

Emily Zhao

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EDUCATION

B.S. Mathematics

May 2025

Georgia Institute of Technology

- Minor in Computing and Intelligence
- Minor in Spanish
- GPA: 3.97/4.00

Language for Business and Technology Study Abroad Program

Summer 2022

University of Puerto Rico in Río Piedras

SKILLS & LANGUAGES

- Proficient in Java, Python, and C
 - Experience with Pandas, Sklearn and Keras Python libraries
 - Experience with Coq interactive theorem prover
 - Chinese and Spanish- proficient comprehension and speech
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PROFESSIONAL & RESEARCH EXPERIENCES

Student Research Assistant

2023–Present

Georgia Tech Research Institute (GTRI)

Formal Verification of Cyber-Physical systems

- Investigated the formal verification of cyber-physical systems, with the intention of generating rigorous, human-readable proofs for large systems such as smart power grids or robotics components
- Formalizing discrete dynamical systems and the Kalman filter in Coq, an automated theorem prover
- Implementing key matrix operations that are unavailable in current libraries

Custom RISC-V Processor Project

- Modeled assembly instructions in Coq to demonstrate characteristics of securely executed code in a custom dual-core processor
- Represented data flow dependencies between memory locations during assembly instruction execution
- Analyzed hardware interrupts in the context of altering end state of data
- Investigated assigning mathematical structures such as groups and Büchi automata
- Delivered findings in a poster fair format

REU: Dimensionality Reduction for Predicting COVID-19 Data

2024

Professor Wenjing Liao, Applied Mathematics, Georgia Institute of Technology

- Compared principal component analysis against auto-encoding for dimensionality reduction of a COVID-19 dataset
- Analyzed three data-driven frameworks for predicting the pandemic's evolution in the latent space: Recurrent Neural Network, Transformer Neural Network, Parametric Latent Space Dynamics Identification
- Resulted in a departmental poster presentation
- Presented at Atlanta Undergraduate Research Mathematics Seminar

Directed Reading Program in Category Theory

2023-2024

Georgia Tech Algebra and Topology Group

- Read and worked portions of *Algebra 0* by Paolo Aluffi, an introductory category theory book, with guidance from a graduate student mentor

Buzz Ballots: A Secure and Portable Voting Machine Project

2021-2023

Configurable Computing and Embedded Systems VIP

- Designed a secure voting machine according to embedded systems security principles
- Guided development by drafting top level specifications in Linear Temporal Logic
- Implemented verification of hardware systems in SystemVerilog

2023 Posters at the Capitol

2023

Georgia Undergraduate Research Conference

- Presented about the above voting machine project to attendees
- Demonstrated computer architecture design to state legislators working on election security and voter participation

EXTRACURRICULARS

Publicity Officer

2024-Present

Association of Women in Mathematics, Georgia Tech Chapter

- Designed and implemented promotional material on physical and digital platforms which contributed to a 200% increase in membership from the previous year
- Peer mentor for younger students seeking academic and career related advice

Chapter Risk Manager

2021-2022

Alpha Omega Epsilon Professional and Social Sorority

- Ensured compliance of activities with safety guidelines and insurance policies
- Served as an advisor and referral point to resources regarding safety and personal wellbeing