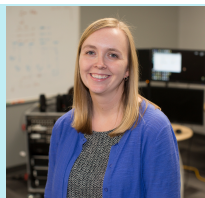


Brain-Computer-Interface Society

Note from the president



Dear friends,

As we enter a new year, I am taking time to reflect on 2021, while also looking ahead to the future. I know that many of you have faced significant professional and personal challenges this past year. The ways that we conduct research, collaborate, and communicate have changed more than we might ever have imagined. As a Society, we have tried to adapt to these the ever-changing challenges associated with the coronavirus pandemic to continue to promote BCI research and foster collaboration in our community. I extend a sincere 'thank you' to our Past-President, José del R. Millán, for guiding us through the first year of the pandemic as well his leadership that led to the creation of many new initiatives for the BCI Society.

One major success for 2021 was the virtual BCI conference that was hosted in June. While we were not able to gather in person, the virtual format enabled more than 400 people from 35 countries to attend. Attendees participated in interactive workshops, learned about the latest BCI research achievements from the keynote speakers, discussed pressing neuroethical issues in our field, interacted with poster presenters, and participated in online networking and social events.

Another exciting development from 2021 was the establishment of the BCI Thursdays online seminar series. Besides traditional workshops, these events include the Next Generations workshops, organized by the Postdoc and Student Committee, to provide technical background about fundamental and cutting edge BCI concepts. BCI Thursdays has expanded to include Trainee Spotlight sessions that highlight early career researchers as well as Career Advice sessions that provide an opportunity to engage with leaders from industry, academic, and government.

As you all know, the continued uncertainty surrounding the coronavirus pandemic led us to postpone the next International BCI Meeting until 2023. Despite this, the BCI Society Board and Committees have been working hard to plan activities for 2022 that we hope will keep us connected and provide professional and networking opportunities, particularly for trainees and early career investigators. Stay tuned!

As always, please reach out to me if you have any feedback or suggestions for the BCI Society.

Jen Collinger, President of the BCI Society

Interview with Professor Cuntai Guan

In each of the BCI Society newsletters, we aim to put a senior BCI researcher in the spotlight. For this edition, we asked Professor Cuntai Guan to answer a list of interview questions about his career path, his research and his opinion on the latest developments in the field. We would like to thank Professor Guan for his insightful and inspirational answers.



Could you tell us a bit about your background, education and career path until now? When and where did you join the BCI field? What is your current position and what is the composition of your research team?

I got my Ph.D. degree in pattern recognition and speech processing in 1993. I then joined industries and research institutes for several years doing R&D on speech recognition. I started my BCI research in 2003. I am currently a President's Chair Professor in Computer Science and Engineering at the Nanyang Technological University, Singapore. Our lab, Centre for Brain-Computing Research, comprises 7 Research Fellows & Research Associates, 14 Ph.D. students, and more than 20 collaborators from hospitals and universities.

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Highlights:

- Meet the winners of the Early Career Awards
- BCI Society Poster - get yours and use it to spread news about the BCI Society
- Have you heard about..... the BNCI Horizon 2020 data base?

Interview with Professor Guan continued

What attracts you to BCI research?

I was fascinated by the vision of brain control at the beginning and later became more interested in its potential in medical applications for neurological and mental disorders. My background and training were in computer science and pattern recognition, so I am excited to apply machine learning approaches to solve challenges in BCI.

What, in your opinion, has/have been your most significant contribution(s) to the BCI field?

I think my significant contribution to BCI is to push the technology from technical development to clinical applications. I feel a deep sense of achievement when the BCI technologies were trialled by stroke patients or children with ADHD. Along the way, my team also spent significant effort developing innovative BCI algorithms.

What do you enjoy most in your current position or in BCI research in general?

Since BCI is an interdisciplinary research area, I really enjoy working with my team and many collaborators, locally and internationally, to address BCI challenges, develop new BCI algorithms, test new BCI systems, and solve clinical problems. I especially enjoy working with clinicians to turn ideas into solutions and eventually test the system on targeted users.

What do you consider new important and positive developments in the BCI field?

It is exciting to see many clinical applications in many labs worldwide in the past few years, especially for neural rehabilitation in stroke or spinal cord injury patients. Although most studies are still at the feasibility study stage, the aggregated evidence points us to a very promising direction of possibly scaled use of the BCI technologies in clinics or at home. New applications in improving cognition and emotion using BCI as the core technology also emerged. It is also exciting to see many young researchers dedicate their efforts to BCI research, which helps push the envelope of the research with fresh ideas and deeper innovations.



What aspect or development worries you?

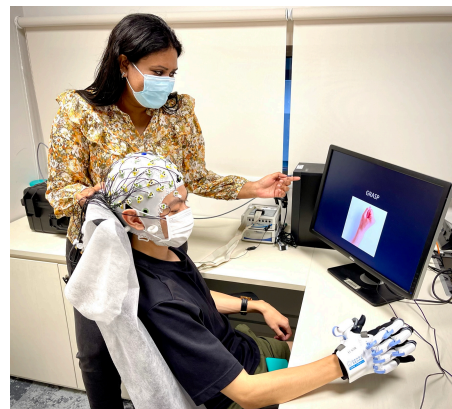
The ethical use of BCI is a critical aspect. We should always be fully aware of the benefits and limitations of the BCI technologies and advocate with a full spectrum of such information. Appropriate and sufficient validation is mandatory before the BCI products can be claimed to achieve the declared effects.

What advice would you give to junior researchers entering the BCI field now?

Look into the fundamentals by understanding the neural mechanisms and asking basic questions to address significant challenges in BCI research. It is extremely rewarding for junior researchers to build a solid neuroscience foundation and put their hands on actual BCI experiments.

Your main research is on non-invasive BCIs for rehabilitation. What do you think is the potential of BCIs here?

I believe non-invasive BCIs for rehabilitation hold a compelling promise to patients with stroke and even spinal cord injury. In conjunction with other feedback or actuation devices (e.g. robotics, FES, electrical stimulations etc.), BCIs will probably become a mainstream rehabilitation platform due to their unique advantages in enhancing or restoring motor, cognitive and affective functions in one integrated system. At the same time, the



neural recordings can provide monitoring and/or prognostic roles.

You have a strong focus on deep learning models – where do you see their potential and where their limits in BCI research?

Like other fields, deep learning will play a significant role in BCI. First, it has much richer learning capabilities than the conventional machine learning methods. Second, explainable AI (XAI) methods provide more possibilities for interpreting or visualizing the information learned in the deep learning model. This, in turn, could potentially lead to a better understanding of the neural mechanism of brain activities. Further, deep learning will continuously improve the performance when more data are available, therefore potentially solving long-standing problems in BCI like calibration burden, cross-session variability, cross-subject variability, etc.

Featured Member Profile Pages

Did you recently join or start a new lab? Or did you finish your PhD? The Featured Member Profile pages are there for you to share your story with the BCI Society. If you are interested in being featured in one of the upcoming newsletters, please contact us via communications@bcisociety.org.

Antonio Esposito, PhD student, Politecnico di Torino

Could you tell us about your new lab? Where is it? Who are part of it? How is it embedded in your institute?

The “Augmented Reality for Health Monitoring laboratory” (ARHeMlab) was recently founded at the University of Naples Federico II and still it has member associates all over Italy. The three pillars of this lab are extended reality, artificial intelligence, and neural engineering, and it is particularly focused on healthcare applications. This laboratory is part of the Department of Electrical Engineering and Information Technology (DIETI), and hence it has an engineering core. However, we are strictly and necessarily linked to physicians and other healthcare professionals. Unsurprisingly, professor Pasquale Arpaia is both the laboratory head and the director of the Interdepartmental Research Center on Management and Innovation in Healthcare (CIRMIS) at Federico II.



What are the research projects in your lab related to brain-computer interfaces?

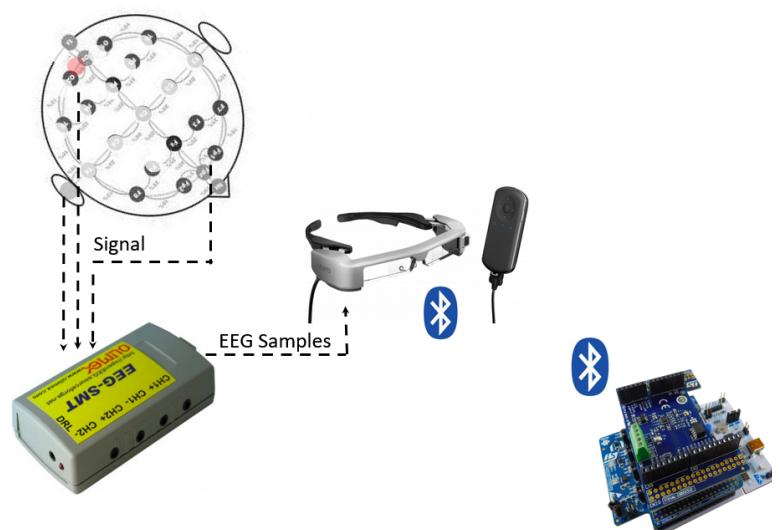
The “brain-computer interface division” of the lab covers reactive, passive, and active paradigms. In the first case, visually evoked potentials elicited by means of smart glasses are used for communication and control and these systems are currently investigated for the rehabilitation of children with ADHD. In the passive BCI case, monitoring of stress, engagement, and attention is studied with the aim to modulate the surrounding environment according to the user's mental state. Finally, my personal research activity is on brain-computer interfaces relying on motor imagery, which are developed in conjunction with virtual reality for control applications and neurofeedback. In all of these activities, we have a metrological approach and the systems are mostly developed by using dry electrodes and components off-the-shelf.

Can you please tell us about your other new responsibilities, such as teaching?

In addition to research, I am also a teaching assistant at master degree courses in electronic engineering, automation engineering, and computer science. The first is an advanced course on “Electronic Measurements” covering all the fundamental aspects of metrology, while the second is the course on “Instrumentation and Measurement for Smart Industry”, in which we also had the occasion to propose a system integrating augmented reality and a reactive brain-computer interface for the monitoring of concrete bridges.

Do you have any funding sources that you would like to thank?

The founding of ARHeMlab was possible thanks to the “ICT for Health” project, which was financially supported by the Italian Ministry of Education, University and Research (MIUR), under the initiative ‘Departments of Excellence’, through an excellence grant awarded to the Department of Information Technology and Electrical Engineering of the University of Naples Federico II, Naples, Italy.



Featured Member Profile Pages

Sergey Stavisky and David Brandman, UC Davis Neuroprosthetics Lab

Could you tell us about your new lab? Where is it? Who are part of it? How is it embedded in your institute?



The [UC Davis Neuroprosthetics Lab](#) just opened its doors on October 1st. It's co-directed by both of us - Sergey Stavisky, PhD, and David Brandman MD PhD, which gives us the benefit of both of our efforts and complementary areas of expertise. We're both new faculty in the [UC Davis Department of Neurological Surgery](#). Our lab is also affiliated with the [UC Davis Center for Neural Engineering and Medicine](#), the [Center for Neuroscience](#), and the wider [UC Davis Neuroscience Consortium](#) and benefits from a very strong local community of over 300 faculty spanning neuroengineering, medicine, and neuroscience. We're also actively collaborating with a number of other research groups worldwide, including those of the [BrainGate consortium](#).

What is the main research project in your lab related to brain-computer interfaces?

Our main project right now is to develop an intracortical BCI to restore lost speech. We will place chronic multielectrode arrays in cortical areas involved in speech production of volunteer clinical trial participants who have lost, or are about to lose, their ability to speak. Our goal is to read out the neural correlates of the person's attempted speech output either complete words a split second after the person tried to speak them ("Brain-to-Words"), or to synthesize voice in real-time ("Brain-to-Voice"). We're building upon foundational prior speech decoding work using ECoG and sEEG, as well as our previous experience developing high-performance cursor and robot arm BCIs using action-potential resolution signals from multielectrode arrays. This multidisciplinary project spans neuroengineering, systems and computational neuroscience, applied math/machine learning, and translational neuro-medicine.

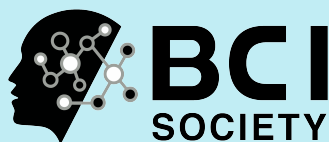
Can you please tell us about your other new responsibilities, such as teaching?

Outside of research and mentoring trainees in the lab, Sergey is looking forward to teaching neuroengineering and systems neuroscience topics to UC Davis students. In addition to spending half his time on research and co-directing the lab, David is also an attending functional stereotactic neurosurgeon at the UC Davis Medical Center in Sacramento, where he uses neuromodulation and minimally invasive procedures to help people living with movement disorders, chronic pain, spasticity, and epilepsy. He also helps train medical students/residents.

Do you have any funding sources that you would like to thank?

We were able to kick off our ambitious human neuroscience and BCI research program with a generous startup investment from our University of California, Davis department, and Sergey's Career Award at the Scientific Interface from the Burroughs Wellcome Fund. We were also just awarded a Pilot Award from the Simons Foundation to study the neural ensemble dynamics underlying speech preparation and production.





Become a Member or renew your BCI Society membership today

Membership in the BCI Society is open to all scientists, principal investigators, postdocs, and students from around the world involved in the many research and practical aspects of BCI research. We welcome all involved in BCIs, including engineers, doctors, therapists and business people.

What are some of the benefits for members?

- Discounted registration for the BCI Society Workshop Series
- Complimentary registration for the Next Generations events
- Complimentary registration for the Master Classes
- Access to member-only initiatives and activities
- Free access to the online edition of the International peer-reviewed journal Brain-Computer Interfaces

Our one or two-year membership cycle has started in January 2022!

For one year:

Student:	\$65 USD
PostDoc:	\$95 USD
Regular:	\$135 USD

For two years:

Student:	\$95 USD
PostDoc:	\$145 USD
Regular:	\$195 USD

For more information, please visit the BCI Society webpage <http://bcisociety.org>

Society News and Views

BCI Society Poster

The BCI Society is always happy to welcome new members and thereby improve interaction and collaboration among BCI researchers, clinicians, the industry, non-profit organizations, end-users, government entities, and others active in BCI research and development. To create more awareness about the BCI Society, we have developed a poster (<https://bcisociety.org/wp-content/uploads/2022/01/BCI-Flyer-Final.pdf>). If you are planning to attend or present at a symposium or conference, we invite you to take the poster with you (in large format or as handouts) and invite people to join! Members are also welcome to share this poster through university websites or other venues where our poster may be of interest.

Looking for interesting events or job opportunities? Visit the BCI Society website!

Did you know that the BCI Society website lists events that are of interest for BCI Society Members? If you know of an important event, you can contact the BCI Society and ask us to mention the event on our website. Your request will then be processed by the Communications Committee and, if relevant, the board. We distinguish three types of events: Other events, Affiliated events and Partnered events. Please take a look at <https://bcisociety.org/affiliated-events/> for more details.

If you are looking for a new position in the BCI field, take a look at the Job Bank at the BCI Society website. We invite all BCI Society members to post their open positions there. So, do not hesitate to contact us if you want to make a posting or if you have questions.

All requests can be sent to cendrine@podiumconferences.com.

Did you know... about the BNCI Horizon 2020 Data Resource?

Since the worldwide Covid-19 crisis, you may have experienced that neural data acquisition is less easy and sometimes even impossible, because participants are more difficult to find, or certain measurements cannot take place due to Covid-19 related restrictions.

We have news: The data you need to answer your research question, or to test your new algorithm, may already exist! Some years ago, several members of the BCI Society were partners in a project funded by the EU called BNCI Horizon 2020. In collaboration with many other top experts in BCIs and related fields, this project initiated, among others, an open access database for BCI datasets.

The database can be found HERE* and currently contains 28 well-curated EEG, ECoG and fNIRS datasets from healthy participants and people with motor impairment. Also, several links to other data resources are provided. We invite all who are in need of data to visit the website and see if it contains a dataset that fits your purposes.

We encourage anyone who has data that could be of value for others to contact Gernot Müller-Putz** for instructions on publishing data in the database. Since the existence of this website, more than 340k visitors could be counted – more than 123k users were visiting the database. Over the years, an incredible amount of valuable data has been collected in our field. Together, we can make sure that this data is used to its fullest extent!

* <http://bncl-horizon-2020.eu/database>

** gernot.mueller@tugraz.at

Society News and Views continued

Invitation to engage!

The BCI Society aims to engage all people worldwide working on BCIs. We invite you all to join, participate and contribute to the Society, its events and committees. Also, do not hesitate to contact us if you have an idea for an event or initiative that will be attractive for the BCI community, including for people in areas that are typically underrepresented in BCI Society activities. Let's work toward BCI for everyone!

And the winner is....

The BCI Society is proud to announce the winners of the 2021 Early Career Awards:

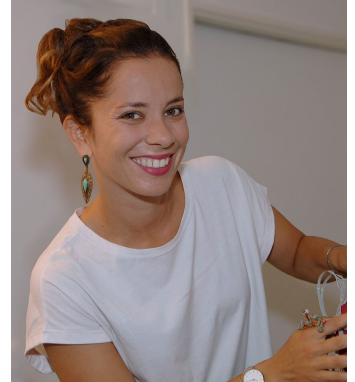


For the Methods Category: Francis Willett.

Francis is a HHMI Research Specialist III at Stanford University. He focuses on intracortical BCIs for restoring movement in people with paralysis. The jurors were excited by the originality and innovative nature of his work and by the number of first-author, high-impact, well-cited publications. They acknowledged the driving force this nominee represents in terms of developing new methods to increasing the reliability of brain machine interface to restore motor function as well as our understanding of the brain function.

For the Neuroscience Category: Camille Jeunet

Camille is a tenured research scientist at CNRS, the French National Scientific Research Center. She focuses on user learning in mental-imagery based BCIs. The jurors were impressed by this nominee's original contributions to the understanding of under-explored BCI-topics. They emphasized the work of this nominee has the potential to significantly influence the BCI field as a whole.



The Awards Committee and the Board of the BCI Society would like to take this opportunity to express their gratitude and appreciation to the jurors, Luigi Bianchi, Ricardo Chavarriaga, Febo Cincotti, Karunesh Ganguly, Robert Gaunt, Ning Jiang, Virginia De Sa and Aleksandra Vuckovic for their valuable contribution in selecting the winners.

Congratulations, Francis and Camille on this achievement!

Please keep an eye on the 2022 BCI Society virtual events and the next edition of the newsletter to learn more about our winners!

BCI Society Committee Updates



Following the exciting first edition of the BCI Society Early Career Award (ECA) in 2020, which was focused on the translational aspects of BCI research, the Awards Committee has been coordinating the evaluation process of the two new categories of the ECAs, namely the ECA Neuroscience and ECA

Methods, which together with the Translational ECA are meant to acknowledge the multi-disciplinarity

of the BCI field. Since the previous newsletter, the Awards Committee has worked on collecting the nominations for the 2021 ECAs and on implementing the procedure for the nomination of 2021 ECAs jury members. This year we had a total of 11 nominations distributed between the two categories. The jury was composed by 8 jurors with a balance between neuroscience and methods expertise. Each application was evaluated by three jurors. Then, the jurors discussed the nominations and evaluations in a virtual meeting, and proposed a winner for the ECA Methods and ECA Neuroscience category to the board, who subsequently gave their approval. Please see **page 6** to find out who the winners are! The winners will be invited to give a presentation during one of the online events that are planned for 2022. We congratulate the ECA2021 Methods and ECA2021 Neuroscience winners, and are grateful to the juror members, Luigi Bianchi, Ricardo Chavarriaga, Febo Cincotti, Karunesh Ganguly, Robert Gaunt, Ning Jiang, Virginia De Sa and Aleksandra Vuckovic, for their commitment to accomplish a successful 2021 ECA edition.



The Communications Committee greatly enjoyed participating in vBCI2021 and reading your many enthusiastic messages about it on Twitter! To help ensure that all members (including those who are not using Twitter) can stay connected and up-to-date about activities organized by the BCI Society, we are planning to setup a BCI Society LinkedIn account,

and will add Wechat to the channels we use for sharing our updates. In addition, we would like to encourage you to share BCI Society posts on other social media.

In the past months, we made sure to keep the Resources tab on the BCI Society website up to date. In this tab, you will find an overview of open positions in the BCI field, interesting events that are coming up, and a link to freely available research data. In addition, we added a new feature, called 'Research participation'. If you are looking for study participants with impairment, you can now post your recruitment information on the BCI Society website. We hope that this new option will help you reach more potential participants.

Finally, we have one request for all of you who are speaking with journalists or the general media about your great work: please mention the BCI Society and refer to our website in your interviews. You will thereby raise awareness among journalists and the general media about the BCI community at large and about the many types of research conducted in our

field, and draw attention to the activities developed by the BCI Society. We hope that this awareness will contribute to a well-balanced coverage of BCI-related topics in general media.



Following the establishment of a fundraising committee in 2021, we have been involved in establishing and writing the framework for a successful partnership with the BCI Society that will be implemented for all possible sponsors of the BCI Society.

We have been working towards securing funding for our BCI Society Awards, the Trainee Collaboration

Projects, Future events (e.g. BCI Thursdays) and Social events (e.g. the SFN social).

The mandate of the committee is to assist the Society in the planning, coordination and implementation of all fundraising activities in support of the projects and activities of the society. If you would like to sponsor the BCI Society or if you would like to share any thoughts related to sponsoring, please contact the head of the Fundraising Committee, Prof. Natalie Mrachacz-Kersting (email: natalymk@icloud.com).



The Membership Committee (MC), together with the Postdoc and Student Committee (PSC), continues to seek ways to expand and support the membership, including member discounts for registration to the BCI Society Workshop Series, and access to member-only initiatives and activities. One initiative, the Trainee Collaboration Project (TCP) is ongoing.

Eighteen BCI Society members across institutions and disciplines joined three projects. Each project was proposed and led by students, and is assigned one or more mentors. They are: 1) Inferring Intent from EEG using Discriminative Neural Networks (Student leader: Niklas Smedemark-Margulies, Mentors: Bill Speier and Deniz Erdogmus); 2) Joint Bayesian Artifact Removal and Intent Inference for BCI (Student leader: Basak Celik, Mentor: Deniz Erdogmus); and 3) The effect of bone conduction auditory stimuli on the performance of EEG-Biometric (Student leader: Nibras Abo Alzahab, Mentor: TBA). The MC is continuing to recruit mentors for Project 3. Next TCP update meeting was held in January 2022. Please contact Gernot Müller-Putz (Gernot.Mueller@tugraz.at) with questions, suggestions, or to join in membership committee activities. For information on the Postdoc and Student Committee see their article in this issue. The Membership Committee continues to seek ways to support members, including member discounts for registration to the BCI Society Workshop Series, and access to member-only initiatives and activities. Please contact Gernot Müller-Putz with questions or suggestions.

If you want to learn more or if you want to participate, please email: members@bcisociety.org.

BCI Society Committee Updates



We wanted to thank everyone who submitted a Workshop Proposal for the 2022 meeting that has now been postponed to 2023. We received 22 proposals covering a wide range of topics that we were excited to share with the community. We appreciate your patience and flexibility with the change in plans and are looking forward to seeing the updates in these areas when we meet again in 2023. In

the next few months, we will start working on the program for the 2023 meeting so if you have suggestions for speakers, topics, or events, please let us know!



The Postdoc and Student Committee (PSC) continues to organize online initiatives to promote career and professional development opportunities of the BCI Society trainees. The committee redesigned the NextGeneration seminar series to host speakers from both academia and industry in each session, to better represent the changing world

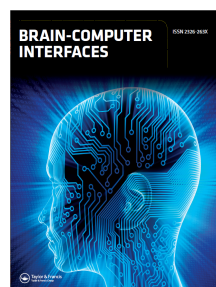
of BCI research. In September we had Dr. Chethan Pandarinath from Emory University and Georgia Tech, and Dr. Joey ODoherty from Neuralink, and in December we had Dr. Fabien Lotte (INRIA) and Dr. Cristopher Guger (g.tec). The PSC has also organized a new initiative called Trainee Spotlight, where trainees present their ongoing research and receive feedback from their peers. This series kicked off on November 18, 2021, with three trainees presenting their work. Furthermore, the PSC has also organized a career advice panel on December 6, 2021, where three panelists discussed different opportunities for trainees to boost their career in academia, industry, and government. Finally, the PSC issued a call for participation, which has received over 20 applications and, among those, 6 new members were selected to serve in the committee for the next 2 years, in addition to 4 returning members and 2 board liaisons (see <https://bcisociety.org/committees/>). The PSC can be contacted at StudentPostdoc@bcisociety.org.



The Young Talent Committee is grateful to the National Institutes of Health, the National Science Foundation, the Wellcome Trust and Flanders Research Foundation for their support of vBCI in 2021. We are actively pursuing funding options to support trainee activities in 2022 and aim to support travel awards for trainees for the in-person meeting in 2023. For more information, please contact the chair of the Young Talent Committee, Dr. Jennifer Collinger (email: collinger@pitt.edu).

Journal Brain-Computer Interfaces

***Brain-Computer Interfaces* is recruiting Reviewers and Associate Editors.**



In 2021, the IEEE P2731 working group that developed a lexicography for BCI research organized a special issue published in Volume 8, Issues 3-4 in *Brain-Computer Interfaces*. This special issue contains one BCI glossary article and six articles focusing on a different aspect of a functional model for BCI (e.g., physiology, psychology, transducer, data storage and sharing, BCI software

in Python, and control interface). These articles are best read together as presented in the special issue, since they complement and build on each other.

Brain-Computer Interfaces continues to make progress toward an impact factor, which is awarded to journals whose citation counts are in the top 50% of their category in the Emerging Sources Citation Index (ESCI). In the category of "Engineering, Biomedical", *Brain-Computer Interfaces* ranks 62/106. So, we only have to move up a few places to reach the top half of the rankings and get an impact factor. We appreciate you sending *Brain-Computer Interfaces* your articles for publication and citing articles from *Brain-Computer Interfaces*.

If you choose to publish open access, remember that BCI Society members get a **50% discount on open access article publishing charges**.

Topics and Events of Interest for BCI Society Members

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