

# Yaoxin Li

734-546-7903 | [selinali@umich.edu](mailto:selinali@umich.edu) | [selina-lii.github.io](https://selina-lii.github.io)

## EDUCATION

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### University of Michigan

*Masters of Engineering in Electrical & Computer Engineering*  
*Bachelors of Science in Computer Science, GPA: 3.9/4.0*

Sep 2021 - Apr 2025

*Ann Arbor, MI*

### Beihang University

*Computer Engineering (transferred), 1st Price Academic Excellence Scholarship*

Sep 2018 - Jun 2020

*Beijing, China*

## RESEARCH EXPERIENCE

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### University of Michigan Biomedical Engineering, Research Assistant

*Lab of Integrated Brain Imaging, Advised by Dr. Zhongming Liu*

May 2023 - Present

*Ann Arbor, MI*

- **fMRI Representation Learning:** Developed a Python library that encodes spatial (VAE) and temporal (BERT) fMRI dynamics into latent representations, yielding a subspace of brain states that could predict task performance and neurological conditions, as part of an NIH-funded **precision health** project.
- **Neuro-ML Software Framework:** Architected interfaces to integrate in-house deep learning models, geometric preprocessors, and CIFTI data utilities. Packaged the software with a web interface and Docker container, increasing efficiency and flexibility of model training and application on local fMRI data.
- **Model Generalizability:** Preprocessed HCP-YA dataset with fMRIPrep and HCPpipeline, then compared embedding alignment and reconstruction quality across preprocessing pipelines to validate model robustness.

### Michigan Neuroscience Institute, Research Assistant

*Burgess Lab, Advised by Dr. Christian Burgess*

Apr 2022 - May 2023

*Ann Arbor, MI*

- **Homeostatic Plasticity in Visual Cortex:** Characterized homeostatic balance after visual deprivation and restoration in adult mice V1, uncovering a rebound in spontaneous firing of task-activated neuronal ensemble.  
Profiled neural activity of 6,000 neurons through long-term **two-photon calcium imaging**, indexing their stimuli orientation selectivity, onset-offset tuning, and spontaneous activity patterns in a custom-built database that allows rapid longitudinal analysis of 20T data.
- **Imaging and Wet Lab:** Assisted animal experiments, including two-photon microscopy and behavioral sessions, genotype verifications, and surgical preparations for cranial windows.
- **Neural Data GUI:** Developed a custom graphical user interface tracking two-photon imaging and analysis files, ensuring data integrity and saving 5+ hours weekly in imaging workflows.

### Chinese Institute for Brain Research, Research Assistant

*Cui Lab, Advised by Dr. Zaixu Cui*

Apr 2021 - Aug 2021

*Beijing, China*

- **Individualized Brain Parcellations (fMRI):** Adapted and refined unsupervised learning models, NMF and MS-HBM, to generate personalized resting-state functional networks for 1,200 HCP subjects.
- **Gradient of Edge-level Variability:** Discovered a cascade of higher inter-subject variability in connectivity edges that involve association (rather than sensorimotor) networks, suggesting a basis for individual uniqueness in healthy connectomes.  
Computed and analyzed edge variability matrices from the parcellation networks for a key figure in manuscript, and evaluated how anatomical/behavioral factors explain functional connectivity variations.
- **Symptom Networks:** Constructed symptom networks from a psychological data cohort of 3,000+ young adults using EBICglasso with bootstrapped p-values for edge weights. Applied PCA and regression on network metrics (e.g. centrality) to identify mental health risk predictors.

### Beihang University, Research Assistant

*State Key Laboratory of Software Development, Advised by Dr. Rong Ding*

Oct 2019 - Jan 2020

*Beijing, China*

- **Knowledge Graph for Aphasia Treatment:** Remodeled dataset of an NLP-based aphasia therapy platform into a Neo4j knowledge graph, producing higher-quality cues for language disorder patients.

## PUBLICATIONS AND PRESENTATIONS

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**Li Y**, Han K, MacKenzie O, Choi M, Liu Z, Peltier S, **"RepL-fMRI: A Python Library for fMRI Representation Learning"**, *Poster presentation at Organization for Human Brain Mapping*, June 2024

Faulkner AD, Chiu AS, Sarabi A, Karthik S, **Li Y**, Burgess CR, **"Context flexibly modulates cue representations in visual cortex"**, *Nature Communications* (under review), April 2024

Yang H, Wu G, **Li Y**, Ma Y, Chen R, Pines A, Xu T, Sydnor VJ, Satterthwaite TD, Cui Z, **"Connectional Hierarchy in Human Brain Revealed by Individual Variability of Functional Network Edges"**, *bioRxiv (in submission)*, March 2023

**Li Y**, **"Visualizing Homeostatic Plasticity In Mouse Visual Cortex"**, *Oral presentation at Michigan Integrative Physiology Symposium*, Aug 2022

## INTERNSHIPS AND PROJECTS

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### Open-Source Developer (Neuroimaging)

May 2023 - Sep 2023

*Virtual Brain Lab, advised by Dr. Daniel Birman*

*Remote*

- **Two-photon 3D Visualization:** Developed a *Texture* feature in Urchin (Universal Renderer for Neuroscience) enabling anatomically accurate 3D views of two-photon image/video data, released as a Python API and coordinated testing with users from the neuroscience community.
- Designed web sockets between Unity (C#) backend and Python API, and created a 3D Unity shader for interactive overlays of imaging fields of views onto a virtual mouse brain model.

### Simulation Intern

Aug 2020 - Oct 2020

*TuSimple (Autonomous Transportation)*

*Beijing, China*

- Implemented and verified 250+ edge-case simulations to test in-house autonomous driving algorithms, identified safety risks in 70% of cases and collaborated with the algorithms team on mitigation.
- Enhanced self-driving reliability by 14% for scenarios like highway merges and grouped obstacles in road tests.

## SKILLS

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<b>Programming</b>	Python, MATLAB, R, Julia, Shell, C/C++, SQL, NoSQL, Java, JavaScript
<b>Machine learning</b>	PyTorch, TensorFlow, scikit-learn, HuggingFace, Transformer, VAE, CNN, RNN, Diffusion Models, Dimensionality Reduction (PCA/ICA, NMF)
<b>Neuroimaging</b>	fMRI, Two-photon Calcium Imaging, EEG, Functional Networks, Connectome Workbench, Nilearn, fMRIPrep, GLM, CIFTI, BIDS, MNI atlas, SPM, FreeSurfer, FSL
<b>Developer Tools</b>	Git, Linux, Docker, Singularity, High-Performance Computing (AWS Cloud, Slurm)
<b>Technical</b>	Web Development (React, REST APIs, Node.js), Data Visualization (Matplotlib, Seaborn, ggplot2), Databases (MongoDB, MySQL), Parallel Programming, 3D modeling (CATIA, SolidWorks), FEA (Ansys)

## ACTIVITIES

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Course Assistant, EECS 445: Machine Learning and EECS 484: Database Management Systems	2023 - 2024
STEM Outreach Facilitator, F.E.M.M.E.S. at UofM	2023
Brakes Lead, AERO Racing - FSAE China National Top 10 in 2019	2019 - 2020

## PROFESSIONAL ASSOCIATIONS

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**Organization for Human Brain Mapping** (OHBM), 2021 - 2024

**Society for Neuroscience** (SfN), 2024