Preeya Khanna

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Education

Univ. of Calif. Berkeley & Univ. of Calif. San Francisco August 2012 – Dec 2017
Ph.D. Candidate in Joint Bioengineering Program, GPA: 3.93 / 4.00

University of Pennsylvania, Philadelpha August 2008 – May 2012
B.S in Bioengineering and Mathematics, GPA: 3.85 / 4.00

University College London, London August 2010 – Dec 2010
Study Abroad, Mechanical Engineering Dept.

Awards

Bioengineering Department Admissions Committee Student Representative 2016-17
Outstanding Graduate Student Instructor for UC Berkeley BioE 101 Spring 2015
National Science Foundation (NSF) Graduate Research Fellow (2013-2015)
Penn Engineering Exceptional Service Award, 2012
Penn Graduation Summa cum Laude, 2012
Best of Lexington High School Award presented by Congressman Kaufman, 2008

Research

University of California, Berkeley Jan 2018 – Present
Postdoctoral Fellow: Brain-Machine Interface Lab
Advisor: Professor Jose M. Carmena
Running clinical trial in Spain using invasive brain-machine interface controlled exoskeleton for neurorehabilitation in chronic stroke patients. Collaborating with Dr. Ander Ramos - Murguialday from University of Tubingen, Germany.

University of California, Berkeley August 2012 - December 2017
Ph.D Candidate: Brain-Machine Interface Lab
Advisor: Professor Jose M. Carmena
Studying the role of local field potential signals on motor processing in a non-human primates and humans using brain-machine interfaces. Evaluating potential symptom alleviation effects of neurofeedback in parkinsonian patients. Developing closed-loop brain-machine interface therapies for stroke rehabilitation.

University of Pennsylvania Summer 2010
Undergraduate REU Student: Haptics Lab
Advisor: Professor Katherine J. Kuchenbecker
Developed a sleeve that provides tactile feedback for stroke patients while they practice upper arm motions during physical therapy sessions. Used magnetic motion capture and arm visualization to provide real-time visual feedback to subjects as they practiced. Conducted 20-subject study to test effect of sleeve on motor learning.

Industry

Cortera Neurotechnologies October 2016 - March 2017
Consultant: Data Scientist
Algorithms development using machine learning and signal processing tools at Bay Area startup.

Neuromodulation Technology, Medtronic PLC Summer 2015
Graduate Intern: Biomedical Engineering
Advisor: Dr. Timothy Denison
Prototyped and characterized parameter ranges for closed-loop deep brain stimulation (DBS) algorithms for the fully implantable Nexus - E (embedded) communication system linking sensing channels and stimulation parameters in the Medtronic Active PC + S neurostimulator. Stress tested and validated Nexus-E functionality. Developed real-time visualization tools for testing and validating closed loop performance.

Johnson & Johnson Summers 2011, 2012

Intern: Research and Development Group

Advisor: Dr. Russel Walters

Analyzed in-house data set consisting of skin and ocular irritation results from application of novel consumer product formulations. Identified ocular and skin irritability trends based on individual ingredients, classes of preservative systems, subject demographics, and seasonality. Contributed to development of 'Bedtime (R)' iPhone app, which makes data-driven recommendations for subjects experiencing difficulty with their child's sleep patterns.

Skills

- Relevant Graduate Coursework: Neural Computation (VS 265), Random Processes (EE 226A), Statistical Learning Theory (CS 281A), Advanced Control Systems (EE 220A), Circuits for Bioinstrumentation (BIOE 101), Neural Systems (NS 262)
- Programming and Data Analysis: Python, MATLAB, R, LaTeX, LabVIEW, Simulink
- Human and NHP Electrophysiology: Chronic and acute recording preparations
- Cell Culture Methods: Cell and bacterial culture, PCR, gel electrophoresis
- Languages: Proficient Spanish

Leadership / Teaching

Guest Lecturer, EE 290P: Advanced Topics in Bioelectronics, Fall 2017
Lectured about using brain-machine interfaces as scientific tools, and their translation to the clinic

Bioinstrumentation Lab, BioE 101, Graduate Student Instructor Jan 2015 - May 2015
Developed lab assignments and instructed lab sections, graded homework. Recognized with Outstanding Graduate Student Instructor Award

Prison University Project Fall 2012, Summer 2013, Summer 2014, Spring 2016
Teaching Patten University classes (Intermediate Algebra, Chemistry, Pre-College Mathematics) to students enrolled in Prison University Project at San Quentin Prison.

Big Bears September 2012- Present
Mentoring undergraduate bioengineering students considering applying to graduate school.

Publications

Journal Articles and Peer-Reviewed Conference Proceedings:

1. **Khanna P.**, Athalye V.R., and Carmena J.M. "Task-dependent engagement of higher-dimensional neural dynamics for lower-dimensional BMI control." *In preparation*
2. **Khanna P.**, and Carmena J.M. "Beta Band Oscillations Drive Population Signals that Inhibit Movement in the Motor System." *ELife* doi: 10.7554/eLife.24573.
3. **Khanna P.**, Swann N. C., Hemptinne C., Miller, A., Starr P. A., and Carmena J.M. (2016). "Volitional Control of Beta Band Power Using the Medtronic Activa PC + S and Nexus-D Streaming." *IEEE Transactions on Neural Systems and Rehabilitation Engineering.* doi: 10.1109/TNSRE.2016.2597243
4. **Khanna P.**, Athalye V.R., Carmena J.C. (2016) "Leveraging Emergent Coordinated Neural Dynamics in Improving Brain-Machine Interface Control" *IEEE Engineering in Medicine and Biology Conference, Orlando*
5. Walters R., **Khanna P.**, Chu M., and Mack M. C. (2016). "Developmental changes in skin barrier and structure during the first 5 years of life." Skin Pharmacol Physiol, DOI: 10.1159/000444805.
6. **Khanna P.**, Stanslaski S., Xiao Y., Ahrens T., Bourget D., Swann N., Starr P., Carmena JM., Denison T. (2015). "Enabling Closed-Loop Neurostimulation with Downloadable Firmware Upgrades." IEEE Biomedical Circuits And Systems Conference, Atlanta

7. **Khanna P.** and Carmena J.M. (2015). "Neural oscillations: beta band activity across motor networks." Current Opinion in Neurobiology, 32: 60-67.
8. **Khanna P.** and Carmena J.M. (2015). "Changes in Reaching Reaction Times Due to Volitional Modulation of Beta Oscillations." IEEE Neural Engineering Conference, Montpelier (France).
9. Walters R., **Khanna P.**, Hamilton M., Mays D., and Telofski L. (2015). "Human cumulative irritation tests of common preservatives used in personal care products: a retrospective analysis of over 45,000 subjects". Toxicological Sciences. doi:10.1093/toxsci/kfv158
10. **Khanna P.**, So K., and Carmena J.M. (2012). "Volitional phase control of neural oscillations using a brain-machine interface". IEEE Neural Engineering Conference, San Diego.
11. **Khanna P.**, Mack M. C., Walczak V. R., Robillard A., Hamilton M. T., Composto J., Martin, K. M., et al. (n.d.). "Human ocular response to instillation of surfactant solutions and water across 10, 000 subjects". In Proc. ALTEX 8th World Conference, p127 - 132.
12. Bark K., **Khanna P.**, Irwin R., Kapur P., Jax S., Buxbaum L., Kuchenbecker KJ., (2011). "Lessons in using vibrotactile feedback to guide fast arm motions. In Proc. IEEE World Haptics Conference". p355 - 360.

Presented Abstracts:

1. You, A., Athalye, V., Gowda, S., **Khanna P.**, Moorman, H., and Carmena J.M. (2017). "Neural patterns in control of kinematically redundant brain-machine interface" Society for Neuroscience annual meeting, Washington DC (poster).
2. **Khanna P.**, Swann N.C., Starr P.A., and Carmena J.M. (2017). "Effects of Neurofeedback Control of Beta Band Oscillations in Motor Cortex on Finger Tapping in PD Patients." Society for Neuroscience annual meeting, Washington DC (poster).
3. **Khanna P.**, Athalye V. R., Costa R. M., Carmena J. M. (2017). "Distinct neural encoding schemes emerge for actions generated by the same effector." Computational and Systems Neuroscience, Salt Lake City UT (poster).
4. **Khanna P.**, Athalye V. R., Gowda S., Costa R. M., Carmena J. M. (2016). "Distinct subspaces emerge in neuroprosthetic control during different tasks." Society for Neuroscience annual meeting, San Diego CA (poster).
5. **Khanna P.**, Swann N.C., Hemptinne C.d., Miocinovic, S., Miller, A., Starr P.A., and Carmena J.M. (2016). "Volitional Control of Beta Band Power Using the Medtronic Activa PC + S and Nexus-D Streaming." International BCI meeting, Pacific Grove, CA (poster).
6. **Khanna P.**, and Carmena J.M. (2015). 'Effects of Volitional Modulation of Beta Oscillations on Reaching Tasks.' Society for Neuroscience annual meeting, Chicago IL (poster)
7. Summerson S.R., **Khanna P.**, Rich, E.L, Wallis, J.D., and Carmena J.M. (2015). 'Stimulation in primate caudate nucleus modulates action selection in probabilistic reward task.' Society for Neuroscience annual meeting, Chicago IL (poster)

Invited Talks:

1. April 2018, University of Tubingen
2. August 2016, IEEE Engineering in Medicine and Biology Society Conference, Orlando, FL
3. December 2015, Center for Neural Engineering and Prostheses annual retreat, University of California Berkeley
4. October 2015, Live Demo Session: IEEE Biomedical Circuits and Systems Conference, Atlanta, GA.
5. October 2015, IEEE Biomedical Circuits and Systems Conference, Atlanta, GA.
6. October 2015, Bioengineering Annual Retreat and Conference, Asilomar, CA.

7. March 2015, UC Berkeley Cortex Club, Berkeley, CA.
8. October 2014, Undergraduate Cognitive Science Association, University of California, Berkeley.

Software:

- Nexus-D Patient Neurofeedback Game (2016). Available from www.github.com/pkhanna104/nexusbmi
- Johnson and Johnson Consumer Companies Inc. (2012). Bedtime App. (Version 1.0.5) [Mobile application software]. Available from http://tinyurl.com/cbdey8q

PERSONAL Ultimate frisbee, Rock climbing, Road biking