

Muchen Sun (“Mwu-chen Sun”)

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EDUCATION

Northwestern University

Ph.D. Candidate in Mechanical Engineering (Robotics)

M.S. in Mechanical Engineering (Robotics)

Evanston, IL

Aug 2022 – Jun 2025 (Expected)

Sep 2019 – Aug 2022

Lanzhou University

B.E. in Computer Science

Gansu, China

Sep 2015 – Jun 2019

PROFESSIONAL EXPERIENCE

Algorithm team leader, graduate researcher

Northwestern University / Honda Research Institute (USA)

Evanston, IL / San Jose, CA

March 2022 – Present

- Co-initiated the joint grant between the two institutes on robot navigation in human crowds.
- Lead the algorithm development team at Northwestern University.
- Co-lead hardware deployment with engineers from Honda Research Institute.
- Coordinate with the project manager from Honda Research Institute for annual reports.

Graduate researcher

Todd Murphey Research Group, Northwestern University

Evanston, IL

March 2020 – Present

- Conduct Ph.D. thesis research on efficient robot exploration in complex and uncertain environments.
- Mentor students from the Master of Science in Robotics program and the undergraduate research program.

PUBLICATIONS

Under Review

- [1] **Muchen Sun**, Ayush Gaggar, Peter Trautman, and Todd Murphey. "Fast Ergodic Search with Kernel Functions." *[Under Review]*, 2024.
- [2] **Muchen Sun**, Francesca Baldini, Peter Trautman, and Todd Murphey. "Mixed-Strategy Nash Equilibrium for Crowd Navigation." *[Under Review]*, 2023.

Conference Papers

- [1] Jake Ketchum, Sophia Schiffer, **Muchen Sun**, Pranav Kaarthik, Ryan Truby, and Todd Murphey. "Automated Gait Generation For Walking, Soft Robotic Quadrupeds." In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Detroit, 2023.
- [2] **Muchen Sun**, Allison Pinosky, Ian Abraham, and Todd Murphey. "Scale-Invariant Fast Functional Registration." In *International Symposium of Robotics Research (ISRR)*. Switzerland, 2022.
- [3] **Muchen Sun**, Francesca Baldini, Peter Trautman, and Todd Murphey. "Move Beyond Trajectories: Distribution Space Coupling for Crowd Navigation." In *Robotics: Science and Systems (RSS)*. Virtual, 2021.

Workshop Papers

- [1] **Muchen Sun**, Peter Trautman, and Todd Murphey. "Human-Robot Pacing Mismatch." In *RSS Workshop in Close-Proximity Human-Robot Collaboration*. New York City, 2022.

AWARDS & ACHIEVEMENTS

Martin Outstanding Doctoral Fellowship

Awarded to mid-career Ph.D. candidates for outstanding scholar and research achievements in mechanical engineering.

Northwestern University, 2022

Outstanding Undergraduate Thesis Award

Lanzhou University, 2019

CERTIFICATIONS

Certificate in Management for Scientists and Engineers

Certification in Research Communication

Issued by the Research Communication Training Program funded through the National Science Foundation.

Kellogg School of Management, 2023

Northwestern University, 2021

TALKS

- Social Crowd Navigation with NVIDIA Jetson** San Jose, CA
NVIDIA GTC, Jetson Community Projects Showcase (Co-Presenster with Katie Hughes) March 2024
- Reasoning Over Flexibility for Social Navigation [Recording]** New York City, NY
Workshop of Close-Proximity Human-Robot Collaboration, Robotics: Science and Systems (RSS) July 2022
- Distribution Space Crowd Navigation** Evanston, IL
Center for Robotics and Biosystems Student Seminar, Northwestern University March 2022
- Unfreezing The Robot In Human Crowds** Evanston, IL
Society of Industrial and Applied Mathematics "Bridging The Gap" Seminar, Northwestern University March 2022
- Distribution Space Coupling for Crowd Navigation [Recording]** Virtual
Robotics: Science and Systems (RSS) Spotlight Talk June 2021

LEADERSHIP & SERVICES

Reviewer

- IEEE Transactions on Robotics (T-RO) 2024
- IEEE Robotics and Automation Letters (RA-L) 2021–2023
- IEEE International Conference on Intelligent Robots and Systems (IROS) 2024
- IEEE International Conference on Robotics and Automation (ICRA) 2021–2023
- IEEE International Conference on Robot and Human Interactive Communication (RO-MAN) 2023
- RSS Workshop on Social Robot Navigation 2021

Volunteer Museum Presenter

- Chicago's Museum of Science and Industry (MSI)* 2023, 2022
- Presented current robotics research projects to the general public during national robotics week.

Volunteer Lab Tour Presenter

- Career Day for Girls hosted by Northwestern University Society of Women Engineers (GradSWE)* 2022
- Presented current robotics research projects to middle school and high school students from the Chicagoland area.

Student Administrator

- Center of Robotics and Biosystems, Northwestern University* 2022
- Organized monthly meetings and communicated between faculty and students on administrative affairs.

Chair of Career Development

- Mechanical Engineering Graduate Student Society at Northwestern University* 2021, 2022
- Organized the monthly alumni talk to discuss career development with current graduate students.
 - Communicated graduate student feedback with the department and the advisory board.

TEACHING

MECH_ENG 455: Active Learning in Robotics

- Served as co-lecturer in Spring 2023, guest-lecturer in Spring 2022.

MECH_ENG 314: Machine Dynamics

- Served as TA and guest lecturer in Fall 2020.

MENTORING

- Maia Traub (B.S. student in mechanical engineering) 2024
- Srikanth Schelbert (M.S. student in robotics) 2024
- Katie Hughes (M.S. student in robotics, currently at Boston Dynamics AI Institute) 2023
- Tommy Li (B.S. student in mechanical engineering) 2023
- Meg Sindelar (M.S. student in robotics, currently at Applied Research Associates, Inc.) 2023
- Sophia Schiffer (B.S. student in mechanical engineering) 2022–2023
- Bowen Feng (M.S. student in robotics, currently a Ph.D. student at Princeton University) 2022
- Tianyu Li (M.S. student in robotics, currently a Ph.D. student at the University of Pennsylvania) 2022

OPEN SOURCE FREE SOFTWARE

- FLS: Fast functional registration library** | <https://github.com/MurpheyLab/FLS>
- DistNav: Toolbox for distribution space crowd navigation** | <https://github.com/MurpheyLab/DistNav>
- EWAP-Tools: Toolbox for pedestrian dataset processing** | <https://github.com/MurpheyLab/DistNav>
- Interactive tutorial for Gaussian processes** | https://github.com/MuchenSun/another_gp_tutorial