

JESSIE R. LIU

jessie.liu@berkeley.edu, jessierliu.com

+1 (973) 590-7934

San Francisco, California.

EDUCATION

Ph.D. Candidate, Bioengineering

August 2017 - Present

Advisor: Edward F. Chang, M.D.

Course focus: Machine learning for neuroprosthetics

UC Berkeley - UCSF Graduate Program in Bioengineering

Berkeley & San Francisco, CA, USA.

B.S., Bioengineering

2013 - 2017

Minors: Chemistry, Korean

Summa cum laude

University of Pittsburgh

Pittsburgh, PA, USA.

RESEARCH

Graduate student researcher

May 2018 - Present

Chang Lab, UCSF.

San Francisco, CA

Advisor: Edward F. Chang, M.D.

- Develop computational algorithms for a speech brain computer interface using signal processing and machine learning.
- Research the neural basis of speech production.

Research assistant

Jan 2014 - July 2017

Modo Lab, University of Pittsburgh.

Pittsburgh, PA

- Characterized the distribution of thrombospondin in the extracellular matrix of healthy cortical tissue.
- Developed pipelines for automated histology analyses.

AWARDS AND HONORS

2022 The Annual BCI Award, 3rd place

2021 The Annual BCI Award, 2nd place

Summer 2016 Swanson School of Engineering Undergraduate Summer Research Internship

Summer 2015 Swanson School of Engineering Undergraduate Summer Research Internship

2013 - 2017 University of Pittsburgh Chancellor's Scholarship Nominee Merit Scholarship

2013 - 2017 University of Pittsburgh Kerschgens Engineering Alumni Scholarship

TEACHING

Winter 2021 **Teaching Assistant**
Neural and Behavioral Data Analysis, Dept. of Neuroscience
University of California, San Francisco, CA.

Fall 2016 & Spring 2017 **Teaching Assistant**
Cell Biology I & II, Dept. of Bioengineering
University of Pittsburgh, PA.

Spring 2015 & Spring 2016 **Conference Co-Chair**
First-Year Engineering Conference, Swanson School of Engineering
University of Pittsburgh, PA.

OUTREACH

2021 - Present **Code tutorial leader**
Lead Chang Lab coding tutorials with ENVISION Interns
<https://github.com/ChangLabUcsf/changlabXenvision>
ENVISION Internship Program
UCSF Dept. of Neurological Surgery

2018 - 2021 **Peer Advisor**
Bioengineering Student Association
UC Berkeley - UCSF Graduate Program in Bioengineering
Berkeley & San Francisco, CA.

2018 **Internal Networking Committee**
Bioengineering Student Association
UC Berkeley - UCSF Graduate Program in Bioengineering
Berkeley & San Francisco, CA.

TECHNICAL SKILLS

Programming

Expert in Python 3 with PyTorch, Tensorflow, Pandas, and other common scientific computing packages.
Proficient in Bash and Matlab.
Some experience with PyQtGraph.

PUBLICATIONS

Peer reviewed articles

* indicates equal contribution

Metzger*, S. L., **J. R. Liu***, D. A. Moses*, M. E. Dougherty, M. P. Seaton, K. T. Littlejohn, J. Chartier, G. K. Anumanchipalli, A. Tu-Chan, K. Ganguly, and E. F. Chang. "Generalizable spelling using a speech neuroprosthesis in an individual with severe limb and vocal paralysis". In: *Nature Communications* 13.6510 (Nov. 2022). DOI: 10.1038/s41467-022-33611-3.

Silva, A. B., **J. R. Liu**, L. Zhao, D. F. Levy, T. L. Scott, and E. F. Chang. "A Neurosurgical Functional Dissection of the Middle Precentral Gyrus during Speech Production". In: *Journal of Neuroscience* 42.45 (Nov. 2022), pp. 8416–8426. DOI: 10.1523/JNEUROSCI.1614-22.2022.

Moses*, D. A., S. L. Metzger*, **J. R. Liu***, G. K. Anumanchipalli, J. G. Makin, P. F. Sun, J. Chartier, M. E. Dougherty, P. M. Liu, G. M. Abrams, A. Tu-Chan, K. Ganguly, and E. F. Chang. “Neuroprosthesis for Decoding Speech in a Paralyzed Person with Anarthria”. In: *New England Journal of Medicine* 385.3 (July 2021), pp. 217–227. DOI: 10.1056/nejmoa2027540.

Liu, J. R. and M. Modo. “Quantification of the Extracellular Matrix Molecule Thrombospondin 1 and Its Pericellular Association in the Brain Using a Semiautomated Computerized Approach”. In: *Journal of Histochemistry & Cytochemistry* 66.9 (Apr. 2018), pp. 643–662. DOI: 10.1369/0022155418771677.

Wahlberg, B., H. Ghuman, **J. R. Liu**, and M. Modo. “Ex vivo biomechanical characterization of syringe-needle ejections for intracerebral cell delivery”. In: *Scientific Reports* 8.1 (June 2018). DOI: 10.1038/s41598-018-27568-x.

Ghuman, H., M. Gerwig, F. J. Nicholls, **J. R. Liu**, J. Donnelly, S. F. Badylak, and M. Modo. “Long-term retention of ECM hydrogel after implantation into a sub-acute stroke cavity reduces lesion volume”. In: *Acta Biomaterialia* 63 (Nov. 2017), pp. 50–63. DOI: 10.1016/j.actbio.2017.09.011.

Nicholls, F. J., **J. R. Liu**, and M. Modo. “A Comparison of Exogenous Labels for the Histological Identification of Transplanted Neural Stem Cells”. In: *Cell Transplantation* 26.4 (Apr. 2017), pp. 625–645. DOI: 10.3727/096368916x693680.

Modo, M., T. K. Hitchens, **J. R. Liu**, and R. M. Richardson. “Detection of aberrant hippocampal mossy fiber connections: Ex vivo mesoscale diffusion MRI and microtractography with histological validation in a patient with uncontrolled temporal lobe epilepsy”. In: *Human Brain Mapping* 37.2 (Nov. 2015), pp. 780–795. DOI: 10.1002/hbm.23066.

Conference poster presentations

* indicates equal contribution

Moses*, D. A., S. L. Metzger*, **J. R. Liu***, G. K. Anumanchipalli, J. G. Makin, P. F. Sun, J. Chartier, M. E. Dougherty, P. M. Liu, G. M. Abrams, A. Tu-Chan, K. Ganguly, and E. F. Chang. “Speech neuroprosthetic technology in a person with severe paralysis and anarthria”. In: P558.05. Society for Neuroscience. Nov. 2021.

Liu, J. R. and M. Modo. “An Automated Comparison of the Distribution of Extracellular Matrix Molecules in the Brain”. In: Biomedical Engineering Society. Minneapolis, MN, Oct. 2016.

– “Mapping The Extracellular Matrix: An Automated Analysis of the Striatal Distribution of Thrombospondin”. In: Biomedical Engineering Society. Tampa, FL, Oct. 2015.

Invited talks

Liu, J. R. *Developing a speech neuroprosthesis for assisted communication*. University of Minnesota “The Talking Brain”, Mar. 2022.

– *Developing a speech neuroprosthesis for assisted communication*. Stanford University “Modern Ethical Challenges in Neuroscience and Organ Transplantation”, May 2022.

Liu, J. R., D. A. Moses, and S. L. Metzger. *Neuroprosthesis for decoding speech in a paralyzed person with anarthria*. L.A.S.E.R. Talks, Oct. 2021. URL: https://www.youtube.com/watch?v=AwUgTI56BmQ&ab_channel=PieroScaruffi.

Liu, J. R., D. A. Moses, and S. M. Wilson. *Neuroprosthesis for decoding speech in a paralyzed person with anarthria with David Moses and Jessie Liu*. The Language Neuroscience Podcast, Aug. 2021. URL: <https://langneurosci.org/podcast/#ep13>.