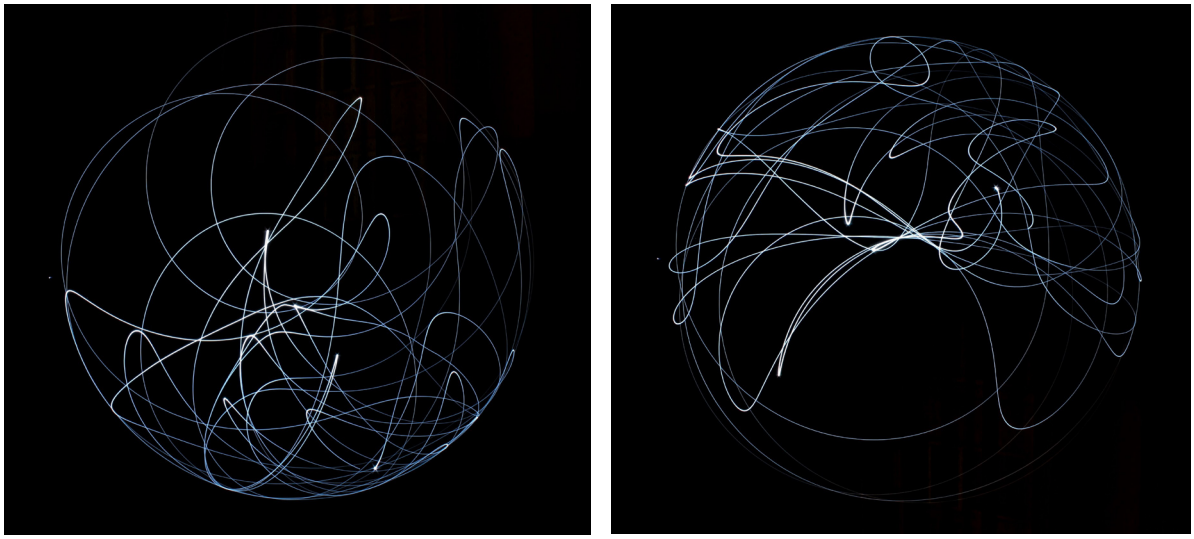
INCUBATOR

Institute of Neural Computation
University of California, San Diego



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UCSD NAMED NATIONAL ENDOWMENT FOR THE ARTS LAB

The Incubator is written [in part] and designed by Margot Wohl - INC Newsletter Editor
UCSD Neuroscience Graduate Student
mwohl@ucsd.edu

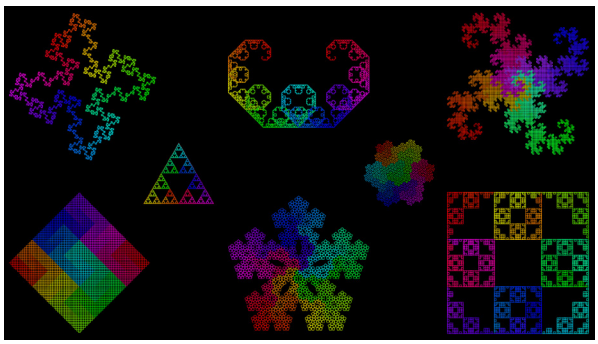
THE QUEEN OF CHAOS TOWER

The fourth floor of the Salk Institute for Biological Studies is mostly filled with pipes and freezers, but it is also home to part of the Sejnowski lab. Walk through a wooden door at the southwest corner and you've entered the Chaos Tower. The person that named it so, the veritable queen of the space, is Claudia Lainscsek. She jokes that her long blond hair could be let down over her window as passage for her students. There are no chaotic vibes to the Chaos Tower – the name refers to the kind of math that gets used to make meaning of endless streams of data. If Claudia is queen of one thing, it's the use of non-linear algorithms to interpret all kinds of phenomenon, from earthquakes to seizures.

Dr. Claudia Lainscsek's desk in the Chaos Tower. Sometimes three monitors are needed!

As a student in Gratz, Austria, Claudia studied physics. Halfway through her thesis on plasma physics, she went to an art show and was struck by the beauty of a fractal within a piece of artwork. The kind of math that can describe such mesmerizing marvels is often called chaos theory or dynamical systems theory. It can capture information from multiple systems that interact with each other in seemingly random ways and systems that don't abide by linear principles.

Claudia developed her own mathematical tool to study chaotic systems called delay differential analysis (DDA). It's not that complex of a formula, just three variables. But it's built upon the idea that if you take a time series and combine it with a delayed version of itself, voila, information will emerge that wasn't detectable through other methods like Fourier transformation or

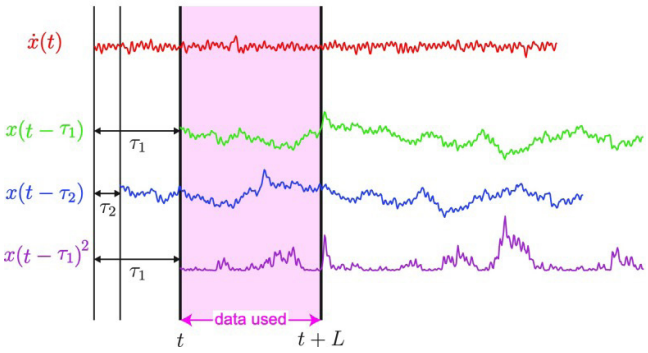


Examples of fractals which can be explained by Chaos theory. Source: https://elc.github.io/posts/plotting-fractals-step-by-step-with-python/

linear regression. Claudia is happy to tell me that her daughter, a physicist as well, has begun using the method. For Claudia, it is an all in one tool to predict many things about our world.

Take the weather, an amalgamation of many forces coming together in ways we are just now getting better at modeling. But the modeling still has room for improvement. At a recent Chapman conference in Alaska, climate scientists were presenting about the influence of El Niño on the weather in Alaska using Pacific Decadal Oscillation (PDO) and El Niño/ Southern Oscillation (ENSO) data. Claudia asked for their data – she had a feeling that by applying DDA, she would see something interesting. "The data speaks to me sometimes," she says with a smirk. After the analysis ran, peaks emerged suggesting weather events but she wouldn't be sure until cross checking with the scientists. It turned out that those peaks corresponded to El Niño. The weather scientists, impressed, began an ongoing collaboration with Claudia.

$$\dot{x} = a_1 x_1 + a_2 x_2 + a_3 x_1^2$$



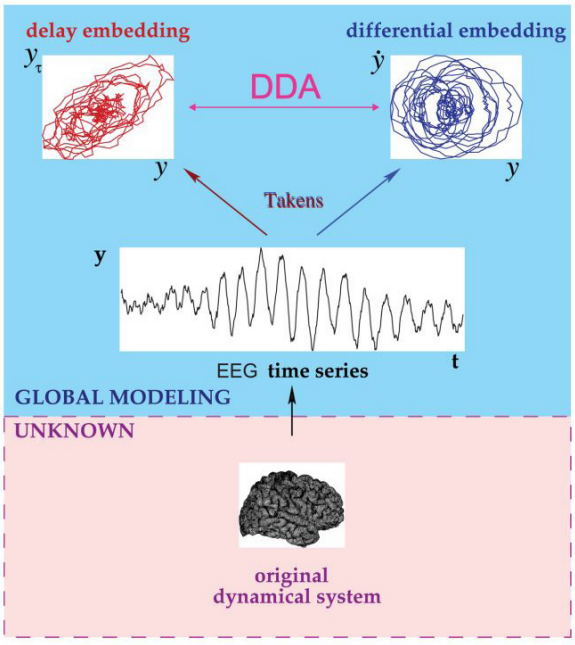
A schematic of how delay differential analysis is calculated from Claudia's latest paper "Nonlinear dynamics underlying sensory processing dysfunction in schizophrenia" (PNAS, 2019)

THE QUEEN OF CHAOS TOWER

Primarily, though, Claudia works with brain signals from epileptic patients. That is what drew her to the Salk, the opportunity to work with brain data. "The brain is so complex and if you use a linear method to look at frequencies, you lose so much information." Epilepsy affects one in 26 people. Most are successfully treated with medicine, but others have intractable epilepsy. Extreme forms can require removal of half of the brain. But newer techniques have been deployed to predict seizures and diffuse them with electrical stimulation. False positives plague these systems and some patients' epilepsy is unpredictable.

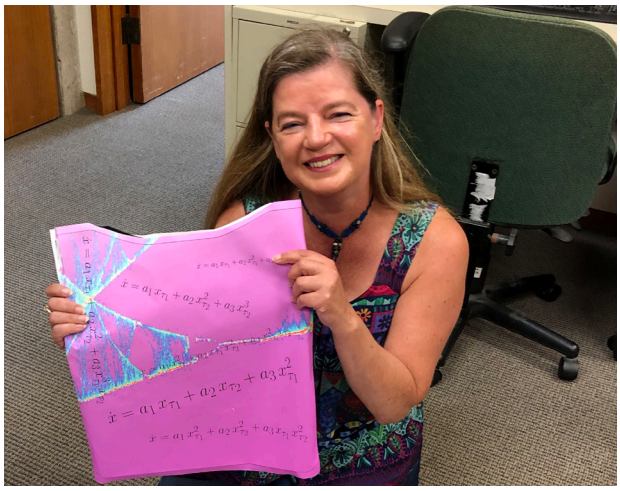
Example of a seizure arising as recorded by EEG. Source: https://commons.wikimedia.org/wiki/File:Epilepsy-_right_hippocampal_seizure_onset.png

With DDA, Claudia hopes to predict seizures with a higher accuracy and detect where in the brain seizures originate. She recently placed 17th out of 500 in a Kaggle contest to predict seizures for three patients. For two of the patients, she out-predicted everyone. "If I can help even 10% of epilepsy patients, I'll be happy."



A schematic of how delay differential analysis is applied to EEG data. Source: Sampson A, etal. "Delay differential analysis for dynamical sleep spindle detection" (Journal of Neuroscience Methods, 2019)

Back at the chaos tower, Claudia fawns over a picture of three chaos tower students, "princes of chaos", wearing equation-laden ties she sewed - one of her many math-themed art projects. Another project is spread out on the floor of an empty room: tote bags with a matching style to the ties. These are a nice distraction from days spent in front of her three computer monitors, coding away to analyze a new set of data. Whether it's epilepsy, heart conditions, earthquakes, explosions, El Niño, or dolphin echolocation, Claudia wants to predict it – take chaos and turn it into interpretable data. There is no predicting what she will predict next. "I'm chaotic, I'm non-linear."



TOP: The "princes" of Chaos Tower wearing matching ties made by Claudia From left: Aaron Sampson, Robert Kim, Chris Gonzalez

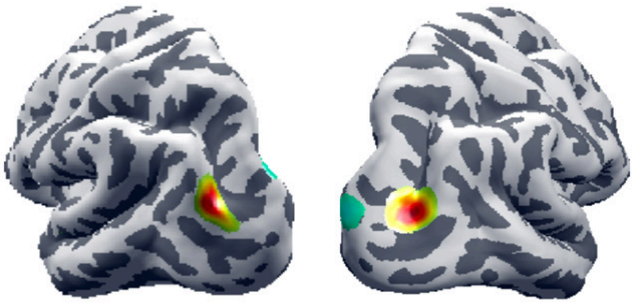
BOTTOM: Fabric covered in delay differential equations and graphs printed by Claudia for her latest artistic endeavor, tote bags.

UCSD RECEIVES $4.4M FROM NIMH FOR BRAIN IMAGING DATA "GATEWAY"

University of California San Diego has been awarded $4.4 million from the National Institute of Mental Health (NIMH) to create the Neuroelectromagnetic Data Archive and Tools Resource (NEMAR). The project is a part of the BRAIN Initiative, a public-private partnership funded through the National Institutes of Health. NEMAR will be a collaboration between the university's Swartz Center for Computational Neuroscience at the Institute for Neural Computation and San Diego Supercomputer Center (SDSC), and Stanford University's Center for Reproducible Neuroscience.

Scott Makeig, director of the Swartz Center for Computational Neuroscience, is the principal investigator (PI) on the grant. Arnaud Delorme, project scientist at the Swartz Center, and Amitava Majumdar, director of SDSC's Data-Enabled Scientific Computing division, are co-PIs alongside Russell Poldrack, the Albert Ray Lang Professor of Psychology at Stanford University.

"This level of cutting-edge multidisciplinary research collaboration is what UC San Diego is known for," says Chancellor Pradeep K. Khosla. "NEMAR has the potential to deepen the scope of data science, clinical research and patient care. Combining the expertise and insight of neuroscientists and computer scientists is one way we are advancing the frontiers of knowledge and discovering new ways to enhance lives everywhere."



A computed image of the distribution of a cortical source of high-density EEG data. Courtesy of SCCN.

NEMAR will act as a portal or gateway to the OpenNeuro data archive created by Poldrack and his team. OpenNeuro is a free and open platform that allows researchers to upload and share neuroimaging data. Submitted datasets can then be analyzed by anyone who logs in. OpenNeuro has been designated by the NIMH as a repository for data collected from BRAIN Initiative projects as well as other types of human neuroimaging data; however, to date workflows only exist for fMRI data. This means that even if other types of brain scans were uploaded to OpenNeuro, there is no infrastructure in place for data analysis.

NEMAR will build the infrastructure and tools necessary to add human neuroelectromagnetic brain imaging to the archive, including EEG (electroencephalography) and its magnetic counterpart, MEG (magnetoencephalography). This brain data will be uploaded through the NEMAR portal to SDSC. After NEMAR software evaluates the quality of the data and the completeness of its documentation, it will be added to the OpenNeuro archive.

Close-up of Comet supercomputer of SDSC

The project will also provide data visualization tools for OpenNeuro users. To do this, NEMAR will use the Neuroscience Gateway (NSG), operated through the National Science Foundation-funded Extreme Science and Engineering Discovery Environment (XSEDE), a national network of supercomputers and other high-performance computing and expertise. SDSC is home to Comet, a petascale supercomputer capable of some 2 quadrillion operations per second and part of the XSEDE program.

In the future, NSG users may also be able to work on OpenNeuro data ported to SDSC's XSEDE resources via a high-bandwidth pipe between SDSC and commercial cloud providers such as Amazon, where the OpenNeuro data now resides. Alternatively, a copy of the neuroelectromagnetic data archived in OpenNeuro may be stored at SDSC to facilitate further processing.

Data streams uploaded through the gateway will be uniformly formatted using BIDS (Brain Imaging Data Standard) and included HED (Hierarchical Event Descriptor) standards. This uniformity

UCSD RECEIVES $4.4M FROM NIMH FOR BRAIN IMAGING DATA "GATEWAY"

will allow researchers to apply new statistical machine-learning approaches to uncover hidden patterns that can be found only by searching across large amounts of data, likely leading to new insights in basic and clinical brain research.

The organization of neuroscience data, known as neuroinformatics, is a relatively new field of research that holds great promise in patient care. With enough analyzable data, researchers may be able to extract robust biomarkers allowing for the precise diagnosis and treatment of neurological disorders.

Makeig is excited about the potential reach of this project, stating, "NEMAR will help us learn more about how brain dynamics support thought and action, and can therefore be a catalyst for advancing brain science and clinical brain research."

The "Brain Initiative Resource: Development of a Human Neuroelectromagnetic Data Archive and Tools Resource (NEMAR)" project is funded by the National Institute for Mental Health under the BRAIN Initiative (grant 1R24MH120037-01).

Written by Michelle Franklin
Originally appeared on the UC San Diego News Center
September 19, 2019
https://ucsdnews.ucsd.edu/pressrelease/uc-san-diego-brain-imaging-data-gateway

MORE ON NEMAR WITH SCOTT MAKEIG

Scott Makeig

I sat down with Scott in his office to get more details about the origin and next steps of NEMAR. Here is what I found out.

THE STORY BEHIND THE NAME NEMAR

Everyone loves a good acronym. When I heard NEMAR, my first thought was Leonard Nimoy, the actor who played Spock in Star Trek. But Scott Makeig says the name came from the Brazilian soccer player, Neymar, who sport-lovers tell me is a big deal. It didn't hurt that the NEMAR also resembled the first name of a former electrical engineering graduate student, Nima Bigdely-Shamlo, who came up with a universal way to tag stimulus events that will be used as part of the NEMAR platform.

WHATS NEXT FOR NEMAR

One reason for the project is to make it easier for scientists to upload all of their electrophysiology data onto the same platform. This will allow meta-analyses of huge datasets that can harness the collective power of different research groups. But, to incentivize researchers to upload their data to the site, Makeig says there must be some perks. In this case, Makeig wants to provide analysis tools that can be run for free on supercomputers. At the moment, data uploaded can remain private for 18 months so analyses can be performed for a project before publication at which time the data can be made public. In addition to providing cloud storage and analysis tools, the project will provide supercomputer use so large scale analyses with the oodles of collective data can be processed in a reasonable amount of time. Hopefully these computing goodies will draw in the data-generators of the world to make the largest repository of electrophysiological data ever collected.

Socer Superstar Neymar da Silva Santo Junior. Source: Wikipedia

COLLABORATORY THROWS ITS FIRST SCIENCE IN SOCIETY EVENT

The calm, ambient tunes of Brian Eno played as attendees filtered in to hear from Drs. Patricia Churchland and Read Montague about the origin of the "Conscience" in the first of a series of "Science in Society" events run by the Collaboratory and sponsored by the INC.

The Collaboratory, the brainchild of INC's Roger Bingham, was founded in 2016 as a way to bring together science and other disciplines in service of exploring the far reaching consequences of science from different vantage points. So far the Collaboratory has helped facilitate the public event, "Ethics of Emerging Technologies" and develop the UCSD class, "Tomorrow's World: A Guided Tour" taught by Bingham with Terry Sejnowski and Churchland.

RIGHT: Collaboratory Logo made by Marley Rossa. The tagline of the Collaboratory is, " Where the science gets cultured -- and the culture gets science."

LEFT: Setting up for the event. Photo Credit: Lara Sievert

Their latest endeavor is the Science in Society gatherings where deep topics like "Conscience" will be explored. As Bingham explains, "One word like 'conscience' or 'loneliness' serves to sum up what we see as urgent facets of the human condition that we want to explore". The choice of "Conscience" as the prompt for their first event was in large part because of the recent release of Churchland's newest book of the same name.

From left to right: Patricia Churchland, Roger Bingham, Read Montague

The central question of the event was why humans do good for others that aren't related to them, when it doesn't serve their genetic "fitness"? Churchland, in her explanation for the origin of our moral compass, began at the evolution of the first warm-blooded animals. These endotherms needed to eat much more food, which means they needed to be smarter. To learn all that was needed to survive, babies developed slower, remaining babies for longer. And it is at this point when Churchland believes we had to expand our idea of self to others in service of taking care of our young. This is the system that she believes further developed into empathy and conscience. Montague, a former postdoc in Sejnowski's lab and professor at Virginia Tech, complemented Churchland's talk with an explanation of mammalian reward systems and our ability to predict future outcomes, features of our brain that are hypothesized to be important for conscience.

The evening vacillated between the subjects of history, philosophy and neuroscience. And that is the way that Bingham likes it. "Omnidisiplinary is our preferred mode of investigation and discussion. To those who say we are all over the map, our answer is Yes! Absolutely - but with expert guides," he proclaims. These guides are meant to serve the public, but also the students of UCSD. The day after the event, a group of students got to meet and converse with the speakers. Bingham says, "This approach has attracted a wonderful group of student collaborators with agile minds and no interest in thinking of science and the arts/humanities as two cultures."

If you missed the first "Science in Society" event, don't worry, there will be more. The next event will be on February 24th, 2020. The topic is "Loneliness" with speakers Drs. Candice Odgers (UC Irvine), Kay Tye (Salk), and Karen Dobkins (UCSD). Come for the science, stay for the culture, or vice versa - It's up to you.

THE DREAM OF "VISIPEDIA"; A RECAP OF THE ROCKWOOD MEMORIAL LECTURE

The Rockwood Memorial lectures are held annually to honor the memory of a former computer science student at UCSD, Jerome Rockwood, who worked in the field of neural computation. This year's lecture was given by a scientist that wants to make computers "see".

Dr. Pietro Perona, a Caltech professor, has always been at the forefront of computer vision. His lab is behind widely used animal tracking software that greatly enhances researchers' abilities to categorize and understand behavior. He was also behind the Caltech 101 image series, containing 101 categories of objects, used widely as a training set for people developing the first computer algorithms for object recognition. Years since its conception, computer vision has made leaps and bounds, allowing driverless cars and facial recognition capabilities. But there are still many hurdles to overcome – weak spots in current categorization algorithms. These hurdles were the basis of Perona's Rockwood Lecture.

Perona began with some scenarios where visual categorization would come in handy in our everyday lives like identifying an insect you find in your house or a yummy looking mushroom. Should you eat it? The answer could be a matter of life or death. Perhaps you type some descriptors into Google image search: "Long stem, small, white cap." Minutes later clicking through the search and you may not have found a match. All of the pertinent information likely exists somewhere on the internet, but you can't access it. This actually happened to Perona's father in law. And the internet told him to buy a field guide if he wanted to classify the fungus correctly. "This is 2019," he thought. Get with it science!

What is holding us back from creating what Perona coins "visipedia" where the input is an image and the output tells us what it is? The best tools we have to build such a search engine at the moment are machine learning algorithms, computer codes that can learn to categorize based on inputs provided to them. While amazing tools, machine learning experts are running into big issues surrounding the amount and type of inputs they must feed the algorithms to get the kind of categorization that is meaningful to us humans.

One problem Perona presented was the sheer magnitude of categories of objects we assign in our world. With just all known plant and animal species, there are 10 million categories that must be learned. That's excluding all man-made objects: appliances, art, furniture, buildings, etc. For humans to learn what an object looks like, they may need a few examples, ten at most. But the human visual system is doing something special without us noticing it. It's helping us visualize what this item might look like at different angles or in different backgrounds, in low lighting, or with other objects covering part of it. This is called generalization or invariance and it is an amazing feature of our brains. But computer algorithms can't make these generalizations, and thus, require many more examples of an object to successfully learn it. As Perona puts it, "Networks are hungry for data."

Perona is hopeful though. "Humans aren't magical," he says. What he means by that is we should be able to deconstruct how the brain is doing things and get computers to do the same. Recent advances in unsupervised machine learning are promising. These are methods where data is fed to computers without telling them what they are looking for or what kind of objects are within each image. Some of these algorithms seem to be learning the kinds of higher order visual information that the human visual system uses to categorize objects. Furthermore, Pietro thinks we can continually teach the algorithms we already have by using more human input.

Dr. Pietro Perona giving the Rockwood Memorial Lecture.

For instance, an app called iNaturalist works as a crowdsourced species identification system that generates lots of tagged data from its over one million users. The iNaturalist team is using this data to fuel their new app, SEEK, which uses an algorithm trained on this data to immediately identify species of flora and fauna from an uploaded photo. However, judging by online reviews for this app, the algorithm is still not very good. It seems our robot overlords won't know what to destroy.

To watch the full talk, visit https://inc.ucsd.edu/events/rockwood/.

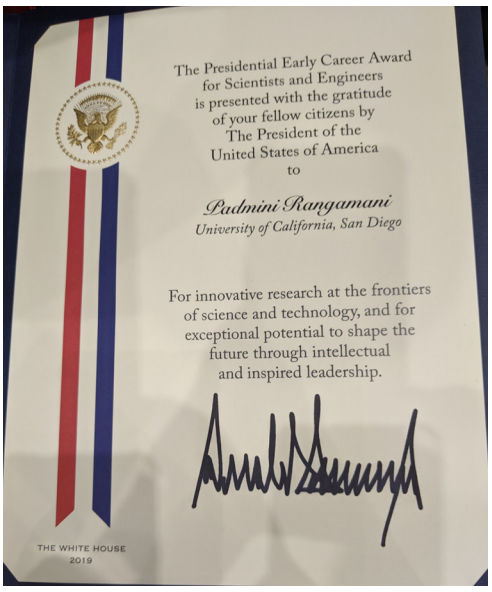
GET TO KNOW NEW INC COMMITTEE MEMBER PADMINI RANGAMANI

Dr. Padmini Rangamani is not new to UCSD. She was hired as an Assistant Professor in 2014 as part of the Department of Mechanical and Aerospace Engineering. She was promoted to Associate Professor in 2018.

Among many awards she has received during her career, perhaps the most prestigious is her recent Presidential Early Career Award for Scientists and Engineers. Nominated by the Department of Defense, Rangamani was recognized for "her exceptional research accomplishments in the advancement of Theoretical Biophysics in physical biology and medicine, and for fundamental contributions to the physical understanding of lipid bilayers," according to a press release from the Jacobs School of Engineering.

Rangamani leads a team of researchers who secured a 5 year grant for $7.5 million dollars awarded by the Air Force Office of Scientific Research through a Multidisciplinary University Research Initiative (MURI) to study how the brain processes information using such little energy. Also part of that team is INC director Terry Sejnowski.

Rangamani answered some questions by email about her research and her new role as a member of the INC executive committee.



TOP: Dr. Padmini Rangamani
BOTTOM: Photo of Padminis' Presidential Early Career Award
Source: Twitter

Can you describe your main research purpose in one to two sentences?

My main research goal is to develop theoretical and computational models of biological processes. Current research focus in my group is studying the role of cell shape and cell mechanics in different cellular contexts.

How does your work relate to neural computation?

I am intrigued by how changes to the physical properties of a synapse can alter neural computation. Can we relate classical cell biology and biophysics ideas on the role of cytoskeletal remodeling and membrane trafficking to neural computation? This is something we are working on exploring.

What will your role be as a member of the INC executive committee?

I am excited to be on the INC executive committee. I'm looking forward to engaging more actively with the INC faculty and students. I believe that the interdisciplinary nature of INC will lead to some exciting collaborations with both students and faculty.

How do you think your perspective will broaden the scope of the INC?

I hope that my perspective on consideration of cell mechanics as an important factor in shaping cell fate will enable new research direction on neuronal mechanics in INC.

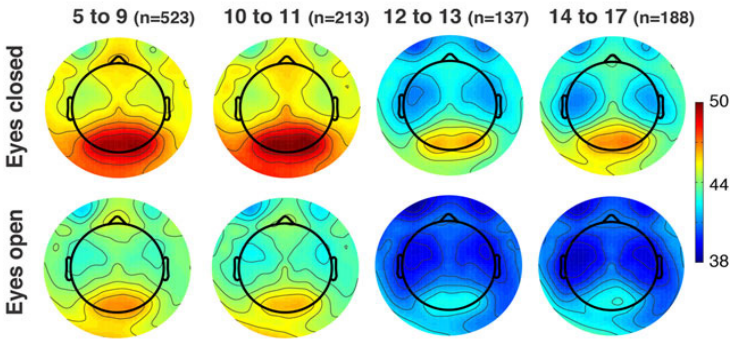
What is your favorite part of the brain and why?

This is the hardest question in this list. I'm currently fascinated by all parts of the brain. How does one pick a favorite region in an organ so fascinating?

SUPERCOMPUTERS AID OUR UNDERSTANDING OF COMPLEX BRAIN WAVES

Even though electroencephalography (EEG) has been used for almost 100 years, this safe and painless test of brain activity remains an efficient method for recording aspects of rapid brain activity patterns supporting our thoughts and actions. Leveraging the power of the Comet supercomputer at the San Diego Supercomputer Center (SDSC) at UC San Diego, campus researchers have demonstrated they can efficiently analyze more than 1,000 EEG 128-channel high-density data sets via the new Open EEGLAB Portal running on SDSC's Neuroscience Gateway (NSG).

Developed by Arnaud Delorme and Scott Makeig of UC San Diego's Swartz Center for Computational Neuroscience (SCCN) in collaboration with SDSC researchers Amitava Majumdar, Subhashini Sivagnanam, and Kenneth Yoshimoto, a first report on the Open EEGLAB portal was presented at the March 2019 International IEEE EMBS Conference on Neural Engineering in San Francisco.



Results of processing 2,194 128-channel EEG datasets from the Child Mind Institute database. Alpha power (color unit, relative power in dB) decreases with age (age groups in years shown in columns) in both eyes open and closed conditions (rows). The EEG processing here was performed purely as a proof of concept to illustrate the potential of using high performance computing (HPC) resources for hypothesis discovery and testing in EEG neuroimaging. Image credit: Delorme, A., Majumdar, A., Sivagnanam, S., Martinez-Cancino, R., Yoshimoto, K., Makeig, S. (2019) The Open EEGLAB portal. IEEE Transactions on Biomedical Engineering (2019 NER Conference), San Francisco, CA. March 20-23, 2019.

In this report, Delorme and Makeig build on their collaboration with the Child Mind Institute Healthy Brain Network (HBN) project to demonstrate how high-performance computing (HPC) can be used for effective analysis of large EEG datasets. To date, difficulties in relating scalp recordings to activities in specific brain structures, individual differences in head and brain shapes and sizes, and difficulty in harnessing sufficient computer power have discouraged researchers from attempting sophisticated source-level analysis of very large data sets.

With a goal of better understanding human brain development, the HBN project is currently collecting brain scans and EEG recordings, as well as other behavioral data from 10,000 New York City children and young adults – the largest such sample ever collected. "We hope to use portals such as the EEGLAB to process this data so that we can learn more about biological markers of mental health and learning disorders in our youngest patients," said HBN Director Michael Milham.

The report by Delorme and colleagues demonstrates that source-level analyses of brain dynamics are now feasible and can become routine in the near future, as continuing advances in machine learning methods are applied to an ever wider range of biological data.

"One of the key players of our study was UC San Diego undergraduate student Brian Rojas, who determined how to efficiently download the Child Mind data and set it up on Comet for processing," said Majumdar. "Brian, who is funded by the National Science Foundation's SciGap project, has been learning about NSG's backend software and usage modes of neuroscientists as they use NSG, helped us develop and execute the data download processing script on Comet."

Delorme, Makeig, and Majumdar hope to be able to tie the EEGLAB Portal and NSG to the growing National Institutes of Health (NIH) human brain imaging data archive, under a recent proposal. "The initiative would create a portal for archiving and analyzing EEG and related data collected from the NIH and other research projects around the world," explained Delorme. "The Child Mind data now being analyzed at SDSC is an important seed for the envisioned archive."

Written by Kimberly Mann Bruch

Originally appeared on the UC San Diego News Center April 01, 2019

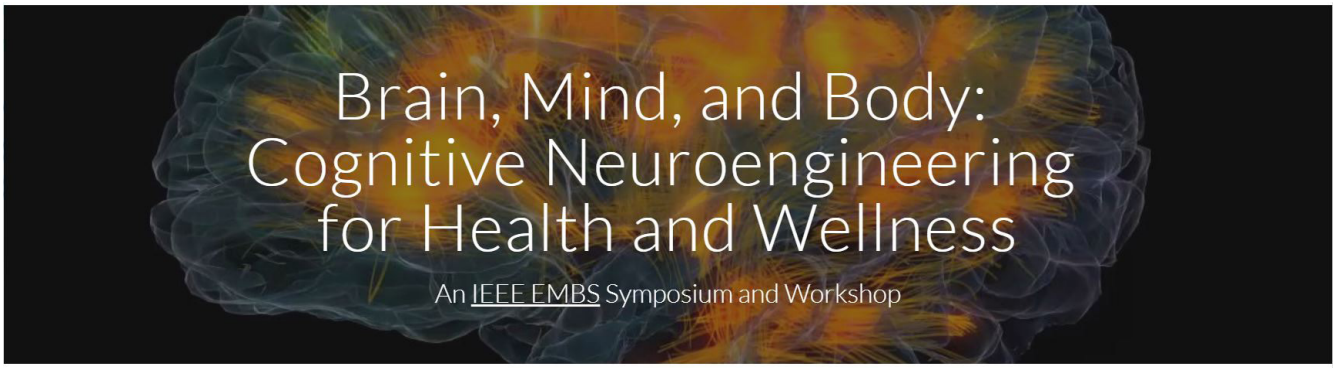
https://ucsdnews.ucsd.edu/pressrelease/supercomputers_aid_our_understanding_of_complex_brain_waves

IEEE SYMPOSIUM ON HEALTHY BRAINS AND BODIES HELD AT UCSD

Mens sana in corpore sano— a healthy mind thrives in a healthy body. Great technological feats in engineering and medicine have provided powerful means for remediating specific impairments in body and brain function through highly localized intervention. However, potentially even greater healing powers reside within, calling for minimally intrusive and regenerative strategies throughout the body that harness natural defenses against disease.

The IEEE Engineering in Medicine and Biology Society (EMBS) in partnership with the cognitive neuroscience and clinical neuroengineering communities aim to catalyze such advances towards more effective and sustainable healthcare.

The IEEE EMBS symposium and workshop, titled "Brain, Mind, and Body: Cognitive Neuroengineering for Health and Wellness" brought together researchers and practitioners across academia, industry and the clinical profession to crystalize a vision towards holistic integration of unobtrusive neurotechnology and medicine with a focus on minimally invasive strategies including neurofeedback and electroceuticals that harness/cultivate harmony between brain, mind, and body.



Moran Amit, postdoc at the UCSD Deparment of Electrical and Computer Engineering, won first prize for her poster, "Wearable sensing gloves for objective assessment of motor disorders."
From left to right: Bruce Wheeler, Moran Amit, Metin Akay

The program included plenary oral sessions with invited talks by leading researchers, contributed interactive poster presentations and live demonstrations of unobtrusive neurotechnology and medicine, and a panel with industry, clinical practitioners, and policy makers on transitioning technology advances to global health outcomes. The event was open to the public and over 150 participants took part.

Organized by Gert Cauwenberghs, the two-day symposium and workshop event was held in December on the campus of the University of California San Diego. It was co-sponsored by IEEE Brain, the Institute for Neural Computation, the Institute for Engineering in Medicine, the Department of Bioengineering, the Qualcomm Institute, and the Kavli Institute for Brain and Mind.

Many INC members and affiliated faculty participated including Andrea Chiba, Bruce Wheeler, Mateusz Gola, Todd Coleman, Fadel Zeidan, Tzyy-Ping Jung, Gabriel Silva, Roger Bingham and Terrence Sejnowski.

See the full program and videos of the entire event posted at https://sites.google.com/ucsd.edu/embs2019/

SPRING CALENDAR OF EVENTS

Collaboratory Science in Society Event

February 24: The topic is "Loneliness" with speakers Drs. Candice Odgers (UC Irvine), Kay Tye (Salk), and Karen Dobkins (UCSD)

31st EEGLAB Workshop

May 27-28: Introduction to EEGLAB (intensive workshop for novices)
May 30 - June 2: EEGLAB Workshop
June 3-5: Intensive collaborative EEGLAB workshop (analyze your own data)
June 5: 2nd Hands-On Lab Streaming Layer Workshop

Mobile Brain/Body Imaging (MoBI) Conference * (https://sites.google.com/ucsd.edu/mobi2020)

June 7: Evening Reception and open house at SCCN
June 8: Fundamentals. Hardware, Software, Stefan Debener Keynote, Vendor demos. Posters.
June 9: Music and Movement. Gait (basic and clinical), MoBI in Music/Dance/Arts, Laurel Trainor Keynote
June 10: Spatial Environment. Spatial Cognition. Neuroarchitecture. Sarah Robinson Keynote. MoBI Award. MoBI Moonshot.
June 11: NSF Workshop on group brain dynamics and multi-person recording. For more information contact Dr. John Iversen (jiversen@ucsd.edu).
Abstract submission deadline is February 16th
Early bird registration through April 1st

32nd EEGLAB Workshop

June 15: Held at the John Paul II Catholic University of Lublin in Poland. For more information, contact Dariusz Zapała (d.zapala@gmail.com).

UCSD NAMED NATIONAL ENDOWMENT FOR THE ARTS RESEARCH LAB

A team led by Drs. John Iversen, Tim Brown, and Terry Jernigan with the San Diego Children's Choir and Vista Unified School District is one of four new interdisciplinary teams who will be supported by the National Endowment for the Arts (NEA) with the goal of "generating new knowledge about the value and impact of the arts."

According to the NEA press release, the team plans to "trace the potential effects of various musical interventions on early childhood development." It continues, "The goal is to identify and relate those effects to age, status of brain development, and genetic variation."

NATIONAL ENDOWMENT for the ARTS RESEARCH LABS