

Philip Smith

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Summary

Master's student in Robotics Engineering at Worcester Polytechnic Institute with research and industry experience in swarm and multi-robot systems. Background includes developing coordination algorithms, ROS2/Gazebo simulation frameworks, and machine vision pipelines. Presented research at ROSCon and multiple undergraduate symposia, with work spanning multi-robot interaction modeling, point cloud integration, and reproducible robotic experimentation. Research interests include multi-robot coordination, task allocation, and human-swarm interaction, to advance scalable and reliable swarm robotics.

Technical Skills

Programming Languages	Python, C++, MATLAB, Java, Julia, Bash, Flutter/Dart, JavaScript (Vue, Node), Kotlin
Concepts & Frameworks	OOP, Parallel Computing, Machine Learning, Networking (TCP/IP, UDP), Data Structures, Algorithms
Robotics & Middleware	ROS1/ROS2, Micro-ROS, IsaacSim, Gazebo, Docker, Protobuf, CMake, Colcon
Embedded Hardware	CAN-FD, I2C, SPI, UART, Microcontrollers (Teensy, Arduino, ESP32, RP2040)
Development Tools	Git, Docker, Proxmox, GitHub Actions, TravisCI, Linux, SQL
CAD & Electronics	Onshape, Fusion360, KiCAD, PCB Design, 3D Printing, Soldering (Through-hole & SMT)
Fabrication	CNC Milling, Laser Cutting, Water Jet, CNC Embroidery, Physical Prototyping
Other Tools	Microsoft Office Suite, Google Workspace, Adobe Creative Cloud, Logic Analyzer, Multimeter

Work Experience

Worcester Polytechnic Institute, Automata Lab

Worcester, MA, USA

RESEARCH ASSISTANT

Oct. 2025 - Present

- Creating benchmarks to compare MILP solutions from literature to a novel SMT based method for solving Multi-Agent CaTL (Capability Temporal Logic) encoded task specifications
- Worked on solving high-level plans using Satisfiability-Modulo-Theorem solvers
- Created a generic benchmark tool to create random scenarios and compare solver types

UNC Charlotte, College of Computing and Informatics

Charlotte, NC, USA

TEACHING ASSISTANT

Aug. 2023 - May. 2025

- Supported courses in Mobile Robotics, Intelligent Robotics, and Tangible Computing.
- Designed assignments, led lab sessions, facilitated ROS1-to-ROS2 migration, and mentored undergraduate researchers in multi-robot experiments.
- Implemented Docker-based environments to improve reproducibility of robotics labs.

UNC Charlotte Super Fab Lab

Charlotte, NC, USA

ASSISTANT MANAGER

Aug. 2024 - May. 2025

- Designed IoT devices for data collection to support robotic system monitoring and maintenance.
- Developed a user management system for lab access and project tracking.
- Created interactive demonstrations with robots and lab tools to support outreach and education.

Rugged Robotics

Houston, TX, USA

SOFTWARE ENGINEERING INTERN

May 2024 - Aug. 2024

- Developed logging and analysis tools for autonomous robots, improving debugging efficiency and performance evaluation.
- Built internal utilities for data parsing and success-rate reporting, enabling reproducible assessment.

UNC Charlotte COAR Lab

Charlotte, NC, USA

UNDERGRADUATE RESEARCHER

Jan. 2024 - May. 2024

- Developed a multi-use Gazebo + ROS2 simulation framework to evaluate multi-robot coordination algorithms and track performance metrics.
- Conducted experiments to quantify the impact of improved physics models on algorithm outcomes.
- Presented research at the UNC Charlotte OUR Symposium, emphasizing reproducibility and performance evaluation in multi-robot systems.

UNC Charlotte CCI Robotics Lab

Charlotte, NC, USA

UNDERGRADUATE RESEARCHER

May 2023 - Aug. 2023

- Developed algorithms to stitch 3D colored point clouds from multiple RGB-D cameras for multi-robot perception and mapping.
- Presented findings at UNC Charlotte OUR Summer Symposium, focusing on scalable sensor fusion techniques.

UNC Charlotte BRIDGES Project

UNDERGRADUATE RESEARCHER

Charlotte, NC, USA

Aug. 2022 - May. 2024

- Developed interactive assignments and educational tools to improve student engagement in computer science courses.
- Supported server functions and contributed new features to the BRIDGES game library.
- Provided technical support to instructors, ensuring reliable execution of educational experiments.

HEBI Robotics

SOFTWARE DEVELOPER INTERN

Pittsburgh, PA, USA

May 2022 - Aug. 2022

- Developed a cross-platform (iOS, Android, MacOS, Linux, Windows, web) human-machine interface using Flutter, Dart, and Protobuf.
- Implemented dynamic control allocation for modular robotic joints, optimizing operator interaction with heterogeneous robots.

4th Vector Technologies

MACHINE VISION INTERN

Apex, NC, USA

May 2018 - Jan. 2022

- Designed and trained classical and ML-based vision systems to solve industrial robotic perception tasks.
- Engineered and assembled electrical enclosures for on-site deployments of robotics systems.
- Implemented VPN networks to enable secure communication between distributed robotic systems.

Presentations

ROScon 2024

PRESENTER

Odense, Denmark

Oct. 2024

- Demonstrated the use of CAN-FD as a transport layer for Micro-ROS between an Nvidia Jetson and Teensy 4.0, enabling high-throughput communication for robotic systems.

UNC Charlotte OUR Research Symposium

PRESENTER - STUDENT RESEARCHER

Charlotte, NC, USA

Apr. 2024

- Presented a poster comparing simulation results to predictions from a mathematical model in multi-robot coordination experiments.

UNC Charlotte OUR Summer Symposium

PRESENTER - STUDENT RESEARCHER

Charlotte, NC, USA

Jul. 2023

- Presented research on algorithms for stitching 3D point clouds from multiple RGB-D cameras, supporting scalable robotic perception.

Publications

Engaging CS1 Students with Audio-Themed Assignments

3RD AUTHOR

Journal of Computing Sciences in
Colleges, Volume 39, Issue 8

May 17, 2024

- Developed and implemented audio-based programming assignments for introductory computer science courses.
- Analyzed student performance data to assess the impact of audio-driven learning lessons.

Honors & Awards

- 2024 **3rd Place**, International Collegiate Programming Contest, Southeast Regional
- 2023 **10th Place**, Lucid Programming Competition, National
- 2021 **Semi-Finalist**, Dean's List - FIRST Tech Challenge
- 2022-2025 **Dean's/Chancellor's List**, UNC Charlotte

Virginia Tech, USA

USA

National Event

Charlotte, NC, USA

Program Committees

- 2025-2026 **Hardware Chair**, IEEE Region 5 Annual Conference
- 2024-2025 **Hardware Game Designer**, IEEE Southeast Conference – Student Activities Committee

Boulder, CO, USA

Southeast USA

Education

UNC Charlotte (University of North Carolina at Charlotte)

B.S. IN COMPUTER SCIENCE, GPA: 3.8/4.0

Charlotte, NC, USA

Aug. 2022 - May. 2025

- Concentration in AI, Robotics, and Gaming; Minor in Mathematics
- Completed coursework relevant to robotics and multi-agent systems, including Mobile Robotics, Intelligent Robotics, Convex Optimization and AI applications, Intro to AI, Data Structures and Algorithms, Linear Algebra, Differential Equations, and Calc 1-3
- Gained extensive hands-on experience in ROS, simulation (Gazebo and IsaacSim), and robotics software development through research projects and teaching assistant roles

Worcester Polytechnic Institute (WPI)

M.S. IN ROBOTICS ENGINEERING, GPA: 4.0/4.0

- Developing technical expertise in multi-robot systems, swarm robotics, and intelligent control

Worcester, MA, USA

Aug. 2025 - May. 2027

Extracurricular Activity

Gold Rush Robotics (IEEE RAS Student Branch)

PRESIDENT (2024-2025), VICE PRESIDENT (2023-2024), CORE MEMBER (2022-2023)

- Led Electrical and Computer subteams, mentoring 10+ members in robot design and development.
- Championed transitions from Arduino to Raspberry Pi, then upgraded to ROS with a custom PCB for improved data and power management.
- Managed logistics, recruitment, and technical strategy for competitive robotics projects.

Charlotte, NC, USA

Jun. 2022 - Jun. 2025

IEEE Charlotte Student Chapter

VICE PRESIDENT (2024-2025), WEBMASTER (2023-2024)

- Revitalized student chapter post-COVID and managed chapter technical infrastructure.
- Organized workshops and events, collaborating with industry professionals to provide educational opportunities.

Charlotte, NC, USA

Aug. 2023 - May. 2025

49th Security Division

MEMBER

- Participated in multiple cybersecurity competitions and conventions.
- Collaborated with peers to develop practical cybersecurity skills and knowledge.

Charlotte, NC, USA

Aug. 2022 - May. 2025