

Michael S. Yao

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Research Statement

My research focuses on building safe and interpretable neural networks for medical image analysis and patient healthcare data. I explore problems related to distributional shift and domain generalization for tasks such as lesion detection, uncertainty quantification, and out-of-distribution detection. I am also interested in developing methods to improve patient accessibility to healthcare.

Education

- 2021 – Present **University of Pennsylvania** – Philadelphia, PA
MD/PhD Candidate, Department of Bioengineering
Advised by [Osbert Bastani](#) and [James Gee](#). *GPA: 4.00.*
- 2017 – 2021 **California Institute of Technology** – Pasadena, CA
BS in Applied Physics
Advised by [Mikhail Shapiro](#). *GPA: 4.00 (class rank 3/233).*

Industry Experience

- Summer 2022 **Microsoft Research (Research Scientist Intern)** – Redmond, WA
Advised by [Michael Hansen](#). Developed fully-supervised methods for accelerated MRI image reconstruction using undersampled datasets. [Project Page](#)
- Summer 2021 **Hyperfine (MR Software Engineering Intern)** – Guilford, CT
Explored methods for MR signal processing, such as band-pass filter tuning and adaptive coil combination algorithms.

Honors and Scholarships

- 2021 – 2023 T32 HHMI/NIBIB Interfaces Scholar (University of Pennsylvania)
Two-year fellowship to support graduate research in medical imaging.
- 2021 George W. Housner Prize (Caltech)
Awarded to a graduating senior in the upper 20% of their class for a piece of original scientific research.

- 2020 Jack E. Froehlich Memorial Award (Caltech)
Awarded to a junior in the upper 5% of their class who shows promise for a creative professional career.
- 2020 Henry Ford II Scholar Award (Caltech)
Awarded to junior engineering students with the best academic record.
- 2019 Richter Memorial Fund Scholarship (Caltech)
Merit scholarship supporting over 60% of tuition costs over 2 years.

Publications

- 2022 **Learning-Based Radiomic Prediction of Type 2 Diabetes Mellitus Using Image-Derived Phenotypes.** [arXiv](#)
Yao MS*, Chae A*, MacLean MT, Verma A, Duda J, Gee J, Torigian DA, Rader D, Kahn C, Witschey WR, Sagreiya H.
- 2022 **A Path Towards Clinical Adaptation of Accelerated MRI.** [Proc. ML4H 2022](#)
Yao MS, Hansen MS.
- 2022 **Ultrasound-controllable Engineered Bacteria for Cancer Immunotherapy.** [Nature Communications](#)
Abedi MH*, Yao MS*, Mittelstein DR, Bar-Zion A, Swift MB, Lee-Gosselin A, Barturen-Larrea P, Buss MT, Shapiro MG.
- 2022 **Seamless Gene Correction in the Human Cystic Fibrosis Transmembrane Conductance Regulator Locus by Vector Replacement and Vector Insertion Events.** [Frontiers in Genome Editing](#)
Suzuki S, Chosa K, Barilla C, Yao MS, Zuffardi O, Kai H, Shuto T, Suico MA, Kan YW, Sargent RG, Gruenert DC.
- 2020 **Demonstration of a Longitudinal Medical Education Model (LMEM) to Teach Point-of-Care Ultrasound in Resource-Limited Settings.** [POCUS Journal](#)
Yao MS, Uhr L, Daghljan G, Amrute JM, Deshpande R, Mathews B, Patel SA, Henri R, Liu G, Reiersen K, Johnson G.
- 2019 **Stakeholder Perceptions of Point-of-Care Ultrasound Implementation in Resource-Limited Settings.** [Diagnostics](#)
Maw AM, Galvin B, Henri R, Yao MS, Exame B, Fleshner M, Fort MP, Morris MA.

Patents

- 2022 **Acoustic Remote Control of Microbial Immunotherapy**
Abedi MH, Shapiro MG, Yao MS. US Patent Application 17/692,778

Teaching Experience

- Winter 2021 **Head Teaching Assistant**, ACM 95a: Methods of Applied Mathematics (Caltech)
Complex analysis and integration, singularity classification, conformal mapping.
- Fall 2020 **Teaching Assistant**, Ph 106a: Topics in Classical Physics (Caltech)
Lagrangian and Hamiltonian formulations of mechanics, small oscillations and normal modes, central forces, rigid-body motion.
- Spring 2020 **Teaching Assistant**, ACM 95b: Methods of Applied Mathematics (Caltech)
ODEs and PDEs, explicit Runge-Kutta methods, signal and function transforms, convolution, Green's functions, asymptotic solutions.
- Winter 2020 **Teaching Assistant**, Ph 12b: Quantum Physics (Caltech)
Wave mechanics, interpretation of the quantum wave-function, one-dimensional bound states, scattering, tunneling.
- Fall 2019 **Teaching Assistant**, Ph 12a: Wave Mechanics (Caltech)
Traveling and standing waves, normal modes, waves in n dimensions, polarization, interference and diffraction.
- Fall 2019 **Teaching Assistant**, CS 24: Operating Systems (Caltech)
Virtualization, dynamic resource management, common-case optimization, caching.

Talks and Tutorials

- Jan 2021 Thermal Bioswitches for Localized Activation of Microbes
International Conference on Biomolecular Engineering
- Oct 2020 Thermal Bioswitches for Localized Activation of Microbes
Biomedical Engineering Society (BMES) Annual Meeting

Mentoring and Outreach

- 2021 – Present **MD Collective, Student Advisor and Software Developer**
- 2021 – Present **University of Pennsylvania Step-Ahead Mentorship Program, Mentor**
- 2020 – 2021 **Caltech Undergraduate Research Journal, Editor-in-Chief**
- 2019 – 2021 **Caltech RISE Tutoring Program, Volunteer Tutor**
- 2018 – 2021 **Caltech Deans' Tutor**
- 2017 – 2019 **Caltech Academics and Research Committee, Student Body Representative**