



CENTER FOR SENSORIMOTOR NEURAL ENGINEERING

Improving lives by connecting brains and technology

September, 2016

Congratulations, Awards

- **Tyler Libey** (Department of Bioengineering, University of Washington; CSNE graduate student) successfully defended his Ph.D. dissertation titled “Restoring Function After Neuromuscular Trauma” on August 9, 2016.
- **Adrienne Fairhall** (CSNE Thrust Leader) has been promoted to Professor in the Department of Physiology and Biophysics at the University of Washington.
- **Bing Brunton (PI)** and **Raj Rao (co-PI)** have been awarded a new grant from the National Science Foundation titled "Understanding neural processing in long-term, naturalistic human brain recordings using data-intensive approaches."

Upcoming Seminars, Lectures, Courses, Conferences

- **Neural Computation and Engineering (BIOEN 466)** will be taught during the 2016 Fall Quarter at the University of Washington by CSNE University Education Manager, Dr. Lise Johnson.
- **Neurotechnix 2016**, 4th International Congress on Neurotechnology, Electronics and Informatics, Porto, Portugal, November 7-8, 2016:
<http://www.neurotechnix.org/Home.aspx>
- **Webinar** - Regulatory Advice for Investigators and Sponsors of Neurological Devices and the Path to Initiating Human Studies – Wednesday, September 14, 2016, 10:00-11:30am ET:
<http://www.fda.gov/CDRHWebinar>
- **Webinar** - Neurotechnology and Society: Strengthening Responsible Innovation in Brain Science, September 15-16, 2016:
<http://nationalacademies.org/hmd/Activities/Research/NeuroForum/2016-SEP-15.aspx>

New CSNE Publications

- **Specker Sullivan, L. and Illes, J.**, Beyond ‘communication and control’: towards ethically complete rationales for brain-computer interface research, *Brain-Computer Interfaces*, 3: 156-163, 2016/07/02 2016.
- Iyer, V., Talla, V., Kellogg, B., Gollakota, S. and **Smith, J.R.**, Inter-technology backscatter: towards internet connectivity for implanted devices. SIGCOMM '16, August 22-26, 2016, Florianopolis, Brazil; DOI: <http://dx.doi.org/10.1145/2934872.2934894>
- Agrawal, M., Vidyashankar, S. and **Huang, K.**, On-chip implementation of ECoG signal data decoding in brain-computer interface, 2016 IEEE 21st International Mixed-Signal Testing Workshop (IMSTW), 2016, Pages:1-6, DOI: 10.1109/IMS3TW.2016.7524225.



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- Abstracts by CSNE personnel accepted for the upcoming Society for Neuroscience Annual Meeting in San Diego (November, 2016) include:
 - Stimulation strategies to convey sensory information directly to the cortex via intracortical microstimulation (ICMS)
D.A. BJANES, A.L. FAIRHALL, C.T. MORITZ
 - Exploration of the phase and dose dependence of cortico-cortical evoked potentials during beta-oscillation triggered direct electrical stimulation in humans
D.J. CALDWELL, J.D. OLSON, J.D. WANDER, S ZANOS, D. SARMA, D. SU, J. A. CRONIN, K. COLLINS, J. WU, L. JOHNSON, K. WEAVER, K. CASIMO, E. FETZ, R.P.N. RAO, J.G. OJEMANN
 - Reliability of electrophysiological connectivity in the resting state
K. CASIMO, T. MADHYASTHA, J.G. OJEMANN, K.E. WEAVER
 - Precollege participant outcomes for a short-duration field trip outreach program to a neural engineering research center
E.H. CHUDLER, K.C. BERGSMAN
 - Somatosensory feedback via direct cortical electrical stimulation in humans
J.A. CRONIN, J.WU, D.J. CALDWELL, K.L. COLLINS, D. SARMA, R.P.N. RAO, J.G. OJEMANN, J.D. OLSON
 - Surface and penetrating glassy carbon integrated microelectrode array for recording low and high frequency neural signals
N. GOSHI, M. VOMERO, T.J. RICHNER, E. MAGGIOLINI, E. ZUCCHINI, E. CASTAGNOLA, D. BJANES, I. DRYG, W. SHAIN, S.I. PERLMUTTER, D. RICCI, L. FADIGA, C.T. MORITZ, S. KASSEGNE
 - Investigating the rubber hand illusion using electrocorticography
GUTERSTAM, K. COLLINS, J. CRONIN, K. WEAVER, J. OJEMANN, H. EHRSSON
 - Flexible fibers for optoelectronic probing of spinal cord circuits
LU, S. PARK, U. FRORIEP, A. DERRY, J. SELVIDGE, Y. FINK, P. ANIKEEVA
 - A library of human electrocorticographic data and analyses
K.J. MILLER, J. OJEMANN
 - A micro-LED implant for long-term optogenetic stimulation of the rat spinal cord
S.E. MONDELLO, M.D. SUNSHINE, A.E. FISCHEDICK, P.J. HORNER, C.T. MORITZ
 - Direct cortical stimulation for sensory feedback
J.G. OJEMANN, J. OLSON, J. CRONIN, K. WEAVER, K. COLLINS, A. GUTERSTAM, H. EHRSSON, D. CALDWELL, L. JOHNSON, L. SORENSEN



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- A wireless bidirectional brain machine interface
Y. OZTURK, Y. SU, K.S. MOON, S. PERLMUTTER, S. ZANOS, E. FETZ
- Flexible multifunctional polymer fibers for integrated optogenetics
S. PARK, Y. GUO, X. JIA, H. CHOE, B. GRENA, J. KANG, H. YOON, G. B. CHOI,
Y. FINK, P. ANIKEEVA
- Closed-loop neural interfacing strategies for the bladder
T.J. RICHNER, B.J. MAHONEY, S.D. BOYER, V. RANGANATHAN, M.D.
SUNSHINE, G. MOORE, R. SOLINSKY, G.D. HORWITZ, P.O. ANIKEEVA, J.R.
SMITH, J.W. FAWCETT, C.T. MORITZ
- Cortical network changes in individuals learning a bimanual task in coordination
with an electrocorticographic brain-computer interface
SARMA, J. WU, J.G. OJEMANN, R.P.N. RAO
- Intraspinal activation of respiratory muscles depends on phase of respiratory
cycle
M.D. SUNSHINE, C.N. GANJI, P.J. REIER, D.D. FULLER, C.T. MORITZ
- Unsupervised decoding of long-term, naturalistic human neural recordings with
automated video and audio
X. WANG, A. FARHADI, J.G. OJEMANN, B.W. BRUNTON, R.P.N. RAO
- Error-related potentials for co-adaptive cortical brain-computer interfaces
N.R. WILSON, D. SARMA, J.D. WANDER, J.G. OJEMANN, R.P.N. RAO
- Identification of stage transitions of imagined hand movements with
electrocorticography
J. WU, L. BASHFORD, J.A. CRONIN, D.J. CALDWELL, N.R. WILSON, D.
SARMA, B.W. BRUNTON, R.P.N. RAO, J.G. OJEMANN
- Effects of vagus nerve stimulation on cortical activity and excitability in the
nonhuman primate
S. ZANOS, S. MOORJANI, S. SABESAN, E.E. FETZ
- Choice certainty reveals equivalence of POMDP and drift-diffusion model
K. KHALVATI, R. KIANI, R.P. RAO
- Abstracts by CSNE personnel accepted for the upcoming International Neuroethics
Society meeting in San Diego (November, 2016) include:
 - Specker Sullivan, L., and Reiner, P., Persuasive devices: From paternalistic to
maternalistic choice architectures.
 - Specker Sullivan, L. and Illes, J., At the ethics interface of brain computer
interfaces.



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- Klein, E., Sample, M., Pham, M., Specker Sullivan, L., Brown, T.E., Tubig, P., Folland, R., and Goering, S., Neuroethics in practice: Designing principles for neural engineering research (Winner of \$250 INS Travel Stipend).
- Brown, T.E. and Thompson, M.C., When neuroethicists become labmates: Obstacles, recommendations, and metrics for success.

CSNE in the News

- What Illnesses Can Bioelectronics Treat
<http://www.bloomberg.com/news/videos/2016-08-01/what-illnesses-can-bioelectronics-treat>
- First Wi-Fi-Enabled Smart Contact Lens Prototype
<https://www.technologyreview.com/s/602035/first-wi-fi-enabled-smart-contact-lens-prototype/>
- Forget Pokemon Go. New Tech Incubator Takes VR to the Next Level
<http://crosscut.com/2016/08/augmented-and-virtual-reality-hub-comotion-uw/>
- How Hackers Could Get Inside Your Head with “Brain Malware”:
<http://motherboard.vice.com/read/how-hackers-could-get-inside-your-head-with-brain-malware>
- A New Reality for Rehabilitation
<http://www.washington.edu/boundless/a-new-reality-for-rehabilitation/>
- AccessSTEM Aims to Make STEM Careers a Reality for Students of All Abilities
<http://www.insightintodiversity.com/accessstem-aims-to-make-stem-careers-a-reality-for-students-of-all-abilities/>
- This University of Washington spin-out can charge robots and drones wirelessly
<http://www.geekwire.com/2016/university-washington-spin-can-charge-robots-drones-wirelessly/>
- UW team captures Best Paper at SIGCOMM 2016 for interscatter
<https://news.cs.washington.edu/2016/08/23/uw-team-captures-best-paper-at-sigcomm-2016-for-interscatter/>

New CSNE Blog Posts

- Undergraduate students participate in hands-on neural engineering research at San Diego State University:
<http://www.csne-erc.org/engage-enable/post/undergraduate-students-participate-hands-neural-engineering-research-san-diego>



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- Young Scholars Program provides an authentic neural engineering research experience for high school students:
<http://csne-erc.org/engage-enable/post/young-scholars-program-provides-authentic-neural-engineering-research-experience>
- How to train your brain-controlled drone:
<http://csne-erc.org/engage-enable/post/how-train-your-brain-controlled-drone>

Recent Papers of Interest to the CSNE Community

- Donati, et al., Long-Term Training with a Brain-Machine Interface-Based Gait Protocol Induces Partial Neurological Recovery in Paraplegic Patients, *Scientific Reports*, 6: 30383, 2016.
- Vourvopoulos, A. and Bermúdez i Badia, S., Motor priming in virtual reality can augment motor-imagery training efficacy in restorative brain-computer interaction: a within-subject analysis, *J. NeuroEngineering Rehabilitation*, 13:69, 2016, DOI 10.1186/s12984-016-0173-2
- Choi, J.S., Brockmeier, A.J., McNiell, D.B., von Kraus, L.M., Príncipe, J.C. and Francis, J.T., Eliciting naturalistic cortical responses with a sensory prosthesis via optimized microstimulation, *J Neural Engineering*, Vol 13, Num 5, 2016.
- Fu, T-M., Hong, G., Zhou, T., Schuhmann, T.G., Viveros, R.D., Lieber, C.M., Stable long-term chronic brain mapping at the single-neuron level. *Nature Methods*, 2016; DOI: 10.1038/nmeth.3969.
- Neuroscience Trials of the Future: Proceedings of a Workshop, Washington, D.C.: National Academies Press (2016):
<http://www.nap.edu/catalog/23502/neuroscience-trials-of-the-future-proceedings-of-a-workshop>

Grant Opportunities

- NSF Graduate Research Fellow Program:
http://www.nsf.gov/pubs/2016/nsf16588/nsf16588.htm?WT.mc_id=USNSF_25&WT.mc_ev=click
- Call for nominations: Scolnick Prize in Neuroscience:
<http://mcgovern.mit.edu/events/scolnick-prize/call-for-nominations>
- American Association of University Women Fellowships program:
<http://www.aauw.org/what-we-do/educational-funding-and-awards/american-fellowships/>
- Engineering Next-Generation Human Nervous System Microphysiological Systems (R01/R21):
<http://grants.nih.gov/grants/guide/pa-files/PAR-16-398.html>
<http://grants.nih.gov/grants/guide/pa-files/PAR-16-397.html>



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- BRAIN Initiative: Foundations of Non-Invasive Functional Human Brain Imaging and Recording - Bridging Scales and Modalities (R01):
<http://www.grants.gov/web/grants/view-opportunity.html?oppld=287497>
- BRAIN Initiative: Non-Invasive Neuromodulation - New Tools and Techniques for Spatiotemporal Precision (R01):
<http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-17-240.html>
- BRAIN Initiative: Non-Invasive Neuromodulation - Mechanisms and Dose/Response Relationships for Targeted CNS Effects (R01):
<http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-17-245.html>

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Please send additional news and events items for inclusion in this newsletter to Dr. Eric Chudler (CSNE, Executive Director) at chudler@uw.edu.