



Jennifer Mak

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EDUCATION

Doctor of Philosophy, Bioengineering, NSF GRFP Fellow

Aug 2019 - Jun 2024 (expected)

University of Pittsburgh, Center for the Neural Basis of Cognition (CNBC) joint program with Carnegie Mellon University

Advisor: Dr. George Wittenberg, MD, PhD

Thesis work: Brain Mechanisms of Visuomotor Deficits After Stroke

Bachelor of Science, Biomedical Engineering; Minor, Mathematics

Aug 2015 - May 2019

Virginia Commonwealth University (VCU), cum laude

Study Abroad: Robotics Engineering in Barcelona, Spain (Summer 2017)

RESEARCH AND WORK EXPERIENCE

PhD Candidate

Aug 2019 - Present

University of Pittsburgh, Rehab Neural Engineering Labs (RNEL)

- Developing a portable, adaptable EEG-augmented reality (AR) system for the detection and assessment of post-stroke spatial neglect using statistical modeling and machine learning on EEG-derived features
- Investigating upper-limb motor control using TMS to probe motor cortex connectivity during reaching in stroke patients, with the ultimate goal of improving motor function with a personalized combined approach of stimulation and practice
- Designed functional MRI task to investigate changes in motor planning behavior in stroke
- Built EEG neurofeedback system for affect-biased attention training for adolescents with major depressive disorder using EEG-derived steady-state visual evoked potentials (SSVEPs)

Co-Founder, Engineering Testing Officer

Jul 2018 - Jul 2023

DuraSafe, LLC

- Designed pressure-sensing epidural needle to improve efficiency and safety of epidural procedures
- Wrote the competitive analysis, product design controls, human factors considerations, and clinical testing protocols
- Identified stakeholder needs and pain points through focus groups and interviews with nurse anesthetists
- Placed 1st in the VCU Pre-X program with teammates which secured \$10,000 in funding to form an LLC

Pre-PhD Research Experience for Undergraduates (REU) Scholar

Jun 2018 - Jul 2018

University of Pittsburgh, Rehab Neural Engineering Labs (RNEL)

- Assessed stroke-related weakness by mapping forearm muscle synergies in stroke patients using a high-density EMG

Undergraduate Research Assistant

May 2017 - May 2019

Virginia Commonwealth University, Biomagnetics Lab

- Improved analysis of neural signal pathways during simulated TMS by creating fiber tract models and 3D brain models from diffusion weighted images (DTI) for finite element analyses and 3D printing

SKILLS

- **Medical Product Development:** design controls, human factors, customer discovery, intellectual property protection
- **Research Techniques:** Transcranial magnetic stimulation (TMS), electroencephalography (EEG), electromyography (EMG), magnetic resonance imaging (MRI), signal processing, KINARM Exoskeleton robot, statistical modeling, machine learning, diffusion tensor imaging (DTI), finite element analysis (FEA) and simulation, 3D printing, technical writing, and scientific communication
- **Programming:** MATLAB/Simulink, Python, Java
- **Software:** Stata, SPSS, JMP, FreeSurfer, E-Prime, Sim4Life, Autodesk Fusion 360, SOLIDWORKS, Adobe Illustrator
- **Project Management:** interdisciplinary collaboration and communication, attention to detail, organization, team management, documentation, study participant data management (REDCap)

PUBLICATIONS

1. Jantz, M.K., **Mak, J.**, Dalrymple, A.N., Farooqui, J., Grigsby, E.M., Herrera, A.J., Pirondini, E. and Collinger, J.L., 2023. Lifting as we climb: Experiences and recommendations from women in neural engineering. *Front Neurosci*, 17, p.350.
2. Huang, X., **Mak, J.**, et.al., 2022, July. Using Neurofeedback from Steady-State Visual Evoked Potentials to Target Affect-Biased Attention in Augmented Reality. *Annu Int Conf IEEE Eng Med Biol Soc (EMBC)*. (pp. 2314-2318).
3. **Mak, J.**, Kocanaogullari, D., et al., 2022. Detection of Stroke-Induced Visual Neglect and Target Response Prediction Using Augmented Reality and Electroencephalography. *IEEE Trans Neural Syst Rehabil Eng.*, 30, pp.1840-1850.

4. Kocanaogullari, D., Huang, X., **Mak, J.**, Shih, M., Skidmore, E., Wittenberg, G.F., Ostadabbas, S. and Akcakaya, M., 2021, November. Fine-tuning and personalization of EEG-based neglect detection in stroke patients. *Annu Int Conf IEEE Eng Med Biol Soc (EMBC)* (pp. 1096-1099).
5. Kocanaogullari, D., **Mak, J.**, et al., 2020, July. EEG-based neglect detection for stroke patients. *Annu Int Conf IEEE Eng Med Biol Soc (EMBC)*. (pp. 264-267).

MANUSCRIPTS UNDER REVIEW

1. **Mak, J.**, Akcakaya, M., Wittenberg, G. F., Ostadabbas, S., Grattan, E. S., Stroke-Induced Spatial Neglect Biomarkers: A Review of Technology in Detection in Assessment.
2. **Mak, J.**, Kocanaogullari, D., Huang, X., Mullen, K., Grattan, E. S., Ostadabbas, S., Wittenberg., G. F., Akcakaya, M. A Scalable EEG-Based Spatial Neglect Detection System in Augmented Reality for Stroke Patients.

PENDING PATENTS

1. System And Method for Providing Neurofeedback from Steady-State Visual Evoked Potentials to Target Affect-Biased Attention for Treating Therapeutic Outcomes Such as Anxiety and Depression. U.S. Patent No. 18/469,782, filed September 19, 2023.
2. EEG-Guided Spatial Neglect Detection System and Detection Method Employing Same. PCT International Application No. PCT/US2023/016885 filed March 30, 2023.

FELLOWSHIPS

Graduate Research Fellowship Program (GRFP)

Sep 2021 - Aug 2024

National Science Foundation (NSF)

- Three-year fellowship with a \$34,000-\$37,000/year stipend and \$16,000/year cost of education allowance

Integrative Graduate Education and Research Traineeship (IGERT) Program: Interdisciplinary Research Training in Rehabilitation Engineering

Sep 2019

National Science Foundation (NSF)

- \$10,000 stipend award

AWARDS

1. **Neural Control of Movement Scholarship**, Society for the Neural Control of Movement (NCM) Jan 2024
2. **Career Development Award**, Center for Neural Basis of Cognition (CNBC) Jan 2024
3. **Young Investigator Poster Presentation Award**, Pittsburgh Veterans Affairs Medical Center May 2023
4. **George M. Bevier Scholarship**, University of Pittsburgh Oct 2019
5. **Pre-PhD Scholars Program Most Outstanding Mentee Award**, University of Pittsburgh Jul 2018
6. **Virginia Asian Foundation Scholarship Award**, Virginia Asian Chamber of Commerce Dec 2017
7. **Provost Scholarship**, Virginia Commonwealth University Aug 2015 - May 2019

LEADERSHIP AND SERVICE

Vice President, Brain Bag Committee Member

Sep 2021 - Aug 2023

Center for the Neural Basis of Cognition, Carnegie Mellon University and University of Pittsburgh

- Organized weekly student research presentations and ethics seminars
- Managed committee budget and organized the collective student council budgets
- Facilitated communication between student committees and faculty program directors in leadership meetings

Founder of Undergraduate Summer Research Program

Jul 2020 - Aug 2023

Rehab Neural Engineering Labs, University of Pittsburgh

- Led summer programming which included weekly journal clubs and technical and professional development workshops for ~10 undergraduate research assistants every summer
- Improved fairness in hiring process with a redesigned applicant evaluation and personal statements to consider students with limited prior experience or lower academic achievements
- Advertised the program with outreach presentations to classes at Community College of Allegheny County and Point Park University and the local chapter of the National Society of Black Engineers

Co-Editor-in-Chief of *Ingenium* (Undergraduate Engineering Research Journal)

Sep 2020 - Apr 2021

University of Pittsburgh Swanson School of Engineering

- Screened abstract and manuscript submissions from undergraduate engineering students for reviewer assignment
- Reviewed abstracts and manuscripts and finalized manuscripts with publisher

President and Founder

Sep 2015 - May 2019

Phi Sigma Rho Engineering Sorority (Omega Chapter), Virginia Commonwealth University

- Advised and led weekly chapter meetings with 30+ members and e-board meetings with the chapter leadership
- Drafted and enforced chapter bylaws and constitution with co-founders
- Corresponded between the national organization, university oversight bodies, and local Greek life chapters

Chair of Membership and Initiation

Aug 2017 - May 2018

Tau Beta Pi Engineering Honors Society, Virginia Commonwealth University

- Led recruitment meetings and initiation ceremony of new members
- Assisted in organizing annual Pi Day event which raised money to engineering faculties' charity of choice

Secretary

Aug 2017 - May 2018

Engineering Student Council, Virginia Commonwealth University

- Corresponded between the council, School of Engineering faculty and administration, and corporate sponsors of the annual Engineering Gala attended by 200+ students and faculty

Ambassador

Aug 2016 - May 2019

Engineering Student Ambassadors, Virginia Commonwealth University

- Led tour groups to labs and advertised engineering student organizations for prospective students

TALKS

"Non-Primary Motor Area Involvement in Reaching Behavior after Subcortical Stroke"

Apr 2024 (Upcoming)

Neural Control of Movement 2024 Annual Meeting, Dubrovnik, Croatia

- Scientific panel discussion on "The underlying mechanisms of motor impairments after stroke"

"Jennifer Mak at University of Pittsburgh"

Nov 2023

Where does your journey STEM From? Podcast with Dr. Carina Minardi

- Educational podcast discussing STEM career journeys, academic research, and interests in science

"Non-Primary Motor Area Involvement in Reaching Behavior after Subcortical Stroke"

Nov 2023

Society for Neuroscience 2023 Annual Meeting, Washington DC

- Scientific individual talk in the "Imaging and Assessment of Stroke Damage" Nanosymposium session

"How to Prelim: Professional and Technical Development Seminar Series"

Jan 2022, Jan 2023

Rehab Neural Engineering Labs, University of Pittsburgh

- Information session for first- and second-year Bioengineering PhD students on how to successfully prepare for the PhD preliminary exam milestone

TEACHING

Volunteer Instructor, Adult Computer Programming

Sep 2022 - Jun 2023

Hill District Community Engagement Center, University of Pittsburgh

- Instructed 8-week coding course on basic programming logic using Python for 10+ adults in underserved communities

Applying to Grad School Workshops

Aug 2021, Jul 2022

Rehab Neural Engineering Labs, University of Pittsburgh

- Summer workshop for undergraduates on the process of and tips for applying to graduate programs

Biosignals Processing Basics Workshops

Jul 2021, Jul 2022, Jun 2023

Rehab Neural Engineering Labs, University of Pittsburgh

- Summer workshops for undergraduates on an introduction to signals processing for biological systems with hands-on examples in EMG, EEG, peripheral nerve, and intracortical brain recordings

Graduate Teaching Assistant, Medical Product Development

Jan 2021 - Apr 2021

University of Pittsburgh

- Advised 24 Masters of Medical Product Engineering students in homework, class activities and discussions on FDA design controls, clinical strategies, human factors, competitive analyses, and risk management

Graduate Teaching Assistant, Managing Medical Product Innovations

Aug 2020 - Dec 2020

University of Pittsburgh

- Advised 18 Masters of Medical Product Engineering students in homework, class activities and discussions on product management, design thinking, Lean startup, and market discovery

Head Teaching Assistant, Honors Rhetoric

Aug 2016 - May 2019

Virginia Commonwealth University

- Assisted students in developing research questions and writing a technical literature review in the classroom, weekly walk-in breakout sessions for students, and individual meetings
- Managed 40+ undergraduate teaching assistants with breakout session schedules and review assignments

CONFERENCE PRESENTATIONS

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| 1. Society for Neuroscience Annual Meeting , Washington DC, podium talk | Nov 2023 |
| 2. 11th International IEEE EMBS Conference on Neural Engineering , Baltimore, MD, poster presentation | Apr 2023 |
| 3. American Society for Neurorehabilitation Annual Meeting , Charleston, SC, poster presentation | Mar 2023 |
| 4. Society for Neuroscience Annual Meeting , San Diego, CA, poster presentation | Nov 2022 |
| 5. American Society for Neurorehabilitation Annual Meeting , St. Louis, MO, poster presentation | Mar 2023 |
| 6. Society for Neuroscience Annual Meeting , Virtual, poster presentation | Nov 2021 |
| 7. Biomedical Engineering Society Annual Meeting , Atlanta, GA, poster presentation | Oct 2019 |
| 8. 14th IEEE Joint MMM-Intermag Conference , Washington DC, poster presentation | Jan 2019 |
| 9. IEEE 15th International Symposium on Biomedical Imaging , Washington DC, poster presentation | Apr 2018 |
| 10. National Conference for Undergraduate Research , Memphis, TN, poster presentation | Nov 2017 |

ORGANIZATIONS

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| 1. Neural Control of Movement (NCM) | Dec 2023 - Present |
| 2. American Society for Neurorehabilitation (ASNR) | Mar 2022 - Present |
| 3. Society for Neuroscience (SfN) | Nov 2021 - Present |
| 4. IEEE Engineering in Medicine and Biology Society | Mar 2021 - Present |
| 5. Center for the Neural Basis of Cognition , Carnegie Mellon University, University of Pittsburgh | Dec 2019 - Present |
| 6. Graduate Women in Engineering (GWEN) , University of Pittsburgh | Sep 2019 - Present |
| 7. Tau Beta Pi Engineering Honors Society (VA-E) , Virginia Commonwealth University | Nov 2016 - May 2019 |
| 8. Biomedical Engineering Society , Virginia Commonwealth University | Sep 2016 - May 2019 |
| 9. Engineering Student Council , Virginia Commonwealth University | Sep 2017 - May 2018 |
| 10. Engineering Student Ambassadors , Virginia Commonwealth University | Sep 2016 - May 2019 |
| 11. Phi Sigma Rho Engineering Sorority (Omega) , Virginia Commonwealth University | Sep 2015 - May 2019 |