

Eeshan Zele

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EDUCATION

University of Illinois Urbana-Champaign

Aug 2022 - May 2025

Bachelors in Mathematics and Computer Science

GPA: 4.00/4.00

- Completed Coursework: Algorithms, Data Structures, AI, Safe Autonomy, Graph Theory
- Coursework In Progress: Deep Learning for Vision (graduate), Numerical Analysis, and Computer Systems
- Dean's List: Fall 2022, Spring 2023, Fall 2023, Spring 2024

OBJECTIVE

Seeking a position in a graduate program focused on robust autonomy to develop provably safe autonomous systems.

EXPERIENCE

Reliable Autonomy Group

May 2024 - Present

Student Researcher

- Investigating indistinguishable sets computation for optimal SLAM in hybrid control systems with [Prof. Sayan Mitra](#).
- Optimized indistinguishable set computation for high-dimensional linear systems by parallelizing SMT solvers.
- Developed methodology to train and verify neural networks to compute indistinguishable sets for high dimensional non-linear systems, using SMT-verification and solver layers. Discovered major blindspots in car racing controllers.

Intel

May 2024 - Aug 2024

Software Engineering Intern

- Collaborated with Atom DA FE team, developing tools to help Design Engineers evaluate CPU model performance.
- Improved graph-based verification algorithm, from exponential to linear time, saving 1 hour/day of computation.
- Created 3 scripts and dashboards currently in production and frequently used by DA team.

Illinois Theorem Provers Lab

Dec 2022 - May 2024

Student Researcher

- Contributed to formal verification of Path ORAM with [Prof. Talia Ringer](#) and Ph.D student Hannah Leung.
- Designed memory access functions ensuring privacy-preserving RAM operations and proved correctness with Coq.
- Co-authored conference paper on functional correctness and security properties of Path ORAM.

PROJECTS

CubeVision

- Built end-to-end deep learning pipeline to solve a Rubik's Cube, through live video stream of cube state.
- Developed Deep Reinforcement Learning and Transformer-based solver for 3x3 cube, beating state-of-the-art.

Model Predictive Controller for Car Racing

- Implemented model predictive controller optimized using various learning schemes for CARLA car racing simulator.
- Surpassed benchmarks of racing times by 40 seconds (130%), while meeting safety conditions under various weather and track conditions. [Project video](#).

Automated Proofs of Partition Congruences

- Engineered technique to automate proofs of partition congruences with applying modular forms in Mathematica.
- Worked with a team of 5 undergrad students, a graduate mentor and [Prof. Scott Ahlgren](#) in reproving/improving 20+ published theorems of partition congruences to write [paper](#) and [poster](#).

Betazoid

- Developed an app to predict Bipolar episodes using surveys, location, and other information with deep learning.
- Collaborated with 7 psychiatrists to extensively test app (in theory and practice), and tested with a focus group of 30+ subjects. Awarded Bronze medal at Indian National Science Fair. Link to [Fair Presentation](#).

SKILLS

Programming Languages: Python, C++, Coq, Java, SPL, SQL

Tools and Technologies: Mathematica, L^AT_EX, Git, GitHub

Frameworks: PyTorch, TensorFlow, Numpy, Keras, Z3, OpenCV, Arduino, ROS, Gymnasium