Nathan Wu

nathan_wu@g.harvard.edu
linkedin.com/in/nwu | nathanhwu.github.io

EDUCATION

Harvard University, Cambridge, MA — Expected 2031
Ph.D. Student, Program in Neuroscience — GPA: 3.94/4.00

Yale University, New Haven, CT — December 2024
B.S. Molecular Biophysics & Biochemistry and Computer Science, Cum Laude — GPA: 3.94/4.00
Relevant Coursework: Neurobiology, Biology at the Molecular Level, Modeling Biological Systems, Macromolecular Structure and Biophysical Analysis, Physical Chemistry, Deep Learning on Graph-Structured Data, Algorithms, Differential Equations, Linear Algebra, Philosophy of Mind

AWARDS

Kempner Graduate Fellowship	Feb 2025
Grace Hopper College Richter Fellowship	May 2023
Outstanding Presentation, Summer Undergraduate Research Fellowship Symposium	Aug 2023
Wu Tsai Undergraduate Research Fellowship	Mar 2022
Yale First-Year Summer Research Fellowship in Science and Engineering	Mar 2021

PUBLICATIONS

N. Wu*, B. Zhou*, M. Agrochao, & D.A. Clark, Broken time-reversal symmetry in visual motion detection, *Proc. Natl. Acad. Sci. U.S.A.* 122 (10) e2410768122, https://doi.org/10.1073/pnas.2410768122 (2025). (* Equal contributions)

PRESENTATIONS

"Broken time reversal symmetry in visual motion detection." Poster presented at Computational and Systems Neuroscience (COSYNE) Conference. Montreal, Canada, Mar 2025.

"Elementary models of visual motion detection and their biophysical implementations." Poster presented at Molecular Biophysics and Biochemistry Day of Research. Yale University, New Haven, CT, Apr 2024.

"Perceptual asymmetry of motion detection upon time reversal in *Drosophila*." Poster presented at Summer Undergraduate Research Fellowship Symposium. Yale University, New Haven, CT, Aug 2022.

RESEARCH EXPERIENCE

Yale University, New Haven, CT — Sep 2021 – Dec 2024
Undergraduate Researcher in the lab of Dr. Damon Clark
Study the basis of time reversal symmetry breaking of motion estimation in *Drosophila* to better understand neural computations in biological motion detectors. Discovered that time reversal symmetry breaking can emerge from constrained optimization in environments with non-Gaussian contrast distributions. Designed a novel class of stimuli with unique combinations of symmetries. Built and tested neural network-based motion detectors trained on scenes with both natural and artificial contrast distributions.

Tufts University, Medford, MA — June 2023 – Aug 2023, June 2024 – Aug 2024
Visiting Student Researcher in the lab of Dr. Michael Levin at the Allen Discovery Center
Investigate the ability of neuronal cell cultures to learn on a network-wide level, in the absence of evolved organization. Maintained primary cell cultures and collected time-course data on neural activity from over 1,000 recording electrodes. Applied dimensionality reduction techniques to characterize spontaneous activity. Developed software to design and run closed-loop experiments. Characterized changes in functional connectivity over the course of learning. Mentored three other team members working on the project.

Yale University, New Haven, CT Jan 2021 – Aug 2021
iGEM Team Member in the lab of Dr. Farren Isaacs
The International Genetically Engineered Machine (iGEM) Foundation hosts a competition where teams of students conduct synthetic biology projects addressing everyday issues facing the world. With a team of three other undergraduates, originated and executed a project investigating inhibition and reactivation of CRISPR-Cas9 through toehold-mediated strand displacement in HEK cells. Collaboratively planned experiments, solicited funding from sponsors, and budgeted spending on reagents and equipment.

WORK/TEACHING EXPERIENCE

MaxWell Biosystems AG, Zurich, Switzerland Feb 2025 – Aug 2025
Application Engineer Intern
Contributed to MaxLab Live software development by improving Python/C++ API documentation, testing code examples, and creating supporting materials. Evaluated third-party toolboxes for neural and cardiac applications. Implemented a structured platform for collecting user feedback. Developed tools to streamline customer communication and initiated cross-team feedback sessions.

Yale University, New Haven, CT Sep 2022 – Dec 2024
Peer Tutor, University Physics
Provide individualized tutoring and support to a class of over 200 students. Lead five hours of office hours and study halls each week. Improve student understanding by simplifying and clarifying complicated physics concepts from lectures.

Sanofi, Framingham, MA Sep 2023 – Jan 2024
Upstream Manufacturing Science and Technology Co-op
Developed a GUI-based app for the analysis and visualization of metabolic flux in bioreactors. Predicted intracellular metabolic flux through metabolic flux analysis (MFA) and flux balance analysis (FBA). Utilized app to predict extracellular metabolite concentrations over time and to optimize bioreactor feeding strategies. Planned and executed experiments to validate intracellular and extracellular modeling. Presented findings and work to MSAT department.

Blue Ivy Learning, Remote Jan 2021 – May 2022
Teacher, Geometry for Competition Math
Taught two six-month long courses on geometry, focusing on problems and techniques appearing in high school-level competition math. Planned weekly lessons and created homework assignments to review in-class content. Kept classes of ~10 students engaged in a virtual learning environment.

LEADERSHIP EXPERIENCE

Cadence of Yale, New Haven, CT Sep 2020 – Dec 2024
Music Director
Rehearse and perform as part of Yale's only a cappella group dedicated to intercollegiate competition. Annually perform in the International Championship of Collegiate A Cappella (ICCA) competition, in addition to regular gigs and performances. Lead rehearsals, arrange music, organize concerts, and coordinate recruitment events and performances. Manage group of 9-13 members by communicating and enforcing expectations and policies.

Yale Scientific Magazine, New Haven, CT Sep 2021 – May 2024
Senior Staff Writer
Wrote eight articles on current topics in science. Interviewed experts and researchers, uncovering and conveying the underlying narratives behind their work. Presented complex scientific ideas gathered from papers and interviews in accessible language. Collaborated with editors and other writers.

SKILLS

Computational: Python, MATLAB, C, C++, Git, GUI design (Dash), sklearn, pandas, clustering and dimensionality reduction, deep learning, object-oriented programming, signal processing

Laboratory: MEA electrophysiology, mammalian cell culture, RT-qPCR, CRISPR-Cas9, primer design, metabolic flux analysis, bioreactor operation