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 Master's/PhD position in safe autonomy to advance the formal verification and safety of intelligent systems.

Experience

Reliable Autonomy Group May 2024 - Present
Student Researcher

- Investigating computing indistinguishable sets for optimal SLAM in hybrid control systems with Prof. Sayan Mitra.
- Parallelized SMT solvers in Python to optimally compute indistinguishable sets in n-dimensional systems.

Intel May 2024 - August 2024
Software Engineering Intern

- Worked with the Atom DA FE team, developing tools to help Design Engineers evaluate performance of CPU models.
- Optimized graph-based algorithm, from exponential time to linear time, reducing computation time by 1 hour/day.
- Developed 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 PathORAM with Prof. Talia Ringer and Ph.D student Hannah Leung.
- Developed algorithms to support RAM access and rectified key codebase errors, proving correctness using Coq.
- Co-authored paper on functional correctness and security properties of PathORAM, submitted to CPP 2025.

Projects

CubeRL

- Created end-to-end deep learning pipeline to solve a Rubik's Cube, through live video stream of cube state.
- Implemented Deep Reinforcement Learning methods to find optimal human-like solutions following CFOP method.

Model Predictive Controller for Car Racing

- Implemented pure persuit controllers optimized using a genetic algorithm, and a model predictive controller for CARLA car racing simulator, ensuring robustness under various weather and track conditions.
- Controllers developed beat benchmarks of racing times by 40 seconds (130%), while meeting safety requirements. Project video.

Automated Proofs of Partition Congruences

- Learnt modular forms, complex function theory and number theory to automate proofs of partition congruences.
- 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

- Designed a method and an application (Betazoid) to help predict episodes of Bipolar patients.
- Worked 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: C++, Coq, Python, Java, SPL, SQL
Tools and Technologies: Mathematica, LaTeX, Git, GitHub
Tools/Frameworks: PyTorch, TensorFlow, Numpy, Keras, OpenCV, Z3, Gymnasium