

Alp Sahin

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EDUCATION

Lehigh University

Ph.D. in Mechanical Engineering and Mechanics

Bethlehem, PA

Aug. 2021 – Expected: December 2026

Worcester Polytechnic Institute

M.S. in Robotics Engineering

Worcester, MA

Aug. 2019 – May 2021

Bogazici University

B.S. in Mechanical Engineering

Istanbul, Turkey

Sept. 2014 – June 2019

RESEARCH INTERESTS

My research philosophy centers on translating complex robotics problems into mathematical programs and developing algorithms to solve them efficiently. I am interested in combinatorial problems that arise in planning for robotic manipulation, as well as multi-robot and tethered-robot systems. I investigate how ideas from graph theory, algebraic topology, and mixed-integer programming can be leveraged to develop search- and optimization-based approaches.

RESEARCH EXPERIENCE

Autonomous and Intelligent Robotics Laboratory

Research Assistant

August 2021 – Present

Lehigh University

Advisor: Dr. Subhrajit Bhattacharya

- Developed search- and optimization-based planning algorithms for multi-robot and tethered-robot systems.
- Implemented optimization algorithms for kinematic control of snake-like robots and control of networked systems.

Manipulation and Environmental Robotics Lab

Graduate Researcher

January 2020 – May 2021

Worcester Polytechnic Institute

Advisor: Dr. Berk Calli

- Formulated motion primitives for an in-hand manipulation setup involving variable friction fingers and an articulated arm.
- Developed a search-based planning algorithm for achieving target contact configurations on objects.

Robotics, Mobility and Cyberphysical Systems Lab

Graduate Researcher

May 2020 – June 2021

Worcester Polytechnic Institute

Advisor: Dr. Xiangrui Zeng

- Developed an RL-based feature selection algorithm for constrained data collection, maximizing the performance of supervised-learning models trained on delayed data streams.
- Created a benchmarking tool to evaluate the performance of dynamic data collection policies.

PUBLICATIONS

Journal

- [J1] **A. Sahin** and S. Bhattacharya, “Topo-Geometrically Distinct Path Computation Using Neighborhood-Augmented Graph, and Its Application to Path Planning for a Tethered Robot in 3-D,” *IEEE Transactions on Robotics*, 2025. [PDF][Code]
- [J2] **A. Sahin**, N. Kozachuk, R. S. Blum, and S. Bhattacharya, “Spectrum optimization of dynamic networks for reduction of vulnerability against adversarial resonance attacks,” *Frontiers in Complex Systems*, 2025. [PDF]
- [J3] Z. Wang, **A. Sahin**, and X. Zeng, “Efficient Data Collection for Connected Vehicles With Embedded Feedback-Based Dynamic Feature Selection,” *IEEE Transactions on Intelligent Vehicles*, 2024. [PDF]
- [J4] X. Wang, **A. Sahin**, and S. Bhattacharya, “Coordination-free Multi-robot Path Planning for Congestion Reduction Using Topological Reasoning,” *Journal of Intelligent & Robotic Systems*, 2023. [PDF]

Conference

- [C1] **A. Sahin**, S. Brawner, M. Bilsky, and S. Bhattacharya, “Real-Time Joystick-based Kinematics Control of a Snake-like Robot with Robustness Near Singular Configurations,” IEEE Conference on Control Technology and Applications (CCTA), 2024. [PDF]
- [C2] **A. Sahin**, A. J. Spiers, and B. Calli, “Region-Based Planning for 3D Within-Hand-Manipulation via Variable Friction Robot Fingers and Extrinsic Contacts,” IEEE International Conference on Robotics and Automation (ICRA), 2021. [PDF][Code-Planner][Code-Simulation]
- [C3] **A. Sahin** and X. Zeng, “Feedback-Based Dynamic Feature Selection for Constrained Continuous Data Acquisition,” American Control Conference (ACC), 2021. [PDF]
- [C4] **A. Sahin** and X. Zeng, “A Framework for Benchmarking Feedback-Based Dynamic Data Collection Methods in Connected Vehicle Networks,” SAE Technical Paper, 2021.

TEACHING EXPERIENCE

Department of Mechanical Engineering and Mechanics

Graduate Teaching Assistant

January 2022 - May 2023

Lehigh University

Courses: ME 240 – Manufacturing (Spring 2022, Spring 2023), *with Dr. David C. Angstadt*

AWARDS

Lehigh University Rossin College Doctoral Student Fellow

August 2021

2nd Place in WPI Graduate Research Innovation Exchange

April 2021

SERVICE

Scholarly Reviews

IEEE Robotics and Automation Letters (RA-L), IEEE Transactions on Intelligent Vehicles (T-IV), IEEE Transactions on Robotics (T-RO), IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

Outreach

Robotics activity organizer and speaker at Lehigh CHOICES Summer Camp

June 2022 and June 2023

SKILLS

Programming and Development: C/C++, Python, MATLAB, Git, CMake, Docker, Bash

Software: ROS, Gazebo, Gurobi, OpenCV, Drake, Mathematica, CVX, OMPL

Typesetting & Editing: L^AT_EX, Inkscape

PROFESSIONAL EXPERIENCE

Beycelik GESTAMP Teknoloji ve Kalip A.S.

Tooling Process and Design - Intern

Bursa, Turkey

January 2019 - February 2019

TOFAS Turk Otomobil Fabrikasi A.S.

Press and Die Production - Intern

Bursa, Turkey

June 2018 - July 2018

GESTAMP Metalbages

Process Engineering - Intern

Santpedor, Spain

July 2017 - August 2017