Sarah A. Zhao

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EDUCATION

Massachusetts Institute of Technology, Cambridge, Massachusetts
Master of Engineering, Computer Science (BioEECS) | GPA: 4.5/5.0 *May 2024—(Expected) May 2025*
- Advised by Prof. Manolis Kellis, Ph.D.
- Thesis topic: Predicting the impact of variants of uncertain significance on genetic disorders
- Relevant Coursework: Graduate Genetics, Mining Microbiomes, Synthetic Biology, (Expected) Biochemistry, (Expected) Biomechanics

Bachelor of Science, Computer Science, Mathematics | GPA: 4.3/5.0 *Sept 2020—May 2024*
- Relevant Coursework: Organic Chemistry, Physics II, Biology, Differential Equations, Linear Algebra, Micro/Nano Processing Technology, Grad Machine Learning, Natural Language Processing, Computer Vision, Algorithms

EXPERIENCE

Broad Institute of MIT and Harvard, Cambridge, Massachusetts
Graduate Student, Laboratory of Manolis Kellis, Ph.D. *Oct 2024—Present*

Massachusetts Institute of Technology, Cambridge, Massachusetts
Master's Student, Computational Biology Group, Laboratory of Manolis Kellis, Ph.D. *Sept 2024—Present*
- Variant interpretation for precision medicine
- Building a model to predict the effect of genetic variation on the dysregulation of molecular components in psychiatric disorders

Undergraduate Researcher, Laboratory of Manolis Kellis, Ph.D. *Jan 2024—Aug 2024*
- Direct Advisor: Riley Mangan, Ph.D.
- Developed infrastructure using Go for probabilistic representations of biological sequence data, contributing to open-source genomics software package Gonomics
- Reconstructed ancestral genome from extant species genomes based on posterior predictive distributions to identify derived gene regulatory changes between ancient and modern genomes

Massachusetts Institute of Technology, Cambridge, Massachusetts
Undergraduate Researcher, Laboratory of Lindsay Case, Ph.D. *Feb 2024—Aug 2024*
- Direct Advisor: Jibin Sadasivan, Ph.D.
- Constructed protein-protein interaction network using Python and Cytoscape to identify potential scaffold proteins that phase separate in focal adhesions
- Designed and conducted experiments to investigate co-localization between candidate phase separating proteins and known proteins in focal adhesions
- Conducted comprehensive literature review on the focal adhesion proteome and phase separation

MIT Directed Reading Program, Cambridge, Massachusetts *Jan 2024*
- Studied and presented on parameterized algorithms (based on work by Cygan et al., 2015)

Kongsberg Maritime, Lysaker, Norway *June 2023—Aug 2023*
Machine Learning Research Intern
- Developed machine-learning video and image compression algorithms using PyTorch Lightning to decrease file size and improve latency
- Literature review of video compression algorithms

NCSoft, Seongnam, South Korea *June 2022—Aug 2022*
Machine Learning Research Intern
- Direct Advisor: Joon-Hong Seok, Ph.D.
- Built a text-to-video model using Pytorch generating lifelike text-to-animation with multilingual input
- Designed morph targets in Maya for Mandarin lip synching to localise Korean content for Taiwan
- Refactored codebase to comply with current industry code standards and streamline development

Massachusetts Institute of Technology, Cambridge, Massachusetts
Undergraduate Researcher, Laboratory of Faez Ahmed, Ph.D. *Feb 2022—May 2022*
- Direct Advisor: Binyang Song, Ph.D.
- Designed algorithm in Python to process publication abstracts and metadata using natural language programming (NLTK, scikit-learn)
- Evaluated data trends based on statistical data analysis & visualised trends using Plotly and Dash

Massachusetts Institute of Technology, Cambridge, Massachusetts
Undergraduate Researcher, Laboratory of Deblina Sarkar, Ph.D. *Oct 2020—Sept 2021*
- Direct Advisor: Yubin Cai, M.S.

- Programmed models in Python to analyse circuit impedance and fabricated microcoils for non-invasive nanosensors monitoring cell response
- Conducted literature review on neural sensor material impedance, conductivity, and thermal activity

PUBLICATIONS

- Yoo D, … **Zhao SA**, … Eichler, EE. (2024). Complete sequencing of ape genomes. *Accepted Jan 2025 (Nature). (p. 2024.07.31.605654). bioRxiv.* https://doi.org/10.1101/2024.07.31.605654

(In Preparation)

- **Zhao SA**, …, Lowe CB, Kellis M. pDNA: A High-Performance Software Package for Probabilistic Representations of Nucleotide Sequences.

TEACHING

Massachusetts Institute of Technology, Cambridge, Massachusetts
Teaching Assistant, 6.042/6.1200 Mathematics for Computer Science *Sept 2022—May 2024*

- Led twice-weekly recitations for ~15 students on discrete maths and computer science principles for four semesters
- Developed problem sets and exam questions
- Held office hours weekly (4 hrs) for >300 student class
- Supervised course graders (~20 undergraduate graders)

Lab Assistant, 6.009/6.1010 Fundamentals of Programming *Feb 2022—May 2022*

- Advised students in one-on-one meetings during office hours
- Graded student labs and homework assignments

Grader, 8.01 Physics I: Classical Mechanics *Feb 2022—May 2022*

- Evaluated student work and provided feedback

TECHNICAL SKILLS

Experimental Biology

- Cell culture, Western blotting, immunoprecipitation, plasmid cloning and purification, gel electrophoresis, DNA/RNA extraction, transfection, spectrophotometry, microfluidic devices

Computational

- Programming Languages: *Advanced proficiency in* Python, Go, Typescript; *Proficient in* R, Java, C, Assembly; *Additional experience in* Julia, Matlab, Javascript, HTML and CSS
- Machine Learning, Statistics, and Data Science: PyTorch, Tensorflow, NumPy, Pandas, SKLearn

Languages

- Mandarin (Advanced Proficiency), Spanish (Proficient), Korean (Conversational)

CAMPUS INVOLVEMENT

MIT 2024 Ring Committee, Cambridge, Massachusetts
Contributing Artist, Social Chair, *June 2021—June 2022*

- Planned events for more than 1200 students & managed committee correspondence
- Collaborated with jeweller representatives to design ring and coordinate sales

MIT ActLingual, Cambridge, Massachusetts
Committee Leader *Sept 2020—May 2022*

- Wrote manual on medical interpreting in Spanish and Mandarin, and organised interpretation opportunities in Boston for MIT students

MIT Music & Theater Arts, Cambridge, Massachusetts *Sept 2020—May 2021*
Emerson Scholar, Piano

- Scholarship for exemplary talent and passion for music

SERVICE

MIT MedLinks, Cambridge, Massachusetts
Residential Director *Sept 2022—May 2024*

- Connected students to healthcare services, promoted education campaigns, planned welfare events for ~200 students

Harvard Phillips Brooks House Association Chinatown Citizenship, Cambridge, Massachusetts
Mock Interview Teacher *Sept 2020—May 2022*

- Facilitated mock interviews to prepare Chinese-native students for the U.S. naturalisation exam
- Redesigned curriculum according to the USCIS 2022 Naturalization Test Redesign

MIT ARCTAN (Red Cross), Cambridge, Massachusetts
Community Service Coordinator *Sept 2020—May 2022*

- Coordinated events such as education campaigns, blood drives, CPR training and volunteering