia Slocomb, Lead Reviewer
- Satori Neuro: Amy Kruse, General Partner and Chief Investment Officer

Workshop - Machine-Brain Interfaces: Improving the Human and Machine Interactions

Room 303

Different Brain-Machine Interfaces (BMI) have been developed in the past few years to restore function or improve the quality of life for people with limb difference and neural disorders. However, there is still a long way ahead to improve the interaction between the machine and the human. For instance, sensory feedback is a fundamental part of humans' interaction with the environment and such feedback is currently missing in the commercial interfaces. To this end, researchers have been investigating different technologies to improve human and machine interactions through machine-to brain interfaces (MBIs), paving the way to a new generation of interfaces with closed-loop capabilities.

The goal of this workshop is to discuss latest advances and challenges on the pathway to closed-loop brain-machine interfaces. Speakers will present research work and state-of-the-art, addressing the challenges of (i) real-time interfacing with the central and peripheral nervous system (ii) invasive and non-invasive somatosensory interfaces, (iii) closed-loop control of stimulation, and (iv) theoretical models and tools supporting translation efforts.

Agenda

- 1:00-1:05pm - Opening Remarks: Nitish Thakor (JHU)
- 1:05-1:30pm - Paul Sajda (Columbia): Closed-loop EEG-TMS for Personalized Treatment of Major Depressive Disorder.
- 1:30-1:55pm - Ning Lan (Shanghai Jiao Tong University): Developing a non-invasive somatosensory interface for prosthetic hand.
- 1:55-2:20pm - Madeleine Lowery (University College Dublin): Closed loop control of deep brain stimulation for Parkinson's disease.
- 2:20-2:45pm - Solaiman Shokur (EPFL): Partial sensory recovery in chronic complete SCI people trained with a non-invasive bidirectional BMI.
- 2:45-3:10pm - Lee Fisher (UPitt): Restoring sensation in the upper- and lower-limb using spinal cord stimulation.
- 3:10-3:35pm - Rahul Kaliki (iBT): TBD

  Rising stars Theme:
- 3:35-3:55pm - Ashley Dalrymple (CMU/Utah): Stentrode BCI trial and sensory restoration with invasive and non-invasive spinal cord stimulation.
- 3:55-4:25pm - Luke Osborn and Breanne Christie (APL): Enhanced Neural Interfacing and Sensory Stimulation
- 4:25-4:30pm - Synopsis (Nitish Thakor)
- 4:30-5:00pm - Q&A Session

Organizers

Dr. Mohsen Rakhshan (Johns Hopkins University)
Keqin "Catherine" Ding (Johns Hopkins University)
Dr. Andrei Dragomir (National University of Singapore)
Dr. Nitish V. Thakor (Johns Hopkins University)

Workshop - New Vistas on Brain Implants by Multi-Omics

Room 301

For many years now, implanted electrode arrays of different make and material are designed and used to record from and stimulate into the brain. Despite terrific progress, most of these implants do not find their way into truly longterm use, not to mentioned into standard clinical procedures. In order to investigate brain's complex response towards these foreign bodies neuroengineers have too long limited themselves to microscopy of brain tissue representing the implant's impact by a mere handful of markers.

Thankfully, during the last decades biology has experienced an' omics' revolution revealing e.g. new vistas on reactive states in brain tissue and advancing our understanding of the underlying reactive networks. These exciting new approaches are now ready to be roped in for progressing our detailed understanding of brain's detrimental response to implants. Measuring levels of expressed RNA (*transcript-omics*) or proteins (*prote-omics*) with cellular resolution in relation to implant site has been shown to provide insights vastly exceeding neurotech's usual trinity of markers. The high-throughput, "hypothesis-free" nature of these characterizations makes way better use of employed animals (3R) and has produced extremely rich data sets revealing thousands of more markers responding to implants. All these -omics pieces tell stories of vast cascades and are opening up new avenues of interventions to finally bring brain implants to clinical fruition.

This workshop aims to share -omics first hand experiences, dos and dont's and lessons learned with interested audience to transform the single-colored implant characterization to high resolution multi-colored dimensions.

This workshop will be held in the afternoon of April 24.

Speakers

Ulrich Hofmann, University of Freiburg:
: From three to thirty thousand: Getting the most out of precious animal models.

Erin Purcell, Michigan State University:
: Seeing the forest for the trees: Network analysis of differentially expressed genes surrounding device

Jeff Capadona, Case Western Reserve University:
: From the same old story to too much information: establishing multi-omic techniques to assess the microelectrode tissue interface

TK Kozai, University of Pittsburgh:
: New dimensions for bio-integrating neural interfaces beyond the foreign body response

Kevin Joseph, University Medical Center Freiburg:
: Neural implants cause long term changes in transcriptional steady state

Abhishek Prasad, University of Miami

IEEE Brain Panel

Room 307-310

Guiding Responsible Neurotechnology Innovation: Opportunities and Challenges of Different Governance Mechanisms

Moderator and Contributors

Moderator:

- Laura Y. Cabrera – Chair, IEEE BRAIN Neuroethics Subcommittee

Contributors:

- Debra Mathews – John Hopkins, Berman Institute of Bioethics, Incoming INS president
- Anna Wexler – University of Pennsylvania, INS Outreach Committee member
- Jacob Robinson- Rice University, former IEEE BRAIN Neuroethics Subcommittee member
- Ricardo Chavarriaga-Chair, IEEE SA, Industry Connections group on Neurotechnologies for BMI

Rationale

Over the last decade, multiple efforts, both public and private, are underway to develop new tools to deepen our understanding of the brain and to create novel technologies that can record, decode, and sense brain signals as well as stimulate, modify, and augment brain function with improved efficacy and safety.

There have been a variety of undertakings focused on promoting the ethical development and use of neurotechnologies. However, implementation and uptake are still important barriers to fulfil the goals of such efforts. As part of IEEE's mission to support the neuroengineering community and foster the responsible development and use of neurotechnology, the IEEE SA has started work on a series of socio-technical standards focused on neurotechnology, beginning with the P7700 Recommended Practice for the Responsible Design and Development of Neurotechnologies.

Description

This 60-min panel session, a joint effort between IEEE BRAIN Neuroethics Subcommittee and the International Neuroethics Society, will discuss the opportunities and challenges of different neurotechnology governance mechanisms, including the role of soft-law mechanisms, legislative and regulatory action and policies, as well as the creation of socio-technical standards. In particular, the role that different mechanisms play in translation and implementation of neuroethical recommendations at different levels of implementation (local, national, international).

It will touch on lessons to be learnt or even partnerships to be sought from work on other emerging technologies governance efforts, such as Artificial Intelligence. The session aims to foster an interdisciplinary conversation with the audience on key areas or domains where different governance mechanisms can be most valuable for developers and regulators, as well as gaps in current efforts.

11:00 - 12:00
Podium Talk Session 1 - Transducers – actuating
Moderator: Jitendran Muthuswamy (Arizona State University)

Synaptrode: neural interface at the synapse level
Jasper Koen Timmerman (University of Leuven & NERF, Belgium)
Joris De Wit (VIB, Belgium)
Sebastian Haesler (VIB, Belgium)

Efficient Modeling and Calibration of Multi-Electrode Stimuli for Epiretinal Implants
Praful K Vasireddy (Stanford University, USA)
Alex R. Gogliettino (Stanford University, USA)
Jeff B Brown (Stanford University, USA)
Ramandeep Vilkhu (Stanford University, USA)
Sasidhar Madugula (Stanford University, USA)
Andrew J Phillips (Stanford University, USA)
Subhasish Mitra (Stanford University, USA)
Pawel Hottowy (AGH University of Science and Technology, Poland)
Alexander Sher (University of California, Santa Cruz, USA)
Alan Litke (University of California, Santa Cruz, USA)
Nishal P Shah (Stanford University, USA)
Eduardo J. Chichilnisky (Stanford University, USA)

Reconstruction of nerve functional topography using recruitment curves enables selective electrical stimulation
Simone Romeni (EPFL, Switzerland)
Bianca Ziliotto (Scuola Superiore SantAnna, Italy)
Nino Herve (EPFL, Switzerland)
Alice Giannotti (Scuola Superiore SantAnna, Italy)
Silvestro Micera (Scuola Superiore SantAnna, Italy & EPFL, Switzerland)

Regulation of arousal and performance of a healthy non-human primate using closed-loop central thalamic deep brain stimulation
Jonathan L Baker (Weill Cornell Medicine, USA)
Robert Toth (University of Oxford, United Kingdom)
Alceste Deli (University of Oxford, United Kingdom)
Mayela Zamora (IBME - University of Oxford, United Kingdom)
John E Fleming (University of Oxford, United Kingdom)
Moaad Benjaber (University of Oxford, United Kingdom)
Dana Goerzen (Weill Cornell Medicine, USA)
Jae-Wook Ryou (Weill Cornell Medicine, USA)
Keith P Purpura (Weill Cornell Medicine, USA)
Nicholas D Schiff (Weill Cornell Medicine, USA)
Timothy Denison (University of Oxford, United Kingdom)

14:00 - 15:30
Podium Talk Session 2 - Novel sensing, image analysis, and data extraction
Moderator: Karin Wårdell (Linköpings University)

High-Quality 0.5mm Isotropic fMRI: Random Matrix Theory Meets Physics-Driven Deep Learning
Omer Burak Demirel (University of Minnesota & Center for Magnetic Resonance Research, USA)
Steen Moeller (University of Minnesota, USA)
Luca Vizioli (University of Minnesota, USA)
Burhaneddin Yaman (University of Minnesota, USA)
Logan Dowdle (University of Minnesota, USA)
Essa Yacoub (University of Minnesota, USA)
Kamil Ugurbil (University of Minnesota, USA)
Mehmet Akcakaya (University of Minnesota, USA)

Imaging circuit activity in the rat brain with fast neural EIT and depth arrays
Adam Fitchett (University College London, United Kingdom)
Jason Fabbri (Columbia University, United Kingdom)
Yaoxing Hu (Columbia University, United Kingdom)
Justin Cange (Columbia University, United Kingdom)
Karolina Kozeniauskaite (University College London, United Kingdom)
Jason Fabbri (Columbia University, United Kingdom)
David Holder (University College London, United Kingdom)
Kirill Aristovich (University College London, United Kingdom)

Medial Tractography Analysis (MeTA) for White Matter Population Analyses Across Datasets
Iyad Ba Gari (University of Southern California, USA)
Abhinaav Ramesh (University of Southern California, USA)
Shayan Javid (University of Southern California, USA)
Shruti P. Gadewar (University of Southern California, USA)
Elnaz Nourollahimoghadam (University of Southern California, USA)
Sophia I. Thomopoulos (University of Southern California, USA)
Paul M. Thompson (University of Southern California, USA)
Talia M. Nir (University of Southern California, USA)
Neda Jahanshad (University of Southern California, USA)

Investigation of functional integration of cortical organoids transplanted in vivo towards future neural prosthetics applications
Madison Wilson (University of California San Diego, USA)
Martin Thunemann (Boston University, USA)
Francesca Puppo (University of California San Diego, USA)
Emily Martin (Boston University, USA)
Rebeca Blanch (University of California San Diego, USA)
Fred Gage (The Salk Institute for Biological Sciences, USA)
Alysson Muotri (University of California San Diego, USA)
Anna Devor (Boston University, USA)
Duygu Kuzum (University of California, San Diego, USA)

Epileptogenic zone classification with functional connectivity and graph measures
Bruna M Carlos (University of Campinas, Brazil)
Brunno M Campos (University of Campinas, Brazil)
Marina K M Alvim (University of Campinas, Brazil)
Manuel G Patiño (University of Campinas, Brazil)
Fernando Cendes (University of Campinas, Brazil)
Gabriela Castellano (University of Campinas – UNICAMP & Institute of Physics Gleb Wataghin, Brazil)

Observing brain most visited common band connectivity states from different fMRI resting state studies
Janerra Allen (University of Maryland Baltimore, USA)
Sravani Varanasi (University of Maryland Baltimore, USA)
Rong Chen (University of Maryland Baltimore, USA)
Elliot Hong (University of Maryland Baltimore, USA)
Fow-Sen Choa (University of Maryland Baltimore, USA)

9:00 - 10:00
Podium Talk Session 3 - Transducers - sensing
Moderator: Martin Han (University of Connecticut)

In vivo application of electrical rejuvenation pulses to chronically implanted neural macroelectrodes in nonhuman primates for regulation of interface properties
Kyle P O'Sullivan (University of Utah & Scientific Computing and Imaging Institute, USA)
Jonathan L Baker (Weill Cornell Medicine, USA)
Brian Philip (University of Utah, USA)
Mark E Orazem (University of Florida, USA)
Kevin Otto (University of Florida, USA)
Christopher R Butson (University of Florida, USA)

Waveform Development for Neurotransmitter Detection on Novel Boron-Doped Diamond Microelectrodes
Bhavna Gupta (Michigan State University, USA)
Mason L Perillo (Michigan State University, USA)
Isabelle E. Christensen (Michigan State University, USA)
James R. Siegenthaler (Fraunhofer Center Midwest, USA)
Robert Rechenberg (Fraunhofer Center Midwest, USA)
Michael F Becker (Fraunhofer Center Midwest, USA)
Wen Li (Michigan State University, USA)
Erin Purcell (Michigan State University, USA)

Sensory and Motor Intent Signals Recorded by Regenerative Multielectrode Arrays
Kareem Hussein (University of Houston, USA)
Mario I. Mario Romero-Ortega (University of Houston, USA)

Safe retrieval of a stent-based endovascular neural recording array
Venkata S Aditya Tarigoppula (Synchron Australia & The University of Melbourne, Australia)
Gil S Rind (Synchron Australia & The University of Melbourne, Australia)
Stephen M Ronayne (Synchron Australia & The University of Melbourne, Australia)
Andrew Stent (Gribbles Veterinary Pathology, Australia)
Calvin D Eiber (Synchron Australia & The University of Melbourne, Australia)
Thomas J Oxley (Synchron Australia & The University of Melbourne, Australia)
Nicholas L Opie (Synchron Australia & The University of Melbourne, Australia)

14:00 - 15:30
Podium Talk Session 4 - Closed-loop Prostheses
Moderator: Steven Walston (University of Southern California)

Performance of basic vision tasks by people with Argus® II retinal prostheses
Breanne Christie (Johns Hopkins University Applied Physics Laboratory, USA)
Roksana Sadeghi (Johns Hopkins School of Medicine, USA)
Arathy Kartha (Johns Hopkins School of Medicine, USA)
Chigozie Ewulum (Johns Hopkins University Applied Physics Laboratory, USA)
Avi Caspi (Jerusalem College of Technology, Israel)
Francesco V. Tenore (Johns Hopkins University Applied Physics Laboratory, USA)
Roberta Klatzky (CMU, USA)
Gislin Dagnelie (Johns Hopkins University, USA)
Seth Billings (Johns Hopkins University Applied Physics Laboratory, USA)

Smart Dura: A monolithic optoelectrical surface array for neural interfacing with primate cortex
Sergio I Montalvo Vargo (Carnegie Mellon University, USA)
Tiphaine Belloir (University of Washington, USA)
Ibrahim Kimukin (Carnegie Mellon University, USA)
Zabir Ahmed (Carnegie Mellon University, USA)
Devon J Griggs (University of Washington, USA)
Noah Stanis (University of Washington, USA)
Azadeh Yazdan (University of Washington, USA)
Maysam Chamanzar (Carnegie Mellon University, USA)

Identification of neural biomarkers of major depressive disorder symptom severity using computerized linguistic analysis
Daniela A Astudillo Maya (University of California, San Francisco, USA)
Kristin K Sellers (University of California, San Francisco, USA)
Noah Stapper (University of California, San Francisco, USA)
Ankit N Khambhati (University of California, San Francisco, USA)
Catherine Henderson (University of California, San Francisco, USA)
Joline Fan (University of California, San Francisco, USA)
Vikram R Rao (University of California, San Francisco, USA)
Katherine W Scangos (University of California, San Francisco, USA)
Edward F Chang (University of California, San Francisco, USA)
Andrew D Krystal (University of California, San Francisco, USA)

A stand-alone Augmented Reality intervention for chronic pain using embodied systolic stimulation
Oliver A Kannape (University Hospital Geneva & MindMaze SA, Switzerland)
Jonathan Pierret (IRR Nancy, France)
Robert Leeb (MindMaze SA, Switzerland)
Sylvain Cardin (École Polytechnique de Lausanne, Switzerland)
Fabien Bourban (MindMaze SA, Switzerland)
Skander Mensi (MindMaze SA, Switzerland)
Yann Lebrun (MindMaze SA, Switzerland)
Nicolas Merlini (MindMaze SA, Switzerland)
Alexis Dorier (MindMaze SA, Switzerland)
Vincent Moriot (IRR Nancy, France)
Amélie Touillet (IRR Nancy, France)
Andrea Serino (University Hospital Lausanne, Switzerland)

Pilot Performance a Chronic Intraneural Auditory Neuroprosthesis in Felines
William M Thomas (University of Utah, USA)
Richard K Gurgel (University of Utah, USA)
David Warren (University of Utah, USA)

Cortical response to expectation of tactile stimulation from external anthropomorphic and non-anthropomorphic systems
Luke Osborn (Johns Hopkins University Applied Physics Laboratory, USA)
Breanne Christie (Johns Hopkins University Applied Physics Laboratory, USA)
Adam Crego (Johns Hopkins University Applied Physics Laboratory, USA)
Dayann Dalmeida (Johns Hopkins University Applied Physics Laboratory, USA)
David McMullen (National Institute of Mental Health, USA)
Robert W Nickl (Johns Hopkins School of Medicine, USA)
Ambarish Pawar (Johns Hopkins School of Medicine, USA)
Jeremy D Brown (Johns Hopkins University, USA)
Brock Wester (Johns Hopkins University Applied Physics Laboratory, USA)
Chaz Firestone (Johns Hopkins University, USA)
Pablo A Celnik (Johns Hopkins School of Medicine, USA)
Matthew S Fifer (Johns Hopkins University Applied Physics Laboratory, USA)
Francesco V. Tenore (Johns Hopkins University Applied Physics Laboratory, USA)

9:00 - 10:00
Podium Talk Session 5 - BCI/BMI
Moderator: Elisa Donati (Institute of Neuroinformatics UZH/ETHZ)

Networks of Injectable Microdevices Powered and Digitally Linked by Volume Conduction for Neuroprosthetics: a Proof-of-Concept
Laura Becerra-Fajardo (Universitat Pompeu Fabra, Spain)
Jesus Minguillon (Postdoctoral Fellow, Spain)
Albert Comerma (Postdoctoral Fellow, Spain)
Antoni Ivorra (Principal Investigator, Spain)

Edge AI-Based Closed-Loop Peripheral Nerve Stimulation System for Gait Rehabilitation after Spinal Cord Injury
Ahnsei Shon (Texas A&M University, USA)
Alex Stefanov (Texas A&M University, USA)
Michelle Hook (Texas A&M University, USA)
Hangue Park (Sunkyunkwan University & Texas A&M University (Adjunct), Korea (South))

Motor Neuroprosthesis on Forelimb Function Recovery of Chronic Stroke Rats
Huan Gao (Zhejiang University, China)
Xiang Gao (Zhejiang University, China)
Kedi Xu (Zhejiang University, China)
Chang Wang (Zhejiang University, China)

Hand gesture decoding using ultra-high-density EEG
Leonhard Schreiner (Gtec Medical Engineering GmbH & Johannes Kepler University Linz, Austria)
Sebastian Sieghartsleitner (Gtec Medical Engineering GmbH, Austria)
Katrin Mayr (Guger Technologies OG, Austria)
Harald Pretl (Johannes Kepler Universität, Austria)
Christoph Guger (Guger Technologies OEG, Austria)

14:00 - 15:00
Podium Talk Session 6 - Beyond the neural interface
Moderator: Ricardo Chavarriaga (Zurich University of Applied Sciences - Centre for AI)

Human-Centered Design of a Vibrotactile Sensory Substitution Belt for Feet Somatosensation in a Patient with Multiple Sclerosis
Nicolas Berberich (Technical University of Munich & Institute for Cognitive Systems, Germany)
Laura Pilger (Technical University of Munich, Germany)
Natalia Paredes-Acuna (Technical University of Munich & Institute for Cognitive Systems, Germany)
Julio Rogelio Guadarrama Olvera (Technical University of Munich, Germany)
Florian Bergner (Intouch-Robotics GmbH, Germany)
Adrian Dendorfer (Technical University of Munich, Germany)
Daniel Utpadel-Fischler (Technical University of Munich, Germany)
Gordon Cheng (Technical University of Munich, Germany)

Frontal gamma as a marker of effective training during neurofeedback to improve memory in patients with mild cognitive impairment
Yayu Lin (University of California San Diego, USA)
I-Wei Shu (University of California San Diego, USA)
Fiza Singh (University of California San Diego, USA)

Downstream Effects of Photoreceptor Degeneration and Electrical Retinal Stimulation on Visual Cortex Macrostructure and Function
Beomseo Koo (University of Michigan, USA)
James Weiland (University of Michigan, USA)

Impact of microcoil shape and the efficacy of soft magnetic material cores in focal micromagnetic neurostimulation
Renata Saha (University of Minnesota, USA)
Kai Wu (University of Minnesota, USA)
Jiang-Ping Wang (University of Minnesota, USA)

AI for image reconstruction, synthesis, and biomarker extraction

Screening of Mild Cognitive Impairment in Patients with Parkinson's Disease Using a Variational Mode Decomposition Based Deep-Learning
Madan Parajuli (University of South Alabama, USA)
Amy W. Amara (University of Colorado, USA)
Mohamed Shaban (University of South Alabama, USA)

Classification of noxious and non-noxious event-related potentials from S1 in pigs using a convolutional neural network
Nickolaj A. Atchuthan (Aalborg University, Denmark)
Hjalte F. Clark (Aalborg University, Denmark)
Mikkel B Danyar (Aalborg University, Denmark)
Amalie K. Andersen (Aalborg University, Denmark)
Felipe Rettore Andreis (Aalborg University, Denmark)
Suzan Meijs (Aalborg University, Denmark)

Wearable-based Pain Assessment in Patients with Adhesive Capsulitis Using Machine Learning
Chih-Hsing Chen (Academia Sinica, Taiwan)
Kai-Chun Liu (Academia Sinica, Taiwan)
Ting-Yang Lu (National Yang Ming Chiao Tung University, Taiwan)
Chih-Ya Chang (Tri-Service General Hospital, Taiwan)
Chia-Tai Chan (National Yang Ming Chiao Tung University, Taiwan)
Yu Tsao (Academia Sinica, Taiwan)

Exploratory fNIRS Assessment of Cortical Activation during a Novel Virtual Reality Object Orientation Memory Task
James Mcintyre (University of Rhode Island, USA)
John McLinden (University of Rhode Island, USA)
Seyyed Bahram Borgheai (Emory University, USA)
Yalda Shahriari (University of Rhode Island, USA)

High-Quality 0.5mm Isotropic fMRI: Random Matrix Theory Meets Physics-Driven Deep Learning
Omer Burak Demirel (University of Minnesota, USA)
Steen Moeller (University of Minnesota, USA)
Luca Vizioli (University of Minnesota, USA)
Burhaneddin Yaman (University of Minnesota, USA)
Logan Dowdle (University of Minnesota, USA)
Essa Yacoub (University of Minnesota, USA)
Kamil Ugurbil (University of Minnesota, USA)
Mehmet Akcakaya (University of Minnesota, USA)

Explainable AI for EEG Biomarkers Identification in Obstructive Sleep Apnea Severity Scoring Task
Luca La Fisca (University of Mons, Belgium)
Céline Jennebauffe (University of Mons, Belgium)
Marie Bruyneel (CHU Saint-Pierre, Belgium)
Laurence Ris (University of Mons, Belgium)
Laurent Lefebvre (University of Mons, Belgium)
Xavier Siebert (University of Mons, Belgium)
Bernard Gosselin (University of Mons, Belgium)

Refine EEG Spectrogram Synthesized by Generative Adversarial Network For Improving the Prediction of Epileptic Seizures
Tian Yu (University of Toronto, Canada)
Boyuan Cui (University of Toronto, Canada)
Yaqian Xu (University of Toronto, Canada)
Xilin Liu (University of Toronto, Canada)

Wireless Sensors with Edge Deep Learning for Detecting and Alerting the Freezing of Gait Symptoms in Parkinson's Patients
Ourong Lin (University of Toronto, Canada)
Tian Yu (University of Toronto, Canada)
Yuhan Hou (University of Toronto, Canada)
Yi Zhu (University of Toronto, Canada)
Xilin Liu (University of Toronto, Canada)

A CNN-Transformer Deep Learning Model for Real-time Sleep Stage Classification in an Energy-Constrained Wireless Device
Zongyan Yao (University of Toronto, Canada)
Xilin Liu (University of Toronto, Canada)

Identifying Mild Traumatic Brain Injury via Vision Transformer and Bag of Visual Features
Fatemeh Koochaki (Rutgers University, USA)
Laleh Najafizadeh (Rutgers University, USA)

AI-Based Image Segmentation for Personalized Spinal Cord Stimulation Modeling and Segmentation Impact on Stimulation Predictions
Alessandro Fasse (IT'IS Foundation, Switzerland)
Taylor Newton (IT'IS Foundation, Switzerland)
Lucy Liang (University of Pittsburgh, USA)
Niels Kuster (IT'IS Foundation, Switzerland)
Robert Gaunt (University of Pittsburgh, USA)
Elvira Pirondini (University of Pittsburgh, USA)
Esra Neufeld (IT'IS Foundation, Switzerland)

Deep Learning Method for Patient-specific EEG Waveform Extraction and Seizure Forecasting
Trevor Meyer (Johns Hopkins University, USA)
Pedro Irazoqui (Johns Hopkins University, USA)

Clinical trial to HDE

Scanning electron microscope analysis of 980 intracortical microelectrodes after cortical recording and stimulation in three human subjects
David A. Bjånes (California Institute of Technology, USA)
Loren Rieth (West Virginia University, USA)
Spencer Kellis (Blackrock Neurotech, USA)
Brian Baker (University of Utah, USA)
Tyson Aflalo (California Institute of Technology, USA)
Luke Bashford (California Institute of Technology, USA)
Srinivas Chivukula (California Institute of Technology, USA)
Matthew S Fifer (Johns Hopkins University Applied Physics Laboratory, USA)
Luke Osborn (Johns Hopkins University Applied Physics Laboratory, USA)
Breanne Christie (Johns Hopkins University Applied Physics Laboratory, USA)
Brock Wester (Johns Hopkins University Applied Physics Laboratory, USA)
Pablo A Celnik (Johns Hopkins School of Medicine, USA)
Nathan Crone (Johns Hopkins University, USA)
William Anderson (Johns Hopkins School of Medicine, USA)
Kelsi Pejsa (California Institute of Technology, USA)
Nader Pouratian (California Institute of Technology, USA)
Brian Lee (University of Southern California, USA)
Charles Y. Lu (University of Southern California, USA)
Francesco V. Tenore (Johns Hopkins University Applied Physics Laboratory, USA)
Richard Andersen (California Institute of Technology, USA)

External inputs to the NS

Modulation of Intracortical S1 Responses Following Peripheral Nerve High-Frequency Electrical Stimulation in Danish Landrace Pigs
Taha Al Muhammadee Janjua (Aalborg University & Lundbeck Pharmaceutical, Denmark)
Thomas Gomes Nørgaard dos Santos Nielsen (Aalborg University, Denmark)
Felipe Rettore Andreis (Aalborg University, Denmark)
Suzan Meijs (Aalborg University, Denmark)
Winnie Jensen (Aalborg University, Denmark)

Downstream Effects of Photoreceptor Degeneration and Electrical Retinal Stimulation on Visual Cortex Macrostructure and Function
Beomseo Koo (University of Michigan, USA)
James Weiland (University of Michigan, USA)

First Demonstration of Nociceptive and Non-Nociceptive Responses from Spinal Neurons in a Porcine Model
Suzan Meijs (Aalborg University, Denmark)
Carsten R Bjarkam (Aalborg University Hospital, Denmark)
Winnie Jensen (Aalborg University, Denmark)
Felipe Rettore Andreis (Aalborg University, Denmark)

First Demonstration of Nociceptive and Non-Nociceptive Responses from Spinal Neurons in a Porcine Model
Suzan Meijs (Aalborg University, Denmark)
Carsten R Bjarkam (Aalborg University Hospital, Denmark)
Winnie Jensen (Aalborg University, Denmark)
Felipe Rettore Andreis (Aalborg University, Denmark)

Automated Electrical Waveform Design for Cell-Type Selective Stimulation
Chaitanya Goswami (Carnegie Mellon University, USA)
Pulkit Grover (Carnegie Mellon University, USA)

The Effects of Anodal Oscillatory Transcranial Direct Current Stimulation on Top-Down Cortico-Muscular Control: A Pilot Study
Kai Yuan (The Chinese University of Hong Kong, Hong Kong)
Chun-hang Eden Ti (The Chinese University of Hong Kong, Hong Kong)
Chengpeng Hu (The Chinese University of Hong Kong, Hong Kong)
Raymond Kai-Yu Tong (The Chinese University of Hong Kong, Hong Kong)

Cortical response to expectation of tactile stimulation from external anthropomorphic and non-anthropomorphic systems
Luke Osborn (Johns Hopkins University Applied Physics Laboratory, USA)
Breanne Christie (Johns Hopkins University Applied Physics Laboratory, USA)
Adam Crego (Johns Hopkins University Applied Physics Laboratory, USA)
Dayann Dalmeida (Johns Hopkins University Applied Physics Laboratory, USA)
David McMullen (National Institute of Mental Health, USA)
Robert W Nickl (Johns Hopkins School of Medicine, USA)
Ambarish Pawar (Johns Hopkins School of Medicine, USA)
Jeremy D Brown (United States & Johns Hopkins University, USA)
Brock Wester (Johns Hopkins University Applied Physics Laboratory, USA)
Chaz Firestone (Johns Hopkins University, USA)
Pablo A Celnik (Johns Hopkins School of Medicine, USA)
Matthew S Fifer (Johns Hopkins University Applied Physics Laboratory, USA)
Francesco V. Tenore (Johns Hopkins University Applied Physics Laboratory, USA)

Impact of microcoil shape and the efficacy of soft magnetic material cores in focal micromagnetic neurostimulation
Renata Saha (University of Minnesota, USA)
Kai Wu (University of Minnesota, USA)
Jiang-Ping Wang (University of Minnesota, USA)

Intraretinal stimulation with high density carbon fiber microelectrodes
Dorsa Haji Ghaffari (University of Michigan, USA)
Elena Della Valle (University of Michigan, USA)
Paras R Patel (University of Michigan, USA)
Julianna Richie (University of Michigan, USA)
Joseph G Letner (University of Michigan, USA)
Cindy Chestek (University of Michigan, USA)
James Weiland (University of Michigan, USA)

High resolution focused non-invasive electrical stimulation of motor cortex in rodent model
Vishal Jain (Carnegie Mellon University, USA)
Mats Forssell (Carnegie Mellon University, USA)
Derya Z Tansel (Carnegie Mellon University, USA)
Chaitanya Goswami (Carnegie Mellon University, USA)
Gary K Fedder (Carnegie Mellon University, USA)
Pulkit Grover (Carnegie Mellon University, USA)
Maysam Chamanzar (Carnegie Mellon University, USA)

Effects of neck proprioceptive modulation on pallidal network connectivity in dystonia
Prajakta Joshi (Case Western Reserve University, USA)
Alexey Sedov (Moscow Institute of Physics and Technology, Russia)
Svetlana Usova (N N Semenov Federal Research Center for Chemical Physics, Russia)
Ulia Semenova (N N Semenov Federal Research Center for Chemical Physics, Russia)
Valentin Popov (N N Semenov Federal Research Center for Chemical Physics, Russia)
Anna Gamaleya (Burdenko National Scientific and Practical Center for Neurosurgery, Russia)
Alexey Tomskiy (Burdenko National Scientific and Practical Center for Neurosurgery, Russia)
Hyder A Jinnah (Emory University, USA)
Aasef G Shaikh (Case Western Reserve University, USA)

Automated Detection of Evoked Potentials Produced by Intracranial Electrical Stimulation
Eric R Cole (Emory University & Georgia Institute of Technology, USA)
Kevin P. Quimbo (Emory University, USA)
Grant J Stento (Emory University, USA)
Chadd M Funk (Emory University, USA)
Lou T Blanpain (Emory University, USA)
Sina Dabiri (Emory University, USA)
Neal Laxpati (Emory University, USA)
Robert E. Gross (Emory University, USA)

Low-frequency SSVEP stimuli with 20%-pixel density can induce larger EEG and fNIRS responses
Jiayuan Meng (Tianjin University, China)

Construction and Validation of Rodent-Specific Solenoids for Magnetic Temporal Interference Brain Stimulation
Adam Khalifa (University of Florida, USA)
Seyed Mahdi Abrishami (Northeastern University, USA)
Nian Sun (Northeastern University, USA)
Sydney Cash (Massachusetts General Hospital, USA)

Cross-Modal Attention Assistance in Digital Operating Theaters: An Electroencephalography Assessment of Multimodal Priming
David Thinnes (Saarland University, Germany)
Matthias W Laschke (Saarland University, Germany)
Michael D Menger (Saarland University, Germany)
Jonas F Vibell (University of Hawaii, USA)
Daniel J. Strauss (Saarland University, Germany)

Factors influencing perceptual threshold for epiretinal implants
Kathleen E Kish (University of Michigan, USA)
Alex Yuan (Cleveland Clinic, USA)
James Weiland (University of Michigan, USA)

Auditory High Entropy Response (A-HER) for frontal theta band EEG modulation
Gan Huang (Shenzhen University, China)
Xiaoqi Liang (Shenzhen University, China)
Zhenxing Hu (Shenzhen University, China)
Qianyun Zhu (Shenzhen University, China)
Li Zhang (Shenzhen University, China)
Linling Li (Shenzhen University, China)
Zhen Liang (Shenzhen University, China)
Yao Xue (Heidelberg University, Germany)
Zhiguo Zhang (Shenzhen University, China)

Neurodiagnostic Biomarkers of Central Sensitization in Chronic Pain
Toren Arginteanu (Johns Hopkins University, USA)
Keqin Ding (Johns Hopkins University, USA)
Mirinda Anderson White (Johns Hopkins University, USA)
Mohsen Rakhshan (Johns Hopkins University, USA)
Ruixiang Li (Johns Hopkins University, USA)
Nitish Thakor (Johns Hopkins University & Singapore Institute for Neurotechnology (SINAPSE), USA)
Tina Doshi (Johns Hopkins University, USA)

Subthreshold TMS for Cortical Inhibition of Long-Latency Responses in One Forearm Muscle
Cody Helm (University of Delaware, USA)
Kyle Grossman (Northwestern University, USA)
Fabrizio Sergi (University of Delaware, USA)

Effects of the inter-phase delay of microstimulation pulses on the spatio-temporal neural excitation in the mouse visual cortex in vitro
Yuki Hayashida (Mie University & Osaka University, Japan)

Resting-state electroencephalographic correlates of central sensitization in chronic pain
Keqin Ding (Johns Hopkins University, USA)
Toren Arginteanu (Johns Hopkins University, USA)
Mirinda Anderson White (Johns Hopkins University, USA)
Nitish Thakor (Johns Hopkins University & Singapore Institute for Neurotechnology (SINAPSE), USA)
Tina Doshi (Johns Hopkins University, USA)

A catheter-integrated photomodulator for controlled drug delivery through the cardiovascular system
Sadid R Khan (Johns Hopkins University, USA)
Hans Ajieren (Johns Hopkins University, USA)
Jorge Gandia (Consejo Superior de Investigaciones Científicas, Spain)
Xavier Rovira (Consejo Superior de Investigaciones Científicas, Spain)
Javier Inserte (Vall dHebron Institut de Recera, Spain)
Amadeu Llebaria (Consejo Superior de Investigaciones Científicas, Spain)
Pedro Irazoqui (Johns Hopkins University, USA)

Design of a Wearable Separated Interface Nerve Electrode Device for Rodents
Celia Fernandez Brillet (Johns Hopkins University, USA)
Dale C Roberts (Johns Hopkins University School of Medicine, USA)
Charles Della Santina (Johns Hopkins University School of Medicine, USA)
Gene Fridman (Johns Hopkins University, USA)

The Role of Neuroanatomy on Transcranial Magnetic Stimulation Treatment Outcomes in Traumatic Brain Injury Patients
Connor J Lewis (Virginia Commonwealth University, USA)
Laura Manning-Franke (Virginia Commonwealth University, USA)
Joseph V Lee (Virginia Commonwealth University, USA)
Carrie Peterson (Virginia Commonwealth University, USA)
Neil Mittal (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Electrically Conductive and Anatomically Accurate Rat Brain Phantoms for Experimental Validation of Neuromodulation Techniques
Wesley Lohr (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Spinal cord injury induces epileptiform activity in spinal sensory circuits
Matthew A Bryson (Emory University, USA)
Heidi Kloefkorn-Adams (Oregon State University, USA)
Sandra Garraway (Emory University, USA)
Shawn Hochman (Emory University, USA)

Optimizing A Deep Learning Model for the Prediction of Electric Field Induced by Transcranial Magnetic Stimulation for Traumatic Brain Injury Patients
Yash R Saxena (Maggie L Walker Governor's School & Virginia Commonwealth University, USA)
Connor J Lewis (Virginia Commonwealth University, USA)
Joseph V Lee (Virginia Commonwealth University, USA)
Laura Manning-Franke (Virginia Commonwealth University, USA)
Muhammad Sabbir Alam (Virginia Commonwealth University, USA)
Mohannad Tashli (Virginia Commonwealth University, USA)
Jayasimha Atulasimha (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Investigation of Soft Magnetic Material Cores in Transcranial Magnetic Stimulation Coils and the Effect of Changing Core Shapes on the Induced Electrical Field in Small Animals
Mohannad Tashli (Virginia Commonwealth University, USA)
George Weistroffer (Virginia Commonwealth University, USA)
Aryan Mhaskar (Virginia Commonwealth University & Mills E. Godwin High School, USA)
Deepak Kumbhare (Louisiana State University Health Center, USA)
Mark S. Baron (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Electrode Arrangements for Temporal Interference Stimulation of Peripheral Nerves
Hafsa Binte Zahid (University of Toronto & Holland Bloorview Kids Rehabilitation Hospital, Canada)
Leen Jabban (University of Bath, United Kingdom)
Jan Andrysek (University of Toronto & Holland Bloorview Kids Rehabilitation Hospital, Canada)
Ben Metcalfe (University of Bath, United Kingdom)

Automated Peripheral Nerve Geometric Mapping Using Temporal Interference Current Stimulation
Eleni Daskopoulou (Johns Hopkins University, USA)
Trevor Meyer (Johns Hopkins University, USA)
Michael T Williams (Johns Hopkins University, USA)
Pedro Irazoqui (Johns Hopkins University, USA)
Ryan Budde (Johns Hopkins University, USA)

Investigation of EEG Functional Connectivity Relationship with TMS Response in Mild Traumatic Brain Injury Patients
Mishal Z Hussain (Virginia Commonwealth University, USA)
Asif Jamil (Harvard Medical School, USA)
Laura M Franke (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Hybrid Transcranial Magnetic Stimulation and Deep Brain Stimulation in the Presence of an Implantable Pulse Generator
Aryan Mhaskar (Virginia Commonwealth University & Mills E. Godwin High School, USA)
Mohannad Tashli (Virginia Commonwealth University, USA)
Kathryn L Holloway (Virginia Commonwealth University, USA)
R Hadimani (Virginia Commonwealth University, USA)

Electrical stimulation evokes calcium waves in glial cells of degenerate rat retina
Steven T Walston (University of Southern California, USA)
Mark S Humayun (University of Southern California, USA)
Gianluca Lazzi (University of Southern California, USA)

Temporal interference stimulation evoked neural local field potential oscillations in vivo
Xiaoqi Zhu (Imperial College London & UK Dementia Research Institute, United Kingdom)
Jonathan Howard (Imperial College London & Invicro LLC, United Kingdom)
Zachary Bailey (Imperial College London, United Kingdom)
Marcia Garcia Garrido (Imperial College London, United Kingdom)
Adam Williamson (Aix-Marseille Université, France)
Rylie Green (Imperial College London, United Kingdom)
Eric Daniel Glowacki (Brno University of Technology, Czech Republic)
Nir Grossman (Imperial College London and UK Dementia Research Institute, United Kingdom)

Ultrasound induces the production of neuronal nitric oxide (NO) via mechanosensitive ion channels
Vlad Voziyanov (Arizona State University, USA)
Elliot Nester (Arizona State University, USA)
Arati Sridharan (Arizona State University, USA)
Bruce Towe (Arizona State University, USA)
Jit Muthuswamy (Arizona State University, USA)

Neural modeling

The Influence of Spatial Smoothing Kernel Size on ICA Model Order and Spatial Maps of Intrinsic Connectivity Networks
Behnaz Jarrahi (Stanford University, USA)

Novel Neural Microprobe with Adjustable Stiffness
Naser Sharafkhani (Deakin University, Australia)
John Long (Deakin University, Australia)
Scott Adams (Deakin University, Australia)
Abbas Z. Kouzani (Deakin University, Australia)

Neural Circuit Model of Long-Term Potentiation from Intermittent Theta Burst Stimulation
Neil Mittal (Virginia Commonwealth University, USA)
Yeajin Cho (Virginia Commonwealth University, USA)
Carrie Peterson (Virginia Commonwealth University, USA)

Simulating the Effects of Low Intensity Focused Ultrasound in Parkinson's Disease
Ítalo Karmann Aventurato (University of Campinas, Brazil)
Marcelo Romano (University of Campinas, Brazil)
Leonardo Abdala Elias (University of Campinas, Brazil)

Computational Modeling of the LHb-VTA Pathway in Major Depression Disorder
Chenhao Bao (Johns Hopkins University, USA)
Meihong Zheng (Tsinghua University, China)

On the Relationship Between Fascicle Diameter and Perineurium Thickness in the Ulnar Nerve of Pigs
Felipe Rettore Andreis (Aalborg University, Denmark)
Benjamin W Metcalfe (University of Bath, United Kingdom)
Taha Al Muhammadee Janjua (Aalborg University & Lundbeck Pharmaceutical, Denmark)
Valéria Paula Sassoli Fazan (University of São Paulo, Brazil)
Winnie Jensen (Aalborg University, Denmark)
Suzan Meijs (Aalborg University, Denmark)
Thomas Gomes Nørgaard dos Santos Nielsen (Aalborg University, Denmark)

Repetitive Transcranial Magnetic Stimulation (rTMS) Current Pulse and Coil Size Optimization Using a Multi-Scale Modeling Toolbox
Shaghayegh Abbasi (University of Portland, USA)
Benjamin Joray (University of Portland, USA)
Kenneth Rudnicki (University of Portland, USA)
Vincent Leung (Baylor University, USA)
Peter Asbeck (UC San Diego, USA)
Milan Makale (UC San Diego, USA)

BGCN: An EEG-based Graphical Classification Method for Parkinson's Disease Diagnosis with Heuristic Functional Connectivity Speculation
Tian Lyu (National University of Singapore, Singapore)
Haotian Guo (National University of Singapore, Singapore)

Spatio-Temporal Analysis of LTP-like Neuroplasticity in Pigs
Mikkel B Danyar (Aalborg University, Denmark)
Hjalte F. Clark (Aalborg University, Denmark)
Nickolaj A. Atchuthan (Aalborg University, Denmark)
Lasse K. Daugbjerg (Aalborg University, Denmark)
Amalie K. Andersen (Aalborg University, Denmark)
Taha Al Muhammadee Janjua (Aalborg University & Lundbeck Pharmaceutical, Denmark)
Winnie Jensen (Aalborg University, Denmark)

Synchronization effects upon synapses in transcranial alternating current stimulation
Kyeongseop Park (Gwangju Institute of Science and Technology, Korea (South))
Hyeyeon Chung (Duke University, USA)
Cheolki Im (Gwangju Institute of Science and Technology, Korea (South))
Sung Chan Jun (Gwangju Institute of Science and Technology, Korea (South))

Computational modeling of the secondary rod pathway contribution to the retinal output
Laetitia Raison-Aubry (Université de Lorraine, CNRS, LORIA, France)
Loïs Naudin (LORIA CNRS, France)
Chirstophe P. Ribelayga (University of Houston, USA)
Laure Buhry (Université de Lorraine LORIA, France)

A roadmap to restore sexual dysfunction in the new Zeeland white rabbit model
Ivo Strauss (University of Freiburg - Institute for Microtechnology (IMTEK), Germany)
Jonas Herbert Streckmann (University of Freiburg - Institute for Microtechnology (IMTEK), Germany)
Thomas Stieglitz (University of Freiburg, Germany)

Classifying Subjects with PFC Lesions from Healthy Controls during Working Memory Encoding via Graph Convolutional Networks
Sai Sanjay Balaji (University of Minnesota, USA)
Keshab K Parhi (University of Minnesota, USA)

Modeling current-distance effects on microstimulation sensitivity
Benjamin I Ferleger (University of Pennsylvania, USA)
Andrew G. Richardson (University of Pennsylvania, USA)

An anatomically and biophysically realistic rodent subthalamic nucleus neuron model
Hengji Chen (Duke University, USA)
M. Sohail Noor (Duke University, USA)
Clayton S. Bingham (Duke University, USA)
Cameron C. McIntyre (Cleveland College of Medicine, USA)

Effects of Phase-dependent Stimulation on Hippocampal Oscillations: A Computational Modeling Approach
Yousef Salimpour (Johns Hopkins School of Medicine, USA)
Hsin-Pei Lee (Johns Hopkins School of Medicine, USA)
Heba Sattar (Johns Hopkins School of Medicine, USA)
William Anderson (Johns Hopkins School of Medicine, USA)

Reconstruction of nerve functional topography using recruitment curves enables selective electrical stimulation
Simone Romeni (EPFL, Switzerland)
Bianca Ziliotto (Scuola Superiore SantAnna, Italy)
Nino Herve (EPFL, Switzerland)
Alice Giannotti (Scuola Superiore SantAnna, Italy)
Silvestro Micera (Scuola Superiore SantAnna, Italy & EPFL, Switzerland)

One-class classifier based on Riemannian Geometry Distances for Outlier Detection in Motor Imagery
Kyle Kilcrease (California State University, Fresno, USA)
Hubert Cecotti (California State University, Fresno, USA)

Neural Correlations across Mice during Spontaneous and Task-Related Behaviors
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Modeling deep brain stimulation evoked responses with phase oscillator networks
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Computational framework for in silico analysis of neural hyperactivity and loss of neural activity in a population of interconnected neurons
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Identification of Switching Linear Dynamics in Distributed Neural Populations
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Nonlinear System Identification of Tremors Dynamics: A Data-driven Approximation Using Koopman Operator Theory
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Reverse engineering information processing in lateral amygdala during auditory tones
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Microstate analysis of GABA_B and mGluR Mediated Modulation of Calcium Spiking in Hippocampal Neurons
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Inferring Pyramidal Neuron Morphology using EAP Data
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Machine-learning predictor of nerve fiber firing rate allows the automatic optimization of electrical stimulation protocols
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A Transfer Learning-based Model for Individualized Clustered Seizure Prediction using Intracranial EEG
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Reduced Order Realistic Neuron Models for Network Simulations
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Training changes the EEG complexity and connectivity during time estimation
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The Novel NIH Platform for Cloud-Based Collaborative, FAIR, and Sustainable Computational Neurosciences
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Activation of inflammasomes and their effects on neuroinflammation at the microelectrode-tissue interface in intracortical implants
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Virtual Resections: How Dynamic Network Brain Models May Improve EZ Surgery Outcome in Drug- Resistant Epileptic Patients
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Assessment of the Safety of Electrical Stimulation of Peripheral Nerves through Computational Modeling
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Pipeline for personalized physico-physiological modeling of brain stimulation therapies
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Interictal Intracranial EEG Single-Pulse Electrical Stimulation and Virtual Stimulation Comparison for Epileptogenic Zone Localization
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A Model of Spinal Cord Stimulation During Arm Movement Post-Stroke
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A model of the maturation of sensory interactions: from cross-modal competition to facilitation in Autism
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Optimization of targeting in bioelectronic medicine using the Generalized Activating Function: from neuroprosthetics to electroceuticals
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Foreshadowing Maneuvers transmitted by a Tactile System affecting Motion Sickness
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Synchrony due to structural network changes in an STN-GPe model
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Biophysical model of retinal responses to multi-electrode stimulation
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Seizure prediction using source-sink nodal dynamics in the epileptic network
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Quantifying the Accuracy of Computational Models for Compound Nerve Action Potential Recordings
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Model of vestibular implant stimulation in rhesus labyrinth estimates current spread to facial and cochlear nerves
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Towards Designing Memory Prosthesis by Electrical Stimulation of Dentate Gyrus through Multi-Scale Computational Modeling
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Brain activity reconstruction from EEG using multivariate mode decomposition methods
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Reconstruction of realistic entorhinal cortical axons using High-Resolution 3d Serial Reconstruction of Thin Histological Sections
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Individualized Brain Modeling with Noninvasive Stimulation For Neurocontrol Engineering
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Neural correlates of dynamic cognitive control states
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Simulation and Visualization Tools for Deep Brain Stimulation Research Data
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A Computational Model of Sacral Nerve Stimulation for the Treatment of Overactive Bladder
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Mechanical Properties of In Vivo Brain Tissue Determined Using Penetrating Microindentation
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Novel information extraction from traditional imaging modalities

Resting State Neurophysiology of Agonist Antagonist Myoneural Interface in Transtibial Amputees
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Adversarial Debiasing techniques towards `fair' skin lesion classification
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Epileptogenic zone classification with functional connectivity and graph measures
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Quantifying changes in local basal ganglia structural connectivity in the 6-hydroxydopamine model of Parkinson's Disease using correlational tractography
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Timescales of the posterior parietal cortex during locomotor adaptation
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Phase-Amplitude Coupling Between EEG Cortical Oscillations and Respiration: An Exploratory Study
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A Patient-specific Preplanning Treatment Algorithm for Focused Ultrasound Therapy of Spinal Cord Injury
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Automated Sleep Staging on Wearable EEG Enables Sleep Analysis at Scale
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The analysis of electroneurographic and electromyographic activity recorded in the medial nerve of a transhumeral amputee during phantom finger movements
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Measurement of Single-Vessel Flow Parameters for Vascular Characterization of Spinal Cord Injury
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Tensor Decomposition of Large-scale Clinical EEGs Reveals Interpretable Patterns of Brain Physiology
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Optical Phantoms for Calibrating a Novel Neuroimaging System Targeting Central Nervous System Fluid Flow Dynamics
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Optimizing stimulation frequency for BCI-based color vision assessment: Preliminary results
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Observing brain most visited common band connectivity states from different fMRI resting state studies
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Classification of Psychosis and Healthy EEG data using spectral features and multi-layer perception (MLP) networks
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Polar Coordinate Reconstruction for Circular Clustering with Neural Data
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Uncovering Key Predictive Channels and Clinical Variables in the Gamma Band Auditory Steady-State Response in Early Stage Psychosis - a Longitudinal Study
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Cross Power Analysis of Motion Artifacts in in-Ear EEG Electrodes
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Patch2Loc: Learning Representations to Localize MRI Patches for Abnormality Detection
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Myoelectric EEG artifact removal validation using tripolar concentric ring electrodes and canonical correlation analysis
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P300 Fixation-Related Potential affected by Facial Emotion in Virtual Reality
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Visual Reaction Time Prediction in Stroke Patients with Spatial Neglect
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Labeling EEG Components with a Bag of Waveforms from Learned Dictionaries
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A Spatial-Temporal Graph Attention Network for Automated Detection and Width Estimation of Cortical Spreading Depression Using Scalp EEG
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Dry organic electrodes for continuous in-ear EEG
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Neural oscillations during uneven terrain walking
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Magnetic Resonance Fingerprint Segmentation of the Subthalamic Nucleus
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Decoding and encoding algorithms

Shortened calibration of code-VEP based BCI by improved deep learning architecture and golden subjects pre-training
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Long-term stable Electromyography classification using Canonical Correlation Analysis
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Impacts of imagined lexical tone on Mandarin speech imagery BCI performance
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TUDAMatch: Time-Series Unsupervised Domain Adaptation for Automatic Sleep Staging
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A Biologically Plausible Spiking Neural Network for Decoding Kinematics in the Hippocampus and Premotor Cortex
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Toward Robust High-Density EMG Pattern Recognition using Generative Adversarial Network and Convolutional Neural Network
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Identifying Artistic Expertise Difference in Emotion Recognition in Response to Oil Paintings
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Sample Reweighting for Label Denoising of Neural Activity Data
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Spiking Neural Network with Backpropagation Learning for Brain Visual Dynamics Decoding
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Hand gesture decoding using ultra-high-density EEG
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Application of EEG-based passive mental fatigue detection model to an active fatigue task
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Privacy-Preserving Motor Intent Classification via Feature Disentanglement
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Classification of upper limb impairment in acute stroke patients using resting-state EEG markers and machine learning
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Learning signatures of decision making from many individuals playing the same game
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Assessing Temporal Variability in Fixation-Locked P300 Responses during Free-Viewing Visual Search
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EEG-Eye Movements Cross-Modal Decision Confidence Measurement with Generative Adversarial Networks
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Discrimination of Overt, Mouthed, and Imagined Speech Activity using Stereotactic EEG
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Optimal sensor set for decoding motor imagery from EEG
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Detecting change points in neural population activity with contrastive metric learning
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Combining Density based and Linear Discriminant Approaches for Motor Imagery Classification
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Riemannian geometry-based detection of slow cortical potentials during movement preparation
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Wearable EEG-Based Classification of Odor-Induced Emotion
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XAnet: Cross-Attention Between EEG of Left and Right Brain for Auditory Attention Decoding
Saurav Pahuja (University of Bremen, Germany)
Siqi Cai (National University of Singapore, Singapore)
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Adversarial Discriminative Domain Adaptation and Transformers for EEG-based Cross-Subject Emotion Recognition
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On Transfer Learning for Naive Brain Computer Interface Users
Ruofan Liu (The University of Texas at Austin, USA)
Satyam Kumar (The University of Texas at Austin, USA)
Hussein Alawieh (The University of Texas at Austin, USA)
Evan Carnahan (The University of Texas at Austin, USA)
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A Self-supervised Task-agnostic Embedding for EEG Signals
Andisheh Partovi (University of Melbourne, Australia)
Anthony Burkitt (University of Melbourne, Australia)
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Partitioned Temporal Dithering for Efficient Epiretinal Electrical Stimulation
Amrith Lotlikar (Stanford University, USA)
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Assessing Ambiguity of Spike Detection By Thresholding
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Automatic High-Frequency Oscillations Detection Using Time-Frequency Analysis
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Christopher D Adam (University of Pennsylvania, USA)
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Optimizing Neuromorphic Spike Encoding of Dynamic Stimulus Signals Using Information Theory
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Subject Generalization in Neural Speech Decoding using Curriculum Learning
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Abbas Babajani-Feremi (University of Florida, USA)
David Harwath (University of Texas at Austin, USA)
Amir Borna (Sandia National Laboratories, USA)
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A brain-computer typing interface using finger movements
Nishal P Shah (Stanford University, USA)
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Nick Hahn (Stanford University, USA)
Foram Kamdar (Stanford University, USA)
Donald T. Avansino (Stanford University, USA)
Leigh R. Hochberg (Brown University, USA)
Krishna V. Shenoy (Stanford University and HHMI, USA)
Jaimie Henderson (Stanford University, USA)

Region-based conversion of neural activity across sessions
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Carlton Smith (Yale University, USA)
Shreya Saxena (University of Florida, USA)

Months-long high-performance fixed LSTM decoder for cursor control in human intracortical brain-computer interfaces
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Synthesizing Speech by Decoding Intracortical Neural Activity from Dorsal Motor Cortex
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Single-Trial Detection in Rapid Serial Visual Presentation Task using the Lilac Chaser Visual Illusion
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Averaged sparse local representation for the elimination of pseudo-HFOs from intracranial EEG recording in epilepsy
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Zhiyi Sha (University of Minnesota, USA)
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Jay R. Gavvala (UT McGovern School of Medicine, USA)
Sameer A. Sheth (Baylor College of Medicine, USA)
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Processing multimodal neural data and decoding neural dynamics using cross-modality inference
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A Subject-Adaptive Brain State Decoding model via Ensemble Transfer Learning
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Time-varying Mutual Information Analysis of Evoked in vivo Local Field Potentials in Rodents
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Using Automatic Speech Recognition to Measure the Intelligibility of Speech Synthesized from Brain Signals
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Identification of neural biomarkers of major depressive disorder symptom severity using computerized linguistic analysis
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Construction of semi-supervised spatial projections to identify the source of beta- and high frequency oscillations in Parkinson's disease
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Automatic Sleep Stage Classification with Cross-modal Self-supervised Features from Deep Brain Signals
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Federated deep transfer learning for EEG decoding using multiple BCI tasks
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Studying latent neuronal functional circuits underlying brain activity across task conditions
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MRGazerII: Camera-free Decoding Eye Movements from Functional Magnetic Resonance Imaging
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Decoding of Motion Sickness based on EEG Signals using Deep Learning for Human Care
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Understanding how the vagus nerve conveys metabolic information from in vivo recordings
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Evaluating deep learning performance for P300 Speller BCI signal classification
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Simplicial Convolutional Layers for Decoding Head Direction and Grid Cell Data
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Matching User and Machine Learning Rates in Co-Adaptive Closed-Loop Myoelectric Interfaces
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Machine learning-based decoding of visual cortex response recorded with ECoG in a mouse
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Decoding Upsampled Limb Trajectories of a Running Mouse from Two-Photon Calcium Imaging Using a Recurrent Neural Network Encoder-Decoder
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dPCA as a tool for low-dimensional BMI decoding
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In vivo Sensory and Motor Decoding with High-Density-Cortical Surface Electrodes
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Intelligent Compression Methods for Peripheral Nerve Recordings
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Prediction of Electric Fields Induced by Transcranial Magnetic Stimulation in the Brain using a Deep Encoder-Decoder Convolutional Neural Network
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Classification of the Linguistic Characteristics of Overt Speech with Deep Learning
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A shallow convolutional neural network for the classification of a multisensory P300 BCI
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Real-time wetness sensation for prosthetic users
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Cross-experiment transfer learning for real-time brain computer interfaces
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Decoding ERP Scalp Distribution
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Stimulation in Training Data Improves Compliance Discrimination
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Internal inputs to the NS

Two-Photon Targeted, Quad Whole-Cell Patch Clamping Robot
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Injectable Wireless Neuromuscular Microstimulators based on Electronic Rectification of Volume Conducted Currents
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Design and material related limitations of PDMS based, extraneural stimulation electrodes for safe applications
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Reconfigurable Origami Probe for High-density, Multi-modal, and Three-dimensional Intracortical Sensing and Recording
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Multimodal imaging and analysis

Graph-based Fusion of Imaging and Non-Imaging Data for Disease Trajectory Prediction
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Imaging circuit activity in the rat brain with fast neural EIT and depth arrays
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Impact of tip size and shape on the insertion force of implantable CMOS neural probes
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Fine-grained Emotion Recognition using Brain-Heart Interplay measurements and eXplainable Convolutional Neural Networks
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Vincenzo Catrambone (University of Pisa, Italy)
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The Feasibility of Fast Neural Magnetic Detection Electrical Impedance Tomography: A Modelling Study
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Medial Tractography Analysis (MeTA) for White Matter Population Analyses Across Datasets
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Investigation of functional integration of cortical organoids transplanted in vivo towards future neural prosthetics applications
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Population receptive field estimation in sub-bundles of the human optic radiation
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Benedictor Alexander Nguchu (University of Science and Technology of China, China)
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Developing a Non-Invasive Surrogate for Craniospinal Compliance Measurement
Fariba Karimi (ETH Zürich & IT'IS Foundation, Switzerland)
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Andrea Boraschi (University of Zurich, Switzerland)
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Andreas Spiegelberg (University of Zurich, Switzerland)
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Next-Generation Michigan Optoelectrodes: Ultra-flexible micro-LED Probes for Chronic Optogenetic Brain Studies
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Anatomical and topographical characterization of the cardiac autonomic innervation for selective cardiac vagus nerve stimulation in pigs, rabbits, and humans
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Imaging slow neural activity in the rat brain using parallel Electrical Impedance Tomography (EIT)
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Learning from the Past: Probabilistic Deep Brain Stimulation Atlas Based on Intra-Operative Data
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Jérôme Coste (Clermont-Auvergne University, France)
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Feasibility of high-accuracy impedance tomography enabled by time-of-flight EIT (TOF-EIT)
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Real time EEG-fMRI slow wave phase prediction with a recurrent neural network
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Leandro P. L. Jacob (Boston University, USA)
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Reduction of Gait-Synchronized Triboelectric Artifact in Mobile Electroencephalography
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William David Hairston (United States Army Research Laboratory, USA)

Adversary on Multimodal BCI-based Classification
Chetan Kumar (UMass Dartmouth, USA)
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Rohan Gonjari (UMass Dartmouth, USA)
Neela Rahimi (UMass Dartmouth, USA)
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Yalda Shahriari (University of Rhode Island, USA)
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Microelectrodes for simultaneous recording of neural activity and oxygen tension in a 7 Tesla MRI
Livia de Mesquita Teixeira (Arizona State University, USA)
Yuka Sugamura (Arizona State University, USA)
Arati Sridharan (Arizona State University, USA)
Vikram Kodibagkar (Arizona State University, USA)
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Neuroethics

Embedding Ethics into Neuroengineering Education: A Human-Centered Engineering Course on Neurorehabilitation
Nicolas Berberich (Technische Universität München & Institute for Cognitive Systems, Germany)
Natalia Paredes-Acuna (Technische Universität München & Institute for Cognitive Systems, Germany)
Benjamin Michael Lipp (Cornell University, USA)
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Pre-clinical work to clinical

Development of a 3D Printing Strategy for Completely Polymeric Neural Interfaces Fabrication
Ciro Zinno (Scuola Superiore SantAnna, Italy)
Ilaria Cedrola (Scuola Superiore SantAnna, Italy)
Alice Giannotti (Scuola Superiore SantAnna, Italy)
Eugenio Redolfi Riva (Scuola Superiore SantAnna, Italy)
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Flexible Microelectrode Array for Chronic Electrocorticography Recording under Different Neurophysiological Conditions
Suman Chatterjee (Indian Institute of Science, Bangalore, India)
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Shabari Girishan Kv (Indian Institute of Science, Bangalore, India)
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Safe retrieval of a stent-based endovascular neural recording array
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Gil S Rind (Synchron Australia & The University of Melbourne, Australia)
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Andrew Stent (Gribbles Veterinary Pathology, Australia)
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Thomas J Oxley (Synchron Australia & The University of Melbourne, Australia)
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Direct bladder contraction by single and multi-electrode stimulation
Yifan Wang (University of Houston, USA)
Philippe Zimmern (The University of Texas Southwestern Medical Center, USA)
Mario I. Mario Romero-Ortega (University of Houston, USA)

Rodent Forelimb Model of Direct Neurotization for Improved Studies of Muscle Reinnervation and Prosthesis Control
Kiara N Quinn (Johns Hopkins University, USA)
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Siyu Wang (Johns Hopkins University, USA)
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Connor Glass (Johns Hopkins University, USA)
Sami Tuffaha (Johns Hopkins University, USA)
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Global classification of intentional movement across upper limb myoelectric pattern recognition-controlled prosthesis users
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Nathaniel Stambaugh (Coapt LLC & Dexter Southfield School, USA)

A comparative assessment of evoked compound action potentials measured by optrode and conventional bioamplifier systems
Reem Almasri (University of New South Wales, Australia)
Yuan Wei (University of New South Wales, Australia)
Francois Ladouceur (University of New South Wales, Australia)
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A Shared Resource for Building Polymer-Based Microelectrode Arrays as Neural Interfaces
Kee Scholten (University of Southern California & PIE Foundry, USA)
Huijing Xu (University of Southern California, USA)
Dong Song (University of Southern California, USA)
Ellis Meng (University of Southern California, USA)

Microcontroller Based Low Latency Audio System to Study Cortical Auditory Evoked Potentials: Applications with Intraoperative Language Mapping
Israt Tasnim (University of Houston, USA)
Priscella Asman (University of Houston, USA)
Chandra Prakash Swamy (University of Houston, USA)
Sudhakar Tummala (UT MD Anderson Cancer Center, USA)
Sujit Prabhu (UT MD Anderson Cancer Center, USA)
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Introducing the Cleveland Open Source Modular Implant Innovators Community (COSMIIC)
Kevin L. Kilgore (MetroHealth Medical Center, USA)
Brian Smith (Case Western Reserve University, USA)
Cynthia A Chestek (University of Michigan, USA)

Actively Multiplexed µECoG Array Based on Thin-Film Electronics for High-Resolution Brain Mapping
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Sterilization of MXene-Based Electrode Arrays
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Translation of optical techniques for multimodal guidance and monitoring in neurosurgery
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Modular Test Platform for Synchronized EMG and Motion Capture
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High Signal-to-Noise Ratio of Neural Interface in Muscle Graft of a Transected Nerve
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Recording Neural Signals Inside Regenerative Peripheral Nerve Interface (RPNI) by Reducing Stimulus Artifact and Ambient Noise
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Flexible Electronics Based Scalable Multiplexed µECoG Arrays for High-Density Neural Recordings
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Short-to-Medium Term Implantable Wireless Selective Vagus Nerve Stimulator
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Cathodic Deep Brain Stimulation of the Subthalamic Nucleus Evokes Higher Cortical Potentials Compared to Anodic Stimulation
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GABA Regulates Spinal Cord Stimulation Efficacy
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Clinical characterization of a wireless, high channel count, bidirectional somatosensory neuroprosthetic system
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Using machine learning to guide the diagnosis and recovery of vestibular disorder patients through the analysis of therapeutic exercises
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Intraoperative Hand Tracking Method Based on Dual Optical Hand Tracking Sensors with Data Fusion
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Inter-Species Linear Scaling of Vagus Nerve Stimulation Parameters Fails to Achieve Consistent Nerve Responses
Eric Musselman (Duke University, USA)
Nikki Pelot (Duke University, USA)
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High channel count polyimide μECoG: Design for usability, first-in-human recording, and electromagnetic interference mitigation
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Matthew K Leonard (University of California, San Francisco, USA)
Edward F Chang (University of California, San Francisco, USA)
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Neural Activity within Solid Carcinomas: A technique to ascertain solid tumor malignancy
Jay R Shiralkar (Case Western Reserve University, USA)
Grant McCallum (Case Western Reserve University, USA)
Dominique Durand (Case Western Reserve University, USA)

Reinforcement learning in NER

Novel Reinforcement Learning Algorithm for Suppressing Synchronization in Closed Loop Deep Brain Stimulators
Harsh Agarwal (Indian Institute of Technology Jodhpur, India)
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Primate Motor Cortical Activity Displays Hallmarks of a Temporal Difference Reinforcement Learning Process
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Closed-Loop Reinforcement Learning Based Deep Brain Stimulation Using SpikerNet: A Computational Model
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Individual temporal and spatial dynamics of learning to control central Beta activity in neurofeedback training
Elmeri Syrjänen (Mälardalen University, Sweden)
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Adaptive Bayesian Optimization for State-Dependent Brain Stimulation
Sina Dabiri (Emory University, USA)
Eric R Cole (Emory University & Georgia Tech, USA)
Robert E. Gross (Emory University, USA)

Towards AI-controlled FES-restoration of arm movements: neuromechanics-based reinforcement learning for 3-D reaching
Nat Wannawas (Imperial College London, United Kingdom)
Aldo Faisal (Imperial College London, United Kingdom)

Towards AI-controlled FES-restoration of arm movements: Controlling for progressive muscular fatigue with Gaussian state-space models
Nat Wannawas (Imperial College London, United Kingdom)
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Neuromimetic Spiking Neuronal Networks Learn to Navigate Using a Suite of Biologically-Inspired Training Algorithms
Christopher T. Earl (University of Massachusetts Amherst & Nathan Kline Institute of Psychiatric Research, USA)
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System for personalized inference of transcranial current stimulation waveforms
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Evaluating Neural Strategies of Mouse Sensorimotor Control Using Deep Reinforcement Learning
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Complexity Synchronization in Adaptive Systems
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Influence of Extracellular Matrix-Mimicking Gel Electrolyte on Electrode Charge Injection
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Henry Lancashire (University College London, United Kingdom)

Closing the loop in neural prostheses

Linear feedback control of spreading dynamics in stochastic nonlinear network models: epileptic seizures
S Amin Moosavi (Brown University, USA)
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EffiE: Efficient Convolutional Neural Network for Real-Time EMG Pattern Recognition System on Edge Devices
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Closed-Loop Control of Grasp Force with Biorealistic Hand Prosthesis
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Physiological Parameter Estimation for Dorsal Column Spinal Cord Stimulation
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Freeform Stimulator (FS) Implant Design for Non-Pulsatile Arbitrary Waveform Neuromodulation
Alexandra Cheng (Johns Hopkins University, USA)
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A Bio-mimetic Neuromorphic Model for Heat-evoked Nociceptive Withdrawal Reflex in Upper Limb
Fengyi Wang (Technische Universität München, Germany)
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A TinyML-based system for prosthetic control
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Performance of basic vision tasks by people with Argus® II retinal prostheses
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On the in vitro long-term stability of thin-film stimulation contacts in polyimide-based neural interfaces
Paul Cvancara (University of Freiburg, Germany)
Inga Bartels (University of Freiburg, Germany)
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Synaptrode: neural interface at the synapse level
Jasper Koen Timmerman (University of Leuven & NERF, Belgium)
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Neurostimulation Perception Obeys Strength-Duration Curves and is Primarily Driven by Pulse Amplitude
Eric J Earley (Center for Bionics and Pain Research, Sweden & University of Colorado School of Medicine, USA)
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Open Mind Neuromodulation Interface for the CorTec Brain Interchange (OMNI-BIC): an investigational distributed research platform for next-generation clinical neuromodulation research
Hanbin Cho (University of Washington, USA)
Jeffrey Ojemann (University of Washington, USA)
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Carbon and metal microelectrodes for recording of epileptic High Frequency Oscillations: a comparative study
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Iterative feedback tuning of proportional-integral controller parameters for adaptive deep brain stimulation
Jakub Orłowski (University College Dublin, Ireland)
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In vivo application of electrical rejuvenation pulses to chronically implanted neural macroelectrodes in nonhuman primates for regulation of interface properties
Kyle P O'Sullivan (University of Utah, USA)
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Semi-supervised adaptation of upper limb myoelectric pattern recognition prosthesis control through virtual gameplay
Andru Liu (Northwestern University, USA)
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Distributed Tactile Sensors for Palmar Surfaces of Prosthetic Hands
Hoang Truong (University of Colorado Boulder, USA)
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Phase-Locked Noninvasive Brain Stimulation
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Design of a Novel, Low-Cost System for Neural Electrical Impedance Tomography
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Timothy Constandinou (Imperial College London, United Kingdom)

Networks of Injectable Microdevices Powered and Digitally Linked by Volume Conduction for Neuroprosthetics: a Proof-of-Concept
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Regulation of arousal and performance of a healthy non-human primate using closed-loop central thalamic deep brain stimulation
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Waveform Development for Neurotransmitter Detection on Novel Boron-Doped Diamond Microelectrodes
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Model predictive control of a soft elbow exosuit reduces interaction torque
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Edge AI-Based Closed-Loop Peripheral Nerve Stimulation System for Gait Rehabilitation after Spinal Cord Injury
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The Design of Brainstem Interfaces: Characterisation of Physiological Artefacts and Implications for Closed-loop Algorithms
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Intraneural SiC multi electrodes to detect multimodal sensory signals
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Automated Tools to Improve Spinal Cord Injury Outcomes with Epidural Stimulation
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Exploration of acute effects of stimulation frequency on subcallosal cingulate dynamics in SCC DBS
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Smart Dura: A monolithic optoelectrical surface array for neural interfacing with primate cortex
Sergio I Montalvo Vargo (Carnegie Mellon University, USA)
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Sensory and Motor Intent Signals Recorded by Regenerative Multielectrode Arrays
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In-Home Video and IMU Kinematics of Self Guided Tasks Correlate with Clinical Bradykinesia Scores
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Charge Injection Enhancement Comparisons of Iridium Oxide Microelectrodes In vitro and In vivo
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Motor Neuroprosthesis on Forelimb Function Recovery of Chronic Stroke Rats
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An Automated Tactile Stimulator Apparatus for Neuromorphic Tactile Sensing
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Efficient Modeling and Calibration of Multi-Electrode Stimuli for Epiretinal Implants
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A pilot study for active muscles decoding using functional near-infrared spectroscopy
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Patient-tailored closed-loop deep brain stimulation improves residual Parkinson's disease symptoms during at-home evaluation
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Computational assessment of pig vagus nerve stimulation and compound action potential sensing towards closed-loop control
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Closed-Loop Multimodal Neuromodulation of Vagus Nerve for Control of Heart Rate (Abstract)
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Parylene-based flexible intrafascicular neural electrodes for neural signal recording of peripheral nerve
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Error-Related Potentials in Response to Haptic and Visual Disturbances to Exoskeleton Operation
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Switching to Synchronization: Optimizing the Robustness of Closed-Loop Vagus Nerve Stimulation for Heart Rate Control through Switching
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Alerting attention is sufficient to induce a phase-dependent behavior
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Fabrication of Expandable Cuff Electrodes for Selective Stimulation of the Human Vagus Nerve
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Computational Simulation of Optimized Structure for Polymer-based 3D Microelectrode Array in Subretinal Stimulation
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Joonsoo Jeong (Pusan National University, Korea (South))

Chronic recording of peripheral sensory nerve signals using flexible penetrating microelectrode array
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Motor reanimation in a Case of Cervical Spinal Cord Injury using Upper-Limb Motor-Imagery based Electrocorticography Brain-Computer Interface
Kevin C Davis (University of Miami, USA)
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A platform to elicit and record intramuscular EMG signals from anesthetized mice
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Rejin Varghese (Imperial College London, United Kingdom)
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Tactile Percept Formation and Integration for Object Feature Encoding with Electrical Stimulation
Leah Marie Roldan (Case Western Reserve University & Louis Stokes Cleveland VA Medical Center, USA)
Emily Graczyk (Case Western Reserve University & Louis Stokes Cleveland VA Medical Center, USA)
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Usage of Peripheral Nerve Stimulation Occurs Along the Neuroaxis
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Proportional Myoelectric Control of a Portable Bionic Lower Limb Prosthesis
Nicole Stafford (University of Florida, USA)
Daniel P. Ferris (University of Florida, USA)

State-dependent neural biomarker of arousal predicts therapeutic transition in depressive state using responsive neurostimulation
Ankit N Khambhati (University of California San Francisco, USA)
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Supraspinal Response to Spinal Cord Stimulation in Multiple Brain Areas along the Somatosensory Pathway
Jacob Slack (Purdue University Indianapolis, USA)
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Adversarial Stimuli: Attacking Brain-Computer Interfaces via Perturbed Sensory Events
Bibek Upadhayay (University of New Haven, USA)
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Classifying physical activity states based on internal accelerometry for Parkinson's disease treatment
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Miniaturized magnetoelectric implants for robust and high-power bioelectronic applications
Joshua E Woods (Rice University, USA)
Fatima Alrashdan (Rice University, USA)
Amanda Singer (Rice University, USA)
Sunil Sheth (University of Texas Health, USA)
Sameer Sheth (Baylor College of Medicine, USA)
Allison Post (Texas Heart Institute, USA)
Mehdi Razavi (Texas Heart Institute, USA)
Jacob Robinson (Rice University, USA)

A Synchronous Multi-Channel Recording System Based on A Ring Resonator Array
Hans Ajieren (Johns Hopkins University, USA)
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Optimized electrical transcorneal stimulation as a therapeutic approach for retinal degeneration
Ege Iseri (University of Southern California, USA)
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Pei-An Lo (University of Southern California, USA)
Dimitrios Pollalis (University of Southern California, USA)
Jean-Marie Charles Bouteiller (University of Southern California, USA)
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Spatially Multiplexed Electrical Stimulation to Reproduce the Neural Code in the Primate Retina
Andrew J Phillips (Stanford University, USA)
Nishal P Shah (Stanford University, USA)
Madeline R Hays (Stanford University, USA)
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Alexander Sher (University of California, Santa Cruz, USA)
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A Scalable Open-Source Cochlear Implant with Multipolar Stimulation
Abraham Akinin (Lawrence Livermore National Laboratory, USA)
Erin Graf (Lawrence Livermore National Laboratory, USA)
Michael Triplett (Lawrence Livermore National Laboratory, USA)
Razi-ul M Haque (Lawrence Livermore National Laboratory, USA)

Development of a wireless headstage for ECoG/LFP recording of freely-moving animals
Taro Kaiju (National Institute of Information and Communications Technology, Japan)
Masato Inoue (National Institute of Information and Communications Technology, Japan)
Masayuki Hirata (Osaka University, Japan)
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Microfabrication of a Flexible and Transparent Neural Electrode Array based on Cyclic Olefin Copolymer
Yoon Seo (Pusan National University, Korea (South))
Joonsoo Jeong (Pusan National University, Korea (South))

Expanding In-Ear Sensing for Health Monitoring
Akshay Paul (University of California San Diego, USA)
Min S Lee (University of California San Diego, USA)
Yuchen Xu (University of California San Diego, USA)
Tae H Joung (University of California San Diego, USA)
William David Hairston (Army Research Lab, USA)
Gert Cauwenberghs (University of California San Diego, USA)

Disrupting unwanted neuronal oscillations with closed-loop stimulation
Domingos Leite de Castro (University of Porto & Institute for Research and Innovation in Health, Portugal)
Miguel Aroso (Institute for Research and Innovation in Health, Portugal)
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David B Grayden (University of Melbourne, Australia)
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Neurorehabilitation

Motor Evoked Potential Input-Output Curves Indicate Neuroplasticity After Cervical Spinal Cord Injury
Thibault Roumengous (Virginia Commonwealth University, USA)
Yeajin Cho (Virginia Commonwealth University, USA)
Yasmina Zeineddine (Virginia Commonwealth University, USA)
Carrie Peterson (Virginia Commonwealth University, USA)

Assessment of Mental Stress During 240-Days Isolation and Confined Environment using EEG Signals
Fares Al-Shargie (American University of Sharjah, United Arab Emirates)
Saleh Al-Ameri (Mohammed Bin Rashid Space Center, United Arab Emirates)
Abdulla Al-Hammadi (Mohammed Bin Rashid Space Center, United Arab Emirates)
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Usman Tariq (AUS, United Arab Emirates)
Hasan Al-Nashash (American University of Sharjah, United Arab Emirates)

Combined Action Observation, Motor Imagery and SSMVEP BCI Enhances Movement Related Cortical Potential
Aravind Ravi (University of Waterloo, Canada)
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Ning Jiang (University of Waterloo, Canada)

Assessment of Impaired Finger Independence of Stroke Survivors: A Preliminary Study
Jiahao Fan (Penn State University, USA)
Henry Shin (University of North Carolina at Chapel Hill, USA)
Xiaogang Hu (Penn State University, USA)

A stand-alone Augmented Reality intervention for chronic pain using embodied systolic stimulation
Oliver A Kannape (University Hospital Geneva & MindMaze SA, Switzerland)
Jonathan Pierret (IRR Nancy, France)
Robert Leeb (MindMaze SA, Switzerland)
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Modified carbon dots for potential flexible electrode applications
Amaal A Ali (American University of Sharjah, United Arab Emirates)
Mohammad Al-Sayah (American University of Sharjah, United Arab Emirates)
Amani Al-Othman (American University of Sharjah, United Arab Emirates)
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Investigating the relationship between cue immersion and the strength of motor imagery during hand and wrist movements
Christopher L. Hunt (Johns Hopkins University, USA)
Keqin Ding (Johns Hopkins University, USA)
Christoph S. Wagner (University of Edinburgh, United Kingdom)
Nicolas Berberich (Technische Universität München & Institute for Cognitive Systems, Germany)
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Marlis Gonzalez-Fernandez (Johns Hopkins University, USA)
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Orderly Motor Unit Activation Using Sinusoidal Low Frequency Alternating Current Stimulation
Awadh Alhawwash (Purdue University & King Saud University, USA)
M. Ryne Horn (Indiana University & Purdue University Indianapolis, USA)
Nathaniel Lazorchak (Indiana University & Purdue University Indianapolis, USA)
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Simultaneous Modulation of Cortical Activity and Phantom Pain in a Patient with Brachial Plexus Injury
Ali Asghar Asghar Zarei (Aalborg University, Denmark)
S. Farokh Atashzar (New York University, USA)
Winnie Jensen (Aalborg University, Denmark)
Armita Faghani Jadidi (Aalborg University, Denmark)
Romulus Lontis (Aalborg University, Denmark)

Human-Centered Design of a Vibrotactile Sensory Substitution Belt for Feet Somatosensation in a Patient with Multiple Sclerosis
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Exploring reconstruction of motor and sensory function through targeted reinnervation in rat model
Yuxin Ma (Zunyi Medical University, China)
Chunxiao Tang (Zunyi Medical University, China)
Guangfa Xiang (Zunyi Medical University, China)
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Frontal gamma as a marker of effective training during neurofeedback to improve memory in patients with mild cognitive impairment
Yayu Lin (University of California San Diego, USA)
I-Wei Shu (University of California San Diego, USA)
Fiza Singh (University of California San Diego, USA)

Can the crossmodal congruency task be a proxy for intuitiveness of sensory feedback in lower limb amputees?
Rohit Bose (University of Pittsburgh & Rehab Neural Engineering Labs, USA)
Bailey Petersen (University of Pittsburgh, USA)
Roberta Klatzky (CMU, USA)
Lee Fisher (University of Pittsburgh, USA)

Entrainment of Cerebellar Nuclear Cells via AC Stimulation of the cerebellar Cortex
Qi Kang (New Jersey Institute of Technology, USA)
Eric J Lang (NYU Grossman School of Medicine, USA)
Mesut Sahin (New Jersey Institute of Technology, USA)

Cognitive-motor performance assessment during in-person and remote practice of action sequences
Alexandra Shaver (University of Maryland, USA)
Rodolphe J. Gentili (University of Maryland & Maryland Robotic Center & Neuroscience and Cognitive Science Program, USA)
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Pilot Performance a Chronic Intraneural Auditory Neuroprosthesis in Felines
William M Thomas (University of Utah, USA)
Richard K Gurgel (University of Utah, USA)
David Warren (University of Utah, USA)

Automating visual feedback in H-reflex operant conditioning studies: Feasibility and first steps
John McLinden (University of Rhode Island, USA)
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Linear versus Nonlinear Muscle Networks: A Case Study to Decode Hidden Synergistic Patterns During Dynamic Lower-limb Tasks
Rory O'Keeffe (New York University, USA)
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Asymmetric Changes in Intersegmental Covariation Across Ambulation Levels and Prosthetic Devices for Transfemoral Amputee Gait
Nili E Krausz (Weizmann Institute of Science, Israel)
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Perilaryngeal Functional Muscle Network in Patients with Vocal Hyperfunction - A Case Study
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Motor-Cognitive Dual-Task Paradigm Affects Timed Up & Go (TUG) Test Outcomes in Stroke Survivors
Masoud Abdollahi (Rochester Institute of Technology, USA)
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Variability in Depolarization Sensitivity Underlies Differential Responses to High-frequency Stimulation of ON and OFF RGCs
Jae-Ik Lee (Massachusetts General Hospital & Harvard Medical School, USA)

Assistive Multimodal Wearable for Open Air Digit Recognition Using Machine Learning
John M Rattray (Johns Hopkins University, USA)
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Effects of EEG Analysis Window Location on Classifying Spoken Mandarin Monosyllables
Mingtao Li (Southern University of Science and Technology, China)
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Improvements in muscle recruitment selectivity by multielectrode transcutaneous spinal cord stimulation
Noah Bryson (Washington University in St. Louis, USA)
Jie Fei (Washington University in St. Louis, USA)
Rachel Hawthorn (Washington University in St. Louis, USA)
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Enhancing P300-based brain-computer interface Performance through attention-elevated stimulation
Jongsu Kim (UNIST, Korea (South))
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The Comfort of Temporal Interference Stimulation: Computational and Psychophysical Evaluation
Leen Jabban (University of Bath, United Kingdom)
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Electrical brain activity during mechanical bodyweight-supported walking does not differ between genders
Seongmi Song (Texas A&M University, USA)
Andrew D Nordin (Texas A&M University, USA)

Wearable MXene-Bioelectronics for Diagnostics, Precision Rehabilitation, and Prosthetics Control
Raghav Garg (University of Pennsylvania, USA)
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Josh Baxter (University of Pennsylvania, USA)
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Implanted Pulse Generators in Lower Extremity Neuroprostheses: a 25-Year Review
Lizbeth A. Leapo (Case Western Reserve University, USA)
Michael Miller (Louis Stokes Cleveland Veterans Affairs Medical Center, USA)
Ronald J Triolo (Case Western Reserve University, USA)

A wirelessly driven passive cuff electrode for temporal interference stimulation in peripheral nerves
Michael T Williams (Johns Hopkins University, USA)
Pedro Irazoqui (Johns Hopkins University, USA)

A novel brain-machine interface (BMI) system for motor rehabilitation in a severely impaired chronic stroke participant
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Engagement feedback activates stronger motor cortex activities in VR motor exercise
Hyunmi Lim (Keimyung University, Korea (South))
Jeonghun Ku (Keimyung University, Korea (South))

Distraction effects of speech perception and production on ERP-based BCI
Minju Kim (UNIST, Korea (South))
Dong-uk Kim (UNIST, Korea (South))
Sung-Phil Kim (UNIST, Korea (South))

Electrode Positions in One-size-fits-all Device for Motor-Related Electroencephalography
Mori Fukuda (Keio University, Japan)
Junichi Ushiba (Keio University, Japan)

Surface EMG features during wrist flexion-extension in Huntington's disease
Vitória S Fahed (University College Dublin, Ireland)
Emer Doheny (University College Dublin, Ireland)
Caitlin McDonald (University College Dublin, Ireland)
Jérémy Liegey (University College Dublin, Ireland)
Monica Busse (Cardiff University, United Kingdom)
Jennifer Hoblyn (Bloomfield Health Services, Ireland)
Madeleine Lowery (University College Dublin, Ireland)

Sensory Neuroprosthesis Improves Recovery from Treadmill Induced Stumbles
Suzhou Li (Case Western Reserve University, USA)
Ronald J Triolo (Case Western Reserve University, USA)
Hamid Charkhkar (Case Western Reserve University, USA)

DC stimulation with optic nerve cuff electrode for electrically-mediated survival of transplanted retinal ganglion cells
Brett Collar (Johns Hopkins University, USA)
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Thomas V Johnson (Johns Hopkins University, USA)
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Adapting In- and Out-Field-Of-View Processing in Hearing Aids Diminishes Listening Effort Indexed by EEG Phase Organization
Adrian Mai (Saarland University, Germany)
Maja Serman (WS Audiology, Germany)
Sebastian Best (WS Audiology, Germany)
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Andreas Schroeer (Saarland University, Germany)
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Restoring sensations by percutaneous spinal cord stimulation in people with lower-limb amputation
Rohit Bose (University of Pittsburgh)
Ameya Nanivadekar (University of Pittsburgh, USA)
Bailey Petersen (University of Pittsburgh, USA)
Devapratim Sarma (Carnegie Mellon University, USA)
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The Phantom Menace: Transcutaneous Spinal Cord Stimulation to Reduce Phantom Limb Pain
Ashley Dalrymple (Carnegie Mellon University, USA)
Lee Fisher (University of Pittsburgh, USA)
Douglas Weber (Carnegie Mellon University, USA)

Paired-pulse extracellular electrical stimulation for selective activation of retinal ganglion cells
Sasidhar Madugula (Stanford University, USA)
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Textile-based wireless EMG wearable system for prosthetic arm control
Korine Ohiri (Johns Hopkins University Applied Physics Laboratory, USA)
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Spinal cord stimulation reduces compensatory gait strategies in a subject with Spinal Muscular Atrophy
Serena Donadio (Rehab Neural Engineering Labs, USA)
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Alterations in motoneuron firing patterns with deep brain stimulation for Parkinson's disease
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Feasibility of using task-induced changes in resting state functional connectivity to predict motor recovery in post-stroke individuals
Kristin Schmidt (University of Delaware, USA)
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Stimulus Reconstruction Accuracy as Performance Measure of Split Processing Schemes in Hearing Aids During a Realistic Simulated Driving Situation
Sebastian Langguth (Saarland University, Germany)
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Establishing a Biotic Connection to the Brain: An Innovative Transition Micro-Electrode Array Technology for Neural Recording and Stimulation
Yantao Fan (University of Utah, USA)
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Carbon nanotube yarns provide superior signal-to-noise ratio and higher information content from recordings in rodent sciatic nerve
Bhanu Prasad Kotamraju (Case Western Reserve University, USA)
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Dominique Durand (Case Western Reserve University, USA)

Reliability Testing of Thinned Tissue-Engineered Electronic Nerve Interfaces
Kenneth A Fluker, Jr. (University of Florida, USA)
Ladan G Jiracek-Sapieha (University of Florida, USA)
Jack W. Judy (University of Florida & UFNano, USA)

Differential Modulation Of Gamma Band Activity in EEG During Migraine In rodents
Fadi Aiman Gerges (Arizona State University, USA)
Jit Muthuswamy (Arizona State University, USA)
Bruce Towe (Arizona State University, USA)

High-Isolation Gaskets for High-Channel-Density Implantable Connectors
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Peripheral nerve inputs to the central NS

Phase Transfer Entropy to Assess Nonlinear Functional Corticokinematic Coupling
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Raymond Kai-Yu Tong (The Chinese University of Hong Kong, Hong Kong)
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Spatially-selective neuromodulation of efferent and afferent cardiac fibres in the cervical vagus nerve
Enrico Ravagli (University College London, United Kingdom)
Nicole Thompson (University College London, United Kingdom)
Ronald Challita (The University of California Los Angeles, USA)
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Application of direct current to the rat sciatic nerve can augment the sensory signal generated by plantar stimulation (1 page abstract)
David B Green (MetroHealth Medical Center, USA)
Shane A Bender (Case Western Reserve University & MetroHealth Medical Center, USA)
Gustaf M Van Acker (MetroHealth Medical Center, USA)
Kevin L. Kilgore (MetroHealth Medical Center, USA)
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Eliciting plantar sensation via nerve cuff electrodes in individuals with transtibial versus transfemoral amputation
Lindsey M Hauck (Case Western Reserve University & Louis Stokes Cleveland VA Medical Center, USA)
Hamid Charkhkar (Case Western Reserve University, USA)
Ronald J Triolo (Case Western Reserve University, USA)

EIT-based localisation of nerve fascicles using a FINE (flat interface) electrode array geometry
Enrico Ravagli (University College London, United Kingdom)
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Sensory Neuroprosthesis Reduces the Cognitive Load during Dual-Task Walking in Individuals with Lower Limb Loss
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Ronald J Triolo (Case Western Reserve University, USA)
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Injectable neurostimulators for occipital nerve stimulation (ONS) in awake, behaving rodents
Fadi Aiman Gerges (Arizona State University, USA)
Bruce Towe (Arizona State University, USA)
Zaman Mirzadeh (Barrow Neurological Institute, USA)
Jit Muthuswamy (Arizona State University, USA)

Speckle and coherent optical imaging

Cerebral Vascular Resistance is Dysregulated Following Resuscitation from Cardiac Arrest
Yuhang Fu (Johns Hopkins University, USA)
Yucheng Shen (Johns Hopkins University, USA)
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Non-contact coherent optical imaging of evoked in-vivo fast optical neural responses
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Virtual Hiring Event: Scientific & Professional Jobs at FDA

May 23 - 25, 2023

9:00 a.m. - 5:00 p.m. ET

The Center for Devices and Radiological Health (CDRH) at FDA is seeking candidates from a wide variety of backgrounds for scientific and professional jobs.

Join us for:

- Job Interviews
- Real-time engagement with professionals from CDRH
- Highlights of the CDRH employee experience
- Information on federal employee benefits

Registration period is open April 17 - May 25

Note: To be considered for a job interview, register by May 12.
Resumes received after May 12 may be given consideration for future employment opportunities.

To learn more about career opportunities and register for the job fair, visit us at fdacdrhjobs.vfairs.com