

SARAH DOWDEN

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EDUCATION

PhD in Computer Science, University of Illinois Urbana-Champaign

2026 – Present

B.S. in Computer Science, University of Illinois Urbana-Champaign

Minor in Mathematics

GPA: 3.93/4.00

Graduated May 2026, Highest Honors

HONORS AND AWARDS

DaRin Butz Research Scholarship: Competitive merit-based award given to undergraduate women who show exceptional research promise within engineering (August 2025 – May 2026)

Grainger Engineering James Scholar: Academic honors program for top-performing students (August 2023 – May 2026)

Tau Beta Pi Honor Society: Selected for membership by ranking in the top 1/8 of the junior engineering class and demonstrating strong academic and professional excellence (May 2023 – May 2026)

Dean's List: (Fall 2022, Fall 2023, Spring 2025)

RESEARCH INTERESTS

- Robotic task and motion planning, multi-robot motion planning systems, learning-based planning, computational geometry, differential privacy

PUBLICATIONS

- Markowicz, M., **Dowden, S.**, Motes, J. Amato, N. M., “Multi-Robot SPITE: Accelerating Multi-Robot Motion Planning via Hierarchical Swept-Volume Approximations”, ICRA 2026 RoboARCH Workshop
- Gressmann, F., Chen, A., Xie, L., **Dowden, S.**, Amato, N. M., Rauchwerger, L., “A primer on *in vitro* biological neural networks”, NeurIPS 2024 Workshop on Machine Learning with New Compute Paradigms.

EXPERIENCE

University of Illinois Urbana-Champaign

Undergraduate Research Assistant in Parasol Lab

Champaign, Illinois

May 2024 – Present

- Advanced probabilistic roadmap techniques and robot pathfinding algorithms under Professor Nancy M. Amato, achieving faster planning in configuration space in C++, Python, and ROS/ROS2
- Refined a multi-robot motion planning algorithm for dynamic obstacles, decreasing computation time in environments
- Optimized collision detection by decreasing computation time through hierarchical axis-aligned bounding box trees with multi-dimensional geometric approximations

Synchrony

Emerging Technology Intern

Champaign, Illinois

May 2025 – November 2025

- Migrated the Android app's frontend codebase to Kotlin in collaboration with the development team, improving scalability and long-term maintainability
- Enhanced technical expertise through seminars and workshops on Agentic AI, LLMs, and Agile development
- Resolved Java continuity and versioning bugs across multiple software releases

University of Illinois Urbana-Champaign

Undergraduate Research Assistant in Theory and Algorithms

Champaign, Illinois

January 2025 – August 2025

- Collaborated with Professor Sarel Har-Peled on approximation algorithms for disk-related problems
- Investigated randomized and deterministic methods to improve algorithmic performance with provable bounds, expanding applications to machine learning contexts
- Applied flow network algorithms to compute chains and antichains in partially ordered graphs

University of Illinois Urbana-Champaign

Undergraduate Research Assistant for Mind in Vitro

Champaign, Illinois

May 2024 – December 2024

- Simulated biological neural networks and developed spike encoding/decoding schemes using TensorFlow, Keras, and PyTorch
- Investigated machine learning techniques to separate signal from noise in spiking neural network outputs
- Engineered differentiable surrogate models to enable gradient-based training of biological neural networks
- Increased model accuracy by 30% by designing a closed-loop evolutionary training method for non-differentiable neural networks

TEACHING EXPERIENCE

University of Illinois Urbana-Champaign

Undergraduate Teaching Assistant, CS 374: Algorithms and Models of Computation

Champaign, Illinois

Fall 2024 - Present

- Held 6–10 weekly office hours assisting students with algorithm design, proof techniques, and complexity analysis
- Created and graded homework and exam problems

University of Illinois Urbana-Champaign

Undergraduate Teaching Assistant, CS 128: Intro to Computer Science II

Champaign, Illinois

Fall 2024

- Guided students through C++ programming, debugging, memory management, and object-oriented design during lab and office hours
- Designed programming assignments and auto-graded test cases for labs and projects

University of Illinois Urbana-Champaign

Undergraduate Teaching Assistant, CS 361: Probability and Statistics

Champaign, Illinois

Spring 2024

- Created supplemental notes and materials to clarify lecture content
- Graded homework problems and proctored exams

LEADERSHIP AND SERVICE

Illinois CS STARS (Student Ambassadors / Research Scholars)

August 2024 – May 2025

University of Illinois Urbana-Champaign

- Selective academic-year program combining faculty-mentored undergraduate research with leadership and service to the Illinois CS community
- Conduct 6–7 hours/week of research under a Siebel School faculty mentor while contributing 3–4 hours/week to student recruitment, mentoring, and cohort-building
- Engage in outreach activities that empower current undergraduates and support prospective CS students

Women in Engineering Orientation Mentor

Summer 2024, Summer 2025

University of Illinois Urbana-Champaign

- Directed teams of peer orientation leaders, organized logistical operations, and facilitated panels for incoming engineering students
- Conducted weekly mentoring sessions for groups of incoming engineering students, providing curriculum guidance and directing students to academic and campus support resources

TECHNICAL SKILLS

- Programming: C++, Python, C, Java, Haskell
- Libraries: ROS/ROS2, PyTorch, TensorFlow, Keras, NumPy, SciPy, Brian2
- Development Tools: Git, Docker