

Monica Liu

EDUCATION	University of Pittsburgh PhD in Bioengineering with a focus in neural engineering <i>Advisors:</i> Dr. Douglas Weber, Dr. Aaron Batista <i>Research focus:</i> Population analysis of neural mechanisms of sensorimotor integration in the dorsal root ganglia and in motor cortex.	Pittsburgh, Pennsylvania, USA August 2016 – August 2021
	University of Virginia B.S. in Biology B.A. in Computer Science	Charlottesville, Virginia, USA August 2011 – May 2015
RESEARCH EXPERIENCE	Shanahan Postdoctoral Fellow , Allen Brain Institute, University of Washington Mentors: TBD Computational analyses of populations of neurons.	October 2021 – Present
	Rehab Neural Engineering Labs , University of Pittsburgh Mentors: Dr. Douglas Weber and Dr. Aaron Batista · Identified interactive effects of contact force and texture on neural coding of tactile stimuli in the periphery. · Characterized coordinated muscle responses to electrical stimulation of proprioceptive fibers in the dorsal root ganglia. · Examined influence of proprioceptive feedback on brain-computer interface control in M1.	August 2016 – September 2021
	Center for Diabetes Technology , University of Virginia Mentor: Dr. Marc Breton Assisted in clinical trials that tested a closed-loop artificial pancreas system in people with type I diabetes and built an algorithm to estimate insulin sensitivity over time.	May 2014 – June 2015
	Automated detection of axon blebbing , University of Virginia Mentor: Dr. Karsten Siller Built a MATLAB script to automate axon bleb counting, distinguishing between axon blebs and axon crossings in a fluorescent microscopy image with 85% accuracy.	June 2014 – May 2015
	Biochemistry and Molecular Genetics , University of Virginia Mentor: Dr. Ronald Taylor Assisted in the development and testing of a monoclonal antibody therapy to recruit the innate immune system to target cancerous B-cells and quantified off-target effects on platelets.	March 2011 – May 2014
HONORS AND SCHOLARSHIPS	Graduate Research Fellowship Program, National Science Foundation	2018
	Best Presentation, Computational Sensorimotor Neuroscience Summer School	2017
	Bevier Award, University of Pittsburgh Bioengineering Department	2016
PUBLICATIONS	Liu, M.F. , Batista, A.P., Bensmaia, S.J., Weber, D.J. (2020). Information about contact force and surface texture is mixed in the firing rates of cutaneous afferent neurons. <i>Journal of Neurophysiology</i> . https://doi.org/10.1152/jn.00725.2019	
	Urbin, M.A., Liu, M.F. , Bittorff, E.C., Gaunt, R.A., Fisher, L.E., Weber, D.J. (2019). Hindlimb motor responses evoked by microstimulation of the lumbar dorsal root ganglia during quiet standing. <i>Journal of Neural Engineering</i> . https://doi.org/10.1088/1741-2552/ab4c6c	

Pokrass, M.J. **Liu, M.F.**, Lindorfer, M.A., Taylor, R.P. (2013). Monoclonal Antibodies that Target cell-associated HLA or β 2-microglobulin exhibit differential complement activity: Implications for cancer immunotherapy. *Molecular Immunology*. <https://doi.org/10.1016/j.molimm.2013.05.242>

Manuscript in preparation, submission expected August 2021: November 2020 – Present

Proprioceptive encoding in primary motor cortex during BCI control

We examine how visual and proprioceptive feedback are incorporated into BCI control in a person who was completely paralyzed below the neck but retained intact somatosensation.

TEACHING

Lecturer, Teaching Assistant, Quantitative Systems Neuroscience Spring 2017-Spring 2021
Gave lectures on quantitative methods such as principal components analysis and K-means in the context of building a BCI decoder.

Lecture Notes: http://mfliu.github.io/files/BCI_Theory.pdf

Teaching Assistant, Signals and Systems Fall 2017
Graded homeworks and quizzes, held office hours, and tutored students individually.

Curriculum Creation, Methods Lab April 2018
Created a myoelectric-controlled Tetris game to teach undergraduate students about processing of EMG signals and basic classification.

Code: https://github.com/mfliu/Myoelectric_Tetris

**SERVICE AND
OUTREACH**

Obama Academy, Life Skills and College Prep Class February 2021 – April 2021
Collaboratively built a 7-session introduction to STEM for 9th graders that focused on the range and application of STEM careers, as well as the social and ethical responsibility of scientists and engineers.

Neuroscience Activities Website November 2020
Built a website focused on giving students hands-on experience with well-known neuroscience behavioral tasks and analyses.

Link: <https://mfliu.github.io/neuroActivities/>

Training and Discussion, Rehab Neural Engineering Labs March 2020 – Present
Organized a series of lectures and seminars focused on the history of racism in academia and healthcare in America, how this history has contributed to racial inequity in STEM today, and steps to take to begin to remedy these inequities moving forward.

Center for the Neural Basis of Cognition, Retreat Committee Fall 2019 – Present
Planned the annual retreat and helped other student committees organize and run events for the CNBC as a whole.

Ingenium, Co-Editor-In-Chief Summer 2019 – Spring 2020
Served as co-editor-in-chief for the undergraduate engineering research journal by coordinating review and publication process.

Letters to a Pre-Scientist 2018 – Present
Served as a pen pal to an elementary student each year to introduce students to STEM careers and to build writing skills.

Covestro Pittsburgh Regional Science and Engineering Fair March 2017 – March 2021

Interviewed students participating in the regional science fair and provided feedback, and helped other judges determine awards for students.

TALKS

How S1 spiking activity encodes sensory feedback for goal-directed movements in a grasping task November 2017

Liu, M.F., Arbuckle, S.A., Okorokova, E., Herrera, A.J., Kaiser, A.

Motor Learning and Motor Control (MLMC)

Our group won "Best Student Presentation" at the Computational Sensorimotor Neuroscience summer school and were awarded with a time slot to give this talk during MLMC.

POSTERS

Liu, M.F., Dekleva, B., Chowdhury, R., Batista, A.P., Boninger, M., Collinger, J., Gaunt, R., Weber, D.J. "The effect of visual and proprioceptive feedback on brain-computer interface control of a robotic arm". *Neural Control of Movement, 2020*. (Cancelled due to Covid-19)

Liu, M.F., Winberry, J.E., Versteeg, C., Simpson, T., Oby, E.R., Degenhard, A.D., Urbin, M.A., Batista, A.P., Gaunt, R.A., Miller, L.E., Bensmaia, S.J. Weber, D.J. "Effect of surface texture on the encoding of touch, pressure, and shear in the glabrous skin of a rhesus macaque". *Society for Neuroscience, 2018*.

Liu, M.F., Winberry, J.E., Versteeg, C., Simpson, T., Oby, E.R., Degenhard, A.D., Urbin, M.A., Batista, A.P., Gaunt, R.A., Miller, L.E., Bensmaia, S.J. Weber, D.J. "Dorsal root ganglion neuronal population responses to tactile stimuli in rhesus monkey hand". *Society for Neuroscience, 2017*

INDUSTRY EXPERIENCE

Novartis, Institute for Biomedical Research

Boston, Massachusetts, USA

Data Engineer

August 2015 – August 2016

Developed software to support large-scale genomics research by implementing infrastructure to support processing and analysis of large datasets and building a distributed processing system using Apache Spark.

RESEARCH TOOLS

Messaging framework for data collection and syncing

September 2020

A messaging framework that can be used to sync timing across multiple independent data streams with frequencies of 30kHz or more.

Code: <https://github.com/mfliu/networkedMessaging>

Graphic and haptic interface for Force Dimensions robots

November 2019

A framework for building behavioral experiments using a [haptic robot](#). Provides physics simulations of object interactions in complex tasks, such as fluid in a cup.

Code: <https://github.com/mfliu/hapticEnvironment>

SKILLS

Programming Languages:

Python, MATLAB, C++, Java, Javascript, Scala, OCaml, Haskell, HTML

Technical Skills:

Neural recording systems (Ripple, Plexon, Intan), EMG recording systems (Delsys Trigno), Kinematic recording systems (Optitrack, DeepLabCut), MongoDB, Linux, Git, Jupyter

Languages:

English (fluent), Cantonese (advanced), Mandarin (advanced), Spanish (intermediate)