Zili Wang

Curriculum Vitae

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Research Interests

- Formally verifying algorithms using the interactive theorem prover Isabelle/HOL
- Temporal logic validation, specification debugging, benchmark generation, satisfiability checking, programming by examples (PBE)
- Deep reinforcement learning, game playing, natural language processing

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Education

Iowa State University, Ames 2023 - Present
PhD in Computer Science, Anticipated May 2028 GPA: 4.0
Advisor: Kristin Yvonne Rozier
Funded by NSF Graduate Research Fellowship Program (GRFP), awarded 2024

University of California, Berkeley 2020 - 2023
B.A. in Computer Science and B.A. in Mathematics GPA: 3.88

Publications *(* denotes equal contribution)*

1. *Michael Gintz, *Matthew Kortje, *Megan Laurance, ***Zili Wang**, *Yong Yang. *Finite Permutation Groups With Few Orbits Under the Action on the Power Set, II,* Publicationes Mathematicae Debrecen, v.102, 2023, doi.org:10.5486/PMD.2023.9392.
2. *Michael Gintz, *Thomas Keller, *Matthew Kortje, *Megan Laurance, ***Zili Wang**, *Yong Yang. *The Number of Set Orbits of Permutation Groups and the Group Order,* Bulletin of the Australian Mathematical Society, v.106, 2022, doi:10.1017/S0004972721001064.
3. *Michael Gintz, *Matthew Kortje, *Megan Laurance, ***Zili Wang**, *Yong Yang. *On the characterization of some non-abelian simple groups with few codegrees,* Communications in Algebra, v.50, 2022, doi:10.1080/00927872.2022.2049807
4. *Jenna Elwing, Laura Gamboa, *Jeremy Sorkins, *Chiara Travesset, ***Zili Wang**, Kristin Rozier. *Mission-time LTL (MLTL) Formula Validation Via Regular Expressions,* International Conference on integrated Formal Methods (iFM), 2023 Proceedings, doi.org/10.1007/978-3-031-47705-8_15.
5. **Zili Wang**, Laura P. Gamboa Guzman, Kristin Y. Rozier. *WEST: Interactive Validation of Mission-time Linear Temporal Logic (MLTL)*, to appear in Science of Computer Programming, 2024.
6. **Zili Wang**, Katherine Kosaian, Kristin Rozier, *Formally Verifying a Transformation from MLTL Formulas to Regular Expressions,* to appear in the International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2024, https://arxiv.org/abs/2501.17444.
7. *Alec Rosentrater, ***Zili Wang**, *Language Partitioning for Mission-time Linear Temporal Logic*, to appear in the NASA Formal Methods Symposium (NFM), 2025.

8. Gasper Begus, Thomas Lu, **Zili Wang**. *Spontaneous Concatenation in Unsupervised Deep Neural Networks*, to appear in the Journal of Memory and Language, 2024, https://arxiv.org/abs/2305.01626.

Under Submission

9. Katherine Kosaian, **Zili Wang**, Elizabeth Sloan, Kristin Rozier, *Formalizing MLTL Formula Progression in Isabelle/HOL,* 2023, https://arxiv.org/abs/2410.03465
10. Milad Memarzadeh, **Zili Wang**, Farzan Masrour Shalmani, Pouria Razzaghi and Krishna Kalyanam, *Responsible AI for Air Traffic Management: Application to Runway Configuration Assistance Tool*, submitted to the Air Transportation Research and Development Symposium, 2025.

Work/Research Experiences

AI/ML Intern at NASA Ames, Mountain View, CA Summer 2024

- Applied reinforcement learning to enhance the robustness of a runway configuration management tool, aiding air traffic controllers in operational decision-making.
- Research featured in a quarterly meeting with the Federal Aviation Administration.
- Conducted a poster presentation and a center-wide talk to an audience of 500+ researchers.
- Co-authored a research paper that will soon be submitted with NASA colleagues.

Undergraduate Research Apprenticeship Program (URAP), UC Berkeley Fall *2023*

- Utilized informational GANs in PyTorch to model the syntax of spoken natural language.
- Processed raw audio data, handling cleaning and preparation tasks for model input, and trained models using Berkeley's Savio GPU cluster.
- Co-authored a research paper submitted to the Journal of Memory and Language (JML).

Research Experience for Undergraduates (REU), Iowa State University Summer 2022

- Developed novel algorithm for validating Mission-Time Temporal Logic (MLTL) specifications in safety critical systems and implemented algorithm in C++ as the backend for a user-friendly interface created in Python.
- Presented research findings at 2023 Joint Math Meetings (JMM), and 2023 International Conference Integrated Formal Methods (iFM), leading to Co-first author publication.

Research Experience for Undergraduates, Texas State University, Summer 2021

- Solved various open problems in finite Group Theory using computational methods, leading to three publications in mathematics journals.
- Delivered a solo presentation on "Set Orbits of Permutation Groups and Group Order" at the 2021 Young Mathematicians Conference (YMC).

Teaching Assistant for Berkeley Math Circle, (Berkeley, CA) Jan 2021 - Jan 2023

- Graded homeworks and exams for advanced high school curricula (Number Theory, Geometry, Proofs), and also exams for the 2022 Bay Area Math Olympiad (BAMO).
- Gave a guest lecture to high school students on the back propagation algorithm.

Private Math Tutor, Self-employed (Fremont, CA) Jan 2016 - June 2022

- Tutor middle school and high school students one-on-one (60+ students since 2016).
- Increased interest in mathematics for students, and communicated with parents and teachers about students' needs to improve learning outcomes.

- Prepared students for math competitions like Mathcounts, AMC, AIME, etc.

Math Teacher, Best In Class Education Center (Fremont, CA) Oct 2017 - Aug 2021

- Taught Best In Class math enrichment curriculum to elementary & middle school students
- Tutored middle school and high school students one-on-one.
- Promoted a love of math to students at a young age, and hosted 'Problem of the Week' contests for students to collaborate and compete in.

Office and Teaching Assistant, MT Learning Center (Fremont, CA) Jun 2018 - Mar 2020

- Graded homeworks for high school math enrichment classes.
- Send biweekly emails to parents about students' progress and scores.
- Wrote exams and exam solutions for classes.

Teaching Experience

Guest Lecturers:

- COMS 507 (Applied Formal Methods), *Iowa State University, Fall 2024* — series of four lectures teaching students the basics of Isabelle/HOL
- CS:4980:0003 (Theorem Proving in Isabelle/HOL), *University of Iowa, Fall 2024* — lecture on using Isabelle/HOL for research

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Programming

Expert in Python, highly experienced in PyTorch, some experience in Keras, TensorFlow, and scikit-learn. Proficient in C/C++, interactive theorem prover Isabelle/HOL, Java, some experience in Java, Haskell, and OCaml.

Graduate Coursework

ISU: Applied Formal Methods, Graduate Artificial Intelligence, Theory of Computation, Computational Randomness, Responsible AI

UCB: Deep Reinforcement Learning, Formal Methods
