

Marta Markowicz

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EDUCATION

University of Illinois Urbana-Champaign

Ph.D. in Computer Science

2021-Present

Urbana, IL

University of Minnesota Twin Cities

B.S. in Computer Science, GPA 3.9

2017-2021

Minneapolis, MN

SKILLS AND RELEVANT COURSEWORK

Robotics: Motion planning, SLAM, Kalman Filter, Kinematics, Computer Vision, Autonomous Vehicles

Machine Learning: Deep Learning, Reinforcement Learning

Programming Languages: C++, Python, Java, Node.js, SQL

Frameworks and Environments: ROS, Gazebo, Linux, Git, CUDA, OpenGL, AWS, Qt

Electronics: Microcontrollers, Real-time Systems, Arduino, Altium Designer

PUBLICATIONS

C=CONFERENCE

[C.1] S Ashur, **M Markowicz**, M Lusardi, J Motes, M Morales, S Har-Peled, NM Amato, "[SPITE: Simple Polyhedral Intersection Techniques for modified Environments](#)," 16th International Workshop on the Algorithmic Foundations of Robotics, Chicago, IL, USA, October 2024.

POSTERS

[1] **M Markowicz**, M Lusardi, S Ashur, J Motes, M Morales, S Har-Peled, NM Amato, "[SPITE: Simple Polyhedral Intersection Techniques for modified Environments](#)," 40th Anniversary of the IEEE International Conference on Robotics and Automation, Rotterdam, Netherlands, September 2024.

WORK EXPERIENCE

Robotics Graduate Researcher

Advisor: Dr. Nancy Amato, University of Illinois

2021-Present

Urbana, IL

- Conducting research on motion planning algorithms for dynamic and uncertain environments using C++ and ROS
- Developed SPITE, a novel dynamic roadmap for replanning in changing environments, achieving up to 60% faster updates with significantly less pre-processing [C.1]
- Further optimizing dynamic planning through lazy collision evaluation, parallelization, and collision approximation
- Constructing novel temporal planning techniques to integrate with dynamic roadmaps, enabling safer and more reliable autonomous navigation around predicted obstacle trajectories.
- Open sourcing [Parasol Planning Library](#) and benchmarking planning algorithms

Robotics Research Assistant

Advisor: Dr. Stephen J. Guy, University of Minnesota

2017-2021

Minneapolis, MN

- Developed novel space-time path planning algorithm for dynamic environments
- Leveraged safe intervals to achieve asymptotic optimality with temporal sampling-based planning

Autonomy Software Design Intern

Caterpillar

Jun-Sept 2020

Brooklyn Park, MN

- Designed software for autonomous soil compactor testing, improving efficiency in field testing operations
- Enabled real-time remote management of five machines by building user interface in C++ using Qt framework
- Enhanced productivity of equipment testers by reducing on-site monitoring requirements by 40%

Software Development Intern

Cybercom Poland

Jan-Mar 2019

Lodz, Poland

- Developed proof-of-concept solutions integrating hardware and cloud-based software systems
- Designed Arduino module with water sensors and implemented AWS Lambda functions for real-time data collection and monitoring
- Achieved a 60-hour monthly time savings for city technicians in pipe inspection workflows

PROJECTS

Autonomous Vehicle Motion Planning

Spring 2024

Tools: ROS, Gazebo, Git

- Designed and implemented motion planning components for Polaris GEM e2 vehicle using Hybrid A* and Model Predictive Control (MPC).
- Developed solutions for road driving and parking scenarios, incorporating a dynamic vehicle model to optimize trajectory planning.

Real-Time Systems for Path Planning

Fall 2021

Tools: Autoware

- Engineered a resource scheduling algorithm for autonomous vehicle path planning using Autoware
- Enhanced planning efficiency by parallelizing tasks with virtual gang scheduling, achieving an 8% improvement in execution time

Model-based reinforcement learning algorithm for exploration

Fall 2021

Tools: MuJoCo, PyTorch

- Implemented Model-Ensemble Trust-Region Policy Optimization for learning dynamics and policy
- Enhanced convergence speed by 14% through integration of Proximal Policy Optimization (PPO) and model discrepancy evaluation

Solar Vehicle Project: Controls

2017-2019

Tools: Altium, FreeRTOS

- Led a team of five to design and fabricate a PCB for a steering wheel control system using Altium
- Programmed real-time functionality with FreeRTOS, communicating via a CAN bus
- Troubleshoot issues during international race, ensuring system reliability under competitive conditions

HONORS AND AWARDS

Broadening Participation in Computing Fellow

2022-Present

University of Illinois

- Mentoring undergraduate women pursuing research, fostering growth in technical and academic skills
- Running CS Student Ambassadors/Research Scholars ([CS STARS](#)) for engaging students in research and outreach

Andrew and Shana Laursen Fellowship

2021

University of Illinois

- Awarded to top graduate students in recognition of academic excellence and promise in advanced research
- Utilized fellowship support to develop novel planning techniques for robots in unpredictable environments

Hopper-Dean Scholarship honoring Dr. Vipin Kumar

2020

University of Minnesota

- Honored for academic excellence and outstanding contributions to undergraduate research
- Conducted research advancing space-time navigation algorithms, improving efficiency and scalability

MENTORING

Parasol Lab

2022-Present

University of Illinois

Urbana, IL

- Sarah Dowden (Undergrad): Mentoring in robotics planning, leading to successful implementation of temporal features and simulation testing for SPITE project
- Jin Fan, Relena Li (Undergrads): Guided students in developing and open-sourcing planning library, resulting in comprehensive algorithm benchmarking
- Andrew Kindratenko, Sanjay Selvam, Aashini Sanapala (High School students): Taught students motion planning fundamentals, enabling them to contribute to algorithm benchmarking research

CS Student Ambassadors/Research Scholars

2022-Present

University of Illinois

Urbana, IL

- Mentoring up to 50 undergraduates a semester on research pursuits, coursework, and career advice
- Awarded Broadening Participation in Computing Fellowship in recognition of mentorship