

DORUK ALP MUTLU

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Education

Michigan State University, Honors College

Bachelor of Science, Computer Engineering with minor in Mathematics, 4.0/4.0

Aug. 2022 – May 2026

East Lansing, MI

Relevant Coursework: Design and Theory of Algorithms, Computer Systems

Parallel Programming (Undergrad & Grad), Compilers, Software Performance Engineering

Research Experience

Purdue University, Department of Electrical and Computer Engineering

May 2025 - Dec. 2025

Undergraduate Research Assistant

West Lafayette, IN

- Advised by Dr. Jenna DiVincenzo on extending the implementation of Gradual C0, the only working gradual verifier, with pure functions.
- Extended the formal rules of Gradual Viper, the back-end module of Gradual C0, with pure functions, and created a design of the extension for implementation.
- Implemented AST-to-AST translation of pure functions from C0 programs to Gradual Viper programs using Scala.
- Worked on the implementation of a symbolic-execution based approach for verification of pure functions using Scala.
- Work on extending Gradual C0 with pure functions is accepted to the 53rd ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2026) Student Research Competition.
- Enhanced development reliability by identifying and resolving over 20 test failures in the existing codebase and implemented a CI/CD pipeline using GitHub Actions to automate testing and improve development workflow.

Michigan State University, Department of CMSE

Sep. 2022 - May 2024

Undergraduate Research Assistant

East Lansing, MI

- Conducted in-depth research on image segmentation algorithms, optimizing the Quick Shift mode-seeking algorithm to achieve a 57.32% improvement in accuracy on a benchmark dataset.
- Presented research findings at the 2023 and 2024 Michigan State University Undergraduate Research and Arts Forum (UURAF), effectively communicating technical results.
- Co-authored the paper titled “A Labeled Array Distance Metric for Measuring Image Segmentation Quality” accepted to Electronic Letters on Computer Vision and Image Analysis(ELCVIA).

Publications

- **Doruk Alp Mutlu.** Expanding Specification Capabilities of a Gradual Verifier with Pure Functions.
POPL 2026 Student Research Competition

- Maryam Berijanian, Katrina Gensterblum, **Doruk Alp Mutlu**, Katelyn Reagan, Andrew Hart, Dirk Colbry. A Labeled Array Distance Metric for Measuring Image Segmentation Quality. ELCVIA 2024

Teaching Experience

Michigan State University, Department of Computer Science and Engineering

Aug. 2025 - Dec. 2025

Teaching Assistant

East Lansing, MI

- Assisted Dr. Eric Torng with CSE 460: Computability and Formal Language Theory.
- Provided timely and constructive feedback on weekly quizzes and homework assignments through Gradescope.

Michigan State University, Department of Computer Science and Engineering

Aug. 2023 - Dec. 2024

Teaching Assistant

East Lansing, MI

- Assisted Dr. Imen Zaabar with CSE 231: Introduction to Programming I.
- Helped students on lab sessions focusing on basic programming constructs using Python.

Scholarships & Fellowships

PLMW at POPL 2026: PLMW Scholarship worth \$2,500

Purdue University: Summer Undergraduate Research Fellowship worth \$9,000

Michigan State University: Undergraduate Scholarships worth \$152,000

Michigan State University: College of Engineering Scholarships worth \$8,100

Projects

Optimization of 3D Scene Rendering and Simulation

April 2025

- Improved the efficiency of the baseline ray tracing algorithm by implementing a bounding box approach in C.
- Parallelized various computations used in renderer and simulator with multi-threaded programming using OpenCilk.
- Executed low-level performance tuning by leveraging AVX2 intrinsics in C code, maximizing the vectorization of core rendering computations.
- Led multiple sprints during the month-long project, and achieved 30x speed-up on average in 50+ test cases.

Sparty Sudoku Game

Nov. 2023

- Built a Sudoku game centered around controlling a Sparty mascot to move around numbers to complete sudoku puzzles using C++ and wxWidgets GUI while focusing on object-oriented programming principles.
- Worked with XML files to save/load different game scenes.
- Led several development sprints, contributing to approximately 50% of the codebase and ensuring the project was completed within a one-month deadline.

Technical Skills

Languages: C++, C, Python, Scala, Assembly (x86, ARM), Bash, Dafny, HTML/CSS

Tools: Git, Docker, L^AT_EX, Linux, Perf Tools, SLURM

Parallel Computing: OpenCilk, OpenMP, MPI, CUDA

Academic Outreach Experience

Michigan State University, Future Spartan Engineers Office

Sep. 2022 - Aug. 2024

Student Ambassador

East Lansing, MI

- Worked as a part of the Student Ambassadors Team in the Future Spartan Engineers Office.
- Gave tours of the College of Engineering and STEM Teaching and Learning Facility to prospective students and their families.
- Contacted admitted students by e-mail and answered their questions about MSU.