SHUJUN XIONG

https://xiongshujun.github.io/

EDUCATION

New York University — **New York, NY**
PhD in Neural Science — *Sep 2024 – Present*

- **Relevant Graduate Coursework:** Adv. Theoretical Neuroscience, AI, Differentiable Manifolds, Dynamical Systems, Geometric Data Analysis, Machine Learning, Modern Analysis, Probability Theory, Reinforcement Learning, Systems Neurobiology

AWARDS & HONORS

- NSF-GRFP Winner (2024): Competitive grant supporting 3 years of PhD research and tuition benefits.
- MacCracken Fellowship (2024): Full funding, benefits, and housing stipend for a PhD in Neural Science at NYU.
- Rhodes Scholarship Nominee (2023): nominated to be one of ~800 finalists nationwide for the Rhodes Scholarship.
- Undergraduate Summer Research Fellowship (2022): competitive fellowship funding undergraduate summer research (~24%)
- Almaworks Fellowship (2022): fellowship pairing students with local start-ups. Did software engineering for eco-friendly fashion.
- Laidlaw Fellowship (2021-2022): competitive fellowship funding students at select universities. First-year focus on leadership development (sociology research with trans Chinese-Americans). Second-year focus on leadership application (Queer in AI activism)
- Columbia-Rice COVID-19 Health Policy Hackathon Winner (2020): Authored the best health policy briefs out of 30+ undergraduate teams nationwide. Won a $2,500 grant to jumpstart community-based programs for at-risk LGBTQ+ youth in NYC.

RESEARCH EXPERIENCE

Litwin-Kumar Lab, Zuckerman Institute — **New York, NY**
Research Intern — *Sept 2023 - Present*

- Characterized impact of dopaminergic heterogeneity in basal ganglia on deep reinforcement learning models for NeuroGym tasks.
- Studying neural manifold structure through algebraic geometry. Identifying common topologies using computational homology.

NASA-Jet Propulsion League, Machine Learning and Instrument Autonomy — **Pasadena, CA**
Caltech Summer Undergraduate Research Fellow — *May 2023 – Aug 2023*

- Trained source-specific models on constrained datasets to improve methane plume detection on featureless and sparse aerial images.
- Leveraged different state-of-the-art and resource-constrained ensembling techniques to build explainable models for CarbonMapper.

Massachusetts Institute of Technology, Metaconscious Lab (Robert Yang) — **Cambridge, MA**
Columbia Research Fellow — *May 2022 – Dec 2022*

- Modeled real-world competitive behaviors, combining fear-reward psychology with evolutionary deep reinforcement learning agents
- Discovered emergent properties of self-modeling in neural networks constrained by conflicts between innate and planned behaviors.

Pe'er Lab, Columbia University — **New York, NY**
Undergraduate Research Intern — *Jan 2021 – May 2022*

- Applied hierarchical learning models in designed hyperbolic topologies for protein discovery and classification (ICLR/PMLR 2022)
- Investigated the utility and risks of sparse-data learning algorithms on queer community-networks and online data (TransTech 2022)

Broad Institute of MIT and Harvard — **Cambridge, MA**
Summer Research Fellow — *Jun 2021 – Aug 2021*

- Analyzed correlations in genes implicated in cancer and depression incidence using self-designed statistical tools (NDiSTEM 2021)

Xu Lab, New York Psychiatric Institute — **New York, NY**
Computational Research Intern — *Sep 2020 – Apr 2021*

- Cultured cerebral organoids with dystonia knock-outs. Collected mRNA-seq data, compared to schizophrenia-knock-out organoids.

LEADERSHIP AND COMMUNITY SERVICE

Freelance Debate Coach — **United States**
Parliamentary and Public Forum Debate — *Aug 2020 – Current*

- Coach debate for a variety of institutions in California, New Jersey, and New York, with a major emphasis on expanding racial, economic, and gender equality. Provide readings on Buddhism, Feyerabend, Foucault, and Marx.
- Serve as a representative to the National Parliamentary Debate League. Cowrite topics and legislation to improve accessibility.

Prison Math Project — **Los Angeles, CA**
Volunteer — *Nov 2023 – Present*

- Teach math to prisoners over mail, primarily in elementary competitive math, geometry, and algebra.

Queer in AI — **Los Angeles, CA**
Organizer — *Dec 2021 – Feb 2024*

- Collaborate on research projects to identify issues in AI affecting the LGBTQIA+ community, publishing with FAcct and XRDS.
- Organize Queer in AI workshops at major conferences (NeurIPS 2023; NAACL 2022; AAAI 2022).

ACADEMIC TEACHING

- Putnam Seminar Lecturer (Summer 2022, Fall 2022, Spring 2023, Fall 2023, Spring 2024): teach a seminar on the Putnam, the premier collegiate math competition. Prepare students across algebra, analysis, combinatorics, geometry, and number theory.
- Neural Manifold and Deep Learning Theory (Spring 2024): teach core papers and concepts on neural manifolds. Emphasis on capacity theory, manifold representations in neuroscience data, and manifold learning algorithms.
- Artificial Intelligence TA (Fall 2022, Spring 2023, Fall 2023): give weekly recitations and office hours for a graduate-level AI class.
- Theoretical Neuroscience and AI Lecturer (Fall 2023): teach core papers on theoretical neuroscience and its applications to AI. Co-lead a group project with graduate students on simulated neural dynamics for advanced undergraduates.
- Introduction to Proofs TA (Fall 2022, Spring 2023): grade assignments for first- and second-year students to ease their transition to proof-based mathematics. Give brief lectures as needed on how to construct proofs in a logical manner.

PUBLICATIONS

- Organizers of Queer in AI (**Anon**.). Queer In AI: A Case Study in Community-Led Participatory AI. FAccT (2023; Best Paper)
- Bo W, Shiang W., Chunfeng Y., Bing L., Weiming H., Zhonghai W., **Jeffrey X**. Learnable Pixel Clustering Via Structure and Semantic Dual Constraints for Unsupervised Image Segmentation. IEEE ICIP (2022)
- Myers et al. ICLR 2022 Challenge for Computational Geometry & Topology: Design and Results. Proceedings of Topological, Algebraic, and Geometric Learning Workshops, PMLR 196:269-276 (2022)
- Hetvi Jethwani, Arjun Subramonian, William Agnew, MaryLena Bleile, Sarthak Arora, Maria Ryskina, and **Jeffrey Xiong**. 2022. Queer in AI. XRDS 28, 4 (Summer 2022), 18–21. https://doi.org/10.1145/3538543
- **Xiong, Jeffrey**. Justice for Asians After Atlanta. Colorlines (2021).
- **Xiong, Jeffrey**. Fighting for justice for Asian Americans, united against hate crimes (2021).

PRESENTATIONS

- **Xiong, J**.* De La Torre, F., Yang, G.R. I Must Be Dreaming! Imagination and Self-Modeling in Reinforcement Learning. Columbia Undergraduate Research Conference (2022).
- **Xiong, Jeffrey**. Sparse Machine Learning for the Queer Community. TransTech National Conference (2022)
- **Xiong, Jeffrey**. Creating a Portrait of the Transgender/Nonbinary Chinese-American Community: Oral Histories during COVID-19: Methods of Action through Artificial Intelligence. National Conference in Undergraduate Research (2022)
- **Xiong, Jeffrey** and Cooper Galvin. Genes implicated in depression have no significant impact on cancer cell survival. National Diversity in STEM Conference (2021).
- **Xiong, Jeffrey**. An Oral History of COVID-19 and the Transgender Chinese-American Community. Columbia Undergraduate Research Conference (2021).