Yumeng He

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Salt Lake City, UT

EDUCATION

- **University of Utah** *August 2024 - Present*
  PhD in Computer Science Salt Lake City, UT
  - GPA: 4.00/4.00, advised by Pavel Panchekha
  - Coursework: Programming Languages, Operating Systems, Computer Architecture, Software Security
  - Research on program analysis and numerical software reliability, with applications to compilers/HPC

- **University of Rochester** *August 2020 - May 2024*
  *Bachelor of Science, **Double Major** in Computer Science and Mathematics, Minor in Business* Rochester, NY
  - Grade: 3.98/4.00, graduated summa cum laude, highest distinction

PUBLICATIONS

[1] **He, Y.**, & Panchekha, P. (2025). Accurate Numeric Debugging without Arbitrary Precision. *Under Review.*

[2] **He, Y.**, Nandi, C., & Pai, S. (2025). Formalizing Linear-Motion G-code for Invariant Checking and Differential Testing of Fabrication Tools. *OOPSLA 2025.* [DOI] [ArXiv] [Talk] [Code]

[3] **He, Y.**, Kotler-Berkowitz, M., Liuson, H., & Nie, Z. (2024). A Critique of Du's" A Polynomial-Time Algorithm for 3-SAT. arXiv preprint arXiv:2404.04395. [ArXiv]

[4] Chavrimootoo, M. C., **He, Y.**, Kotler-Berkowitz, M., Liuson, H., & Nie, Z. (2023). Evaluating the Claims of" SAT Requires Exhaustive Search". arXiv preprint arXiv:2312.02071. [ArXiv]

PROJECTS

- **Efficient Numeric Debugging with Improved Accuracy [1]** *August 2024 - Present*
  Skills: C/C++, dynamic analysis, runtime instrumentation, numerical analysis
  - Developed a floating-point debugger that improves diagnostic accuracy without using high-precision arithmetic.
  - Extended a WebAssembly interpreter for shadow execution to track per-variable floating-point error.
  - Evaluated on 44 real-world workloads, showing higher accuracy on cases where baseline systems yield false results.

- **Differential Testing on G-code for 3D Printing Bug Detection [2]** *May 2023 - October 2025*
  Skills: Python, static analysis, formal semantics, computational geometry [⌂]
  - Developed a static analysis tool to detect software bugs in 3D printing pipelines using differential testing on G-code.
  - Defined formal G-code semantics for scalable geometric comparison.
  - Detected rotation-invariant violations across 58 real-world models, revealing bugs in production fabrication tools.

- **Lease Cache Design** *May 2023 - August 2023*
  Skills: Rust, cache/memory systems, memory locality, probability theory
  - Modeled performance degradation resulting from optimal virtual lease assignments in physical cache systems.
  - Developed mathematical proofs for key properties of the model.

- **Complexity Theory & Computational Social Choice** *August 2023 - May 2024*
  Skills: computational complexity, voting theory
  - Collaboratively developed proofs critiquing two papers that address the P vs. NP question [3] [4].
  - Contributed to an ongoing paper exploring the difficulty of manipulative actions under uncertain voting rules.

HONORS AND AWARDS

- **Undergraduate Research Award** *May 2024*
  Department of Computer Science, University of Rochester
  - One of four recipients at the graduation ceremony.

- **Phi Beta Kappa** *Elected March 2023*
  University of Rochester Chapter

PROFESSIONAL EXPERIENCE

- **TA for Computer Organization, CS Dept., University of Rochester** *Spring 2023*
- **TA for Operations Research, Math Dept., University of Rochester** *Fall 2022*
- **Product Management Intern, Trucker Path, Renren Inc.** *May 2021 - July 2021*