Muchen Sun

Contact Information

Department of Mechanical Engineering,
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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*
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
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