ZIHUI (RAY) WU

Curriculum Vitae (August 2023)

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EDUCATION

California Institute of Technology (Caltech) — Pasadena, CA
Ph.D. student in Computing & Mathematical Sciences — Sep. 2020 — May 2025 (expected)
Research advisor: Katherine L. Bouman

Washington University in St. Louis (WUSTL) — St. Louis, MO
Bachelor of Science in Computer Science — Aug. 2016 — May 2020
Second major: Mathematics
Research advisor: Ulugbek S. Kamilov

RESEARCH INTERESTS

My research interests lie at the intersection of computational imaging, optimization, and machine learning. The theoretical aspect of my research focuses on efficient Markov chain Monte Carlo (MCMC) algorithms for posterior sampling and uncertainty quantification (UQ). The application-oriented part of my research focuses designing machine learning algorithms for the full-pipeline optimization of biomedical imaging applications, such as the magnetic resonance imaging (MRI). My research has enabled me to have strong skills in both quantitative analysis and practical implementation.

PUBLICATIONS

(* indicates co-first authors.)

7. X. Wu, A. Ajorlou, **Z. Wu**, A. Jadbabaie, A. V. Dalca, and K. L. Bouman, "Demystifying Oversmoothing in Attention-Based Graph Neural Networks," *arXiv:2305.16102*, 2023.
6. **Z. Wu**, T. Yin, Y. Sun, R. Frost, A. van der Kouwe, A. V. Dalca, and K. L. Bouman, "Learning Task-Specific Strategies for Accelerated MRI," *IEEE Transactions on Computational Imaging (TCI)*, under review.
5. **Z. Wu***, T. Yin*, A. V. Dalca, and K. L. Bouman, "Region-of-Interest Adaptive Acquisition for Accelerated MRI," *NeurIPS 2022 Medical Imaging Meets NeurIPS workshop*, 2022.
4. T. Yin*, **Z. Wu***, H. Sun, A. V. Dalca, Y. Yue, and K. L. Bouman, "End-to-End Sequential Sampling and Reconstruction for MR Imaging," *Proceedings of Machine Learning for Health (ML4H)*, PMLR 158:261-281, 2021.
   - **Best Paper Award**
3. Y. Sun*, **Z. Wu***, X. Xu*, B. Wohlberg, and U. S. Kamilov, "Scalable Plug-and-Play ADMM with Convergence Guarantees," *IEEE Transactions on Computational Imaging (TCI)*, vol. 7, pp. 849-863, 2021.
2. **Z. Wu**, Y. Sun, A. Matlock, J. Liu, L. Tian, and U. S. Kamilov, "SIMBA: Scalable Inversion in Optical Tomography Using Deep Denoising Priors," *IEEE Journal of Selected Topics in Signal Processing (JSTSP)*, vol. 14, no. 6, pp. 1163-1175, Oct. 2020, doi: 10.1109/JSTSP.2020.2999820.
1. **Z. Wu**, Y. Sun, J. Liu, and U. S. Kamilov, "Online Regularization by Denoising with Applications to Phase Retrieval," *Proceedings of the IEEE International Conference on Computer Vision Workshop (ICCVW)*, 2019.
   - **Oral presentation**

SELECTED COURSES

- Mathematics classes:
  - Probability Theory and Stochastic Processes — Grade: A-
  - Linear Analysis with Applications — Grade: A
  - Mathematics of Signal Processing — Grade: A

- Mathematical Optimization — Grade: A+
- Stochastic Processes and Regression — Grade: A+
- Monte Carlo Methods for Scientific Computing — Grade: A

- Computer and computational science classes:
  - Machine Learning & Data Mining — Grade: A+
  - Advanced Topics in Machine Learning — Grade: A
  - Analysis and Design of Algorithms — Grade: A

INVITED TALKS

- EI Conference on Machine Learning for Scientific Imaging — Jan. 2020, Online
  - Title: *End-to-End Sequential Sampling and Reconstruction for MR Imaging*

PROFESSIONAL SERVICE

Journal:

- IEEE Transactions on Computational Imaging, *reviewer* — since Jul. 2022
- IEEE Transactions on Robotics and Automation Letters, *reviewer* — since Jul. 2023

Conference:

- IEEE International Symposium on Biomedical Imaging (ISBI), *reviewer* — 2023
- Pacific Symposium on Biocomputing, *reviewer* — 2023

TEACHING

- TA for *CS 101: Special Topics in Computer Science*, Caltech — Fall 2022
- TA for *EE 148: Large Language and Vision Models*, Caltech — Spring 2023

RESEARCH AND WORK EXPERIENCE

- *Research Assistant*, A.A. Martinos Center for Biomedical Imaging, MGH, Harvard Medical School
  Aug. 2023 — present — Charlestown, MA
  - Research Assistant with Prof. Adrian V. Dalca, Robert Frost, and Andre van der Kouwe.
- *Research Assistant*, A.A. Martinos Center for Biomedical Imaging, MGH, Harvard Medical School
  Jun. 2022 — Sep. 2022 — Charlestown, MA
  - Research Assistant with Prof. Adrian V. Dalca, Robert Frost, and Andre van der Kouwe.
- *Research Assistant*, Caltech
  Sep. 2020 — present — Pasadena, CA
  - Graduate Research Assistant with Prof. Katherine L. Bouman.
- *Research Assistant*, WUSTL
  Sep. 2018 — Jun. 2020 — St. Louis, MO
  - Undergraduate Research Assistant with Prof. Ulugbek S. Kamilov.
- *Research Assistant*, WUSTL
  Feb. 2018 — Sep. 2018 — St. Louis, MO
  - Undergraduate Research Assistant with Prof. William Yeoh.
- *Website Developer*, Beijing Hengxinqihua Information Technology Co., Ltd.
  May 2017 — Jul. 2017 — Beijing, China
- *Research Assistant*, Institute of Computing Technology, Chinese Academy of Sciences
  Sep. 2015 — Nov. 2015 — Beijing, China

– Worked as a research assistant for the project "Video-based Object Tracking and Recognition."

HONORS

- *Amazon AI4Science Fellowship* 2023
- *Best Paper Award*, Machine Learning for Health (ML4H) 2021 2021
- *Kortschak Scholars Graduate Fellowship*, Caltech 2020 — 2022
- *Dean's List*, WUSTL FL2016 — FL2019 (all semesters except SP2020 due to COVID-19)
- Selected member of Engineering's Mentor Collective program, WUSTL 2018, 2019
- *Certificate of Distinction*, American Mathematics Competitions 2015