Muchen Sun

CONTACT INFORMATION	Department of Mechanical Engineering, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208	(773) 313-5186 muchensun2021@u.northwestern.edu https://muchensun.github.io

EDUCATION	**Northwestern University**	EVANSTON, USA
	M.S. in Mechanical Engineering	*2019.9 – Present*
	University of California San Diego	SAN DIEGO, USA
	Visiting Student (Non-Degree Program)	*2017.9 – 2017.12*
	Lanzhou University	GANSU, CHINA
	B.E. in Computer Science and Technology	*2015.9 – 2019.6*

Lanzhou University **Thesis**: Analysis of Applying Adaptive Thresholding Method in LiDAR-Based Road Edge Detection Task *(Outstanding Undergraduate Thesis)*

RESEARCH INTERESTS

- ❑ Robot autonomous exploration in uncertain environments
- ❑ Human-robot interaction under uncertainty
- ❑ Robust state estimation for robots

PUBLICATION

[1] Shen, Zebang, Yichong Xu, **Muchen Sun**, Alexander Carballo, and Qingguo Zhou. "3D Map Optimization with Fully Convolutional Neural Network and Dynamic Local NDT." In 2019 IEEE Intelligent Transportation Systems Conference (ITSC), pp. 4404-4411. IEEE, 2019.

RESEARCH EXPERIENCES

Interactive and Emergent Autonomy Lab
Northwestern University, USA   *2020.1 - Present*
Advisor: Prof.Todd Murphey (Dept of Mechanical Engineering)
- Reconstructed an open-sourced distributed trajectory estimation library under ROS. Available at `https://github.com/MuchenSun/ros_distributed_mapper`.
- Developing active SLAM algorithm using ergodic exploration.
- Working on robot navigation in dense human crowds (collaborate with Dr.Peter Trautman from Honda Research Institute).

PISwarm: A Versatile Platform for General Swarm-Robotic Research
Northwestern University, USA   *2019.10 - 2020.3*
Advisor: Prof.Michael Rubenstein (Dept of Mechanical Engineering)
- Developed a central monitor with GUI for controlling and communicating with the swarm robots.

Autonomous Driving Research Group
Lanzhou University, China   *2018.10 – 2019.6*
Advisor: Prof.Qingguo Zhou (Dept of Computer Science and Technology)
- Developed a LiDAR-based road segmentation and road marking extraction method with PCL in ROS [1].

StuPyd: Language For Programming Education
Website: `https://github.com/StuPyd/stupyd-lang`
Lanzhou University, China   *2018.5 – 2018.11*
Advisor: Prof.Hao Yan (Dept of Computer Science and Technology)
- Developed the compiler front end with Python and ANTLR.

- Developed the compiler back end as a bytecode execution virtual machine and a Jupyter Notebook kernel built upon the compiler.

OPEN-SOURCED SOFTWARE	**ROS-Lab: Docker-Based Robot Operating System Virtual Lab** Website: `https://pypi.org/project/ros-lab` • A Docker-based virtual lab of Robot Operating System(ROS) to help beginners learn and practice. **Online Course Notes for** *Modern Robotics* Website: `https://muchensun.github.io/ModernRoboticsCourseNotes/` • Course notes for *Modern Robotics: Mechanics, Planning, and Control Specialization* on Coursera. **Interactive Tutorial for Gaussian Processes** Website: `https://github.com/MuchenSun/another_gp_tutorial` • Interactive tutorial for Gaussian processes based on Jupyter Notebook, modified from Dan Foreman-Mackey's original tutorial.
TEACHING	2020 Fall TA for *ME*314: *Machine Dynamics* at Northwestern University
HONORS AND AWARDS	2019 Lanzhou University Outstanding Graduate Award 2016 – 2017 Second-class Scholarship of Lanzhou University 2015 – 2016 Second-class Scholarship of Lanzhou University
LEADERSHIP AND SERVICE	2020 Certification in Research Communication Training Program (RCTP) at Northwestern University. 2019 – 2020 Vice President of Public Relations at Northwestern Public Speaking Club (formerly Northwestern Toastmaster Club).
TECHNICAL SKILLS	**Computer Languages**: Python, C/C++, MATLAB **Frameworks and Libraries**: ROS, CUDA, MPI, PCL, OpenCV **Tools**: Make, Git, Docker, ANTLR, LaTeX