Curriculum Vitae

Elanor Tang

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Education

Ph.D., Computer Science (Candidate) *Aug 2024 - Present*
Carnegie Mellon University, Pittsburgh, PA
Advisor: Prof. Bryan Parno

M.S., Computer Science *Aug 2022 - Dec 2023*
University of Michigan, Ann Arbor, MI
GPA: 4.00/4.00

B.S, Dual Mathematics and Computer Science *Sep 2018 - Apr 2022*
Physics Minor
University of Michigan, Ann Arbor, MI
GPA: 3.98/4.00

Research Experience

Doctoral Research Assistant *August 2024 - Present*
Carnegie Mellon University, Pittsburgh, PA

- Advised by Prof. Bryan Parno.
- Worked through tutorials for Rust and Verus, a Rust verification tool.
- Implemented and verified HumanEval benchmarks using Rust and Verus. The HumanEval dataset contains programming exercises designed to evaluate Verus's capabilities.

Formal Methods Intern *May 2023 - Aug 2023*
Sandia National Laboratories, Livermore, CA

- Supervised by Dr. John Bender and Dr. Philip Johnson-Freyd.
- Proved validity of the memory model for adding concurrent semantics to CompCert in Coq.
- Formalized algebraic structures in Coq.
- Completed the entire Logical Foundations textbook on Coq, including the exercises.

Graduate Research Assistant *Jan 2023 - Apr 2023*
University of Michigan, Ann Arbor, MI

- Advised by Prof. Jean-Baptiste Jeannin, in collaboration with PhD student Steven Schaefer.
- Originated method for verifying distributed systems implementations in C: translate axiomatized C code to the Ivy language, which is equipped with tools for verification.
- Tested this method against classic distributed systems protocols such as a distributed lock.

Undergraduate Research Assistant *May 2021 - Dec 2022*
University of Michigan, Ann Arbor, MI

- Advised by Prof. Jean-Baptiste Jeannin, in collaboration with PhD student Nishant Kheterpal.
- Implemented an algorithm in Python to automatically run in seconds a process that formerly took hours or days by hand, formally verifying a vehicle control system's ability to prevent collisions with other vehicles or objects.
- Proved completeness of this algorithm; rewrote proof of soundness.
- Developed procedure for formulating the mechanized PVS soundness proof of this algorithm, for any convex polygon moving along a straight-line trajectory.

Publications

[1] Nishant Kheterpal, Elanor Tang, and Jean-Baptiste Jeannin. Automating geometric proofs of collision avoidance with active corners. In Alberto Griggio and Neha Rungta, editors, *Proceedings of the 22nd Conference on Formal Methods in Computer-Aided Design – FMCAD 2022*, volume 3, pages 359–368. TU Wien Academic Press, 2022.

Research Poster Presentations

Nishant Kheterpal and Elanor Tang. Automating and Formalizing Collision Avoidance Proofs. Midwest Programming Languages Summit, October 2023.

Industry Experience

Software Engineering Intern *May 2022 - Aug 2022*
Strata Oncology, Ann Arbor, MI

- Created a React Typescript component for uploading and integrating documents with customer order forms.
- Wrote unit tests with Jest and Python Unit testing frameworks.
- Collaborated with UX designer and other software engineers to plan scope of work.

Teaching Experience

Courses *University of Michigan, Ann Arbor, MI*

- Computer Science Theory: *Fall 2023* (Graduate TA)
- Advanced Algorithms: *Fall 2022* (Graduate TA)
- Data Structures and Algorithms: *Fall 2020, Spring 2021, Fall 2021* (Undergraduate TA)

Responsibilities

- Taught a weekly recorded discussion to 15 students to review lecture material and do homework-relevant practice problems.
- Facilitated student collaboration to construct and analyze algorithms; provided support with the homework.
- Wrote problems and solutions for weekly student homeworks.
- Advocated for student well-being by pushing for a more reasonable assignment schedule.
- (In Data Structures and Algorithms) Enabled students to debug their C++ projects by providing coaching on IDE usage and strategies for writing test cases.

Skills

- **Programming Languages:** Rust, C, C++, Python, OCaml, Typescript, JavaScript, React, HTML/CSS
- **Verification Tools/Theorem Provers:** Verus, Dafny, Coq, PVS
- **Tools:** LaTeX, Git, Bash, Jira

Achievements and Awards

NSF Graduate Research Fellowship *Apr 2024*

Electrical Engineering & Computer Science Scholar *Apr 2021 - Apr 2022*
Awarded to upperclassmen with a GPA of 3.9 or above.

M.S. Keeler Department of Mathematics Merit Scholarship *Aug 2021*
Awarded to current undergraduates presenting outstanding mathematical talent, as evidenced by coursework. Nominated by professor.

7-Term James B. Angell Scholar *Mar 2019 - Apr 2022*
Awarded for 7 consecutive 14-credit terms of all A's (A+/A/A-).

7-Term University Honors *Dec 2018 - Apr 2022*
Awarded for each 14-credit term with a minimum GPA of 3.5.

William J. Branstrom Freshman Prize *Mar 2019*
Awarded to the top 5 percent of the College of Literature, Science, & Arts class in the first term of freshman year.

Regents Merit Scholarship *Aug 2018*

National Merit Finalist *Feb 2028*

Professional Societies

Member of Phi Beta Kappa

Community Service

Member of STEM Society *Jan 2022 - Dec 2023*

- Brought in students from an underserved high schools every semester to expose them to engaging aspects of STEM, via presentations on selected topics.
- Disproved common stereotypes about math and science and increased awareness of opportunities in these fields.
- Presentations: Cryptographic Codes, Protocols, Real-World Graph Theory