

LIN ZHAO

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RESEARCH INTERESTS

Simultaneous localization and mapping (SLAM), sensor fusion, swarm robotics, computer vision, path planning, deep learning, and system development for autonomous robotics, specifically for the marine domain.

EDUCATION

University of Rhode Island (URI), USA Ph.D. in Ocean Engineering Advisor: Prof. Mingxi Zhou Committee: Prof. Chris Roman, Prof. Brice Loose	Sep. 2019 - Aug. 2024 GPA: 3.89/4.0
University of Nevada, Las Vegas (UNLV), USA M.S. in Mechanical Engineering Advisor: Prof. Woosoon Yim	Sep. 2013 - Aug. 2015
Zhejiang University City College, China B.E. in Mechanical & Electronic Engineering Advisor: Prof. Li Xu	Sep. 2009 - Jun. 2013

ACADEMIC EXPERIENCE

University Rhode Island, Kingston, RI Postdoctoral Fellow, Intelligent Control and Robotics Lab & Smart Ocean System Lab	Jan. 2025 - Present
<ul style="list-style-type: none">• Learning-based AUV navigation.• Swarm SLAM for Marine Robotics.	
University Rhode Island, Narragansett, RI R&D Engineer, Smart Ocean System Lab	Sep. 2024 - Dec. 2024
<ul style="list-style-type: none">• WMAV ASV system integration: Lidars, Multi-Beam Echosounder, IMU, GNSS, DVL and Torqeedo motors.• Field experiment support for various AUVs and ASV.	
Research Assistant, Smart Ocean System Lab	Sep. 2019 - Aug. 2024
<ul style="list-style-type: none">• Under-ice multi-sensor SLAM:<ul style="list-style-type: none">– Underwater vehicle system integration: ROS sensor drivers, hardware time-sync, calibration.– Dataset: IMU, DVL, Pressure, Stereo, Forward-Looking Sonar (FLS), USBL.– Dead-reckoning: EKF odometry fused by IMU, DVL and Pressure, and DVL-aided system initialization for the dynamic environment.– DVL-aided VIO: sparse DVL point cloud enhances visual feature estimation within Multi-State Constraint Kalman Filter (MSCKF) framework.– FLS odometry: generative model-based submap creation and submap-constrained FLS feature estimation.• Coverage path planning and seafloor mapping using bathymetric sonar.• Software development, maintenance and test for lab-developed Autonomous Underwater Vehicles.	
Teaching Assistant	Sep. 2019 - Aug. 2024
<ul style="list-style-type: none">• OCG110 The Ocean Planet, 2019 Fall.	

- OCG123G Climate change and the oceans, 2020 Spring.
- OCG120G The World of Robots, 2023 Spring/2024 Spring

University of Nevada, Las Vegas, *Las Vegas, NV*

Research Assistant, Intelligent Structures and Control Lab

Sep. 2013 - Aug. 2015

- 2D path planning simulation (A*, D* Lite, Reciprocal Velocity Obstacle) and integration (Vector Field Histogram) with the ground vehicle using Hokuyo Lidar.
- 3D path planning (Vector Field Histogram) development and integration with UAV using Kinect.

Teaching Assistant

Sep. 2013 - Aug. 2015

- Automatic Control Laboratory, 2013 Fall/2014 Fall.
- Engineering Measurement Laboratory, 2014 Spring.

INDUSTRY EXPERIENCE

ECARX, *Hangzhou, China*

Algorithm Engineer

Dec. 2018 - Aug. 2019

- Lidar-based SLAM development and software implementation for self-driving car.

D2robot Technology, *Hangzhou, China*

Research & Development Engineer

Jul. 2017 - Aug. 2018

- **Software development:** drivers for motor and communication board.
- **Algorithm application:** visual SLAM and differential motion control.
- **Multi-sensor fusion:** calibration (cameras and Lidar), data transmission (point cloud compression and TCP transmission) and real-time 3D dense reconstruction using OpenGL drawing surfel.
- **Medical image processing:** C-Arm imaging device calibration, vertebral contour detection from CT image.

Zhejiang Skywalker Innovation Technology, *Hangzhou, China*

Software Engineer

Oct. 2015 - Jun. 2017

- **Lidar Scanner Design (Leader):** algorithm design to generate 2D data from a single point laser; driver development for UAV flight controller (stm32) and ROS; implemented PID controller to the rotation module; improved in structure design of the entire mechanical system.
- **Obstacle Avoidance:** 2D obstacle avoidance algorithm integration with UAV flight controller; 2D SLAM algorithm implementation on UAV with developed 2D Lidar scanner.

PUBLICATIONS

Journals:

1. **L. Zhao**, M. Zhou, *DPS-VIO: multi-sensor fusion method for robotics under-ice exploration with Forward-Looking Sonar*, IEEE Transactions on Field Robotics, 2024. to be submitted.
2. **L. Zhao**, M. Zhou, *Multi-sensor under-ice dataset*, The International Journal of Robotics Research, 2024. in prepare.

Conferences:

1. M. Zhou, F. Naderi, Y Fu, T. Jacob, **L. Zhao**, M. Panjnani, C. Yuan, W McConnell, E. Gezer, *Towards Modular and Accessible AUV Systems*. IEEE/OES Autonomous Underwater Vehicles Symposium (AUV), Boston, MA, USA, 2024, pp. 1-5.

2. **L. Zhao**, M. Zhou, B. Loose, *Tightly-coupled Visual-DVL-Inertial Odometry for Robot-based Ice-water Boundary Exploration*. 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). 2023, Detroit, USA. [code](#)
3. **L. Zhao**, M. Zhou and B. Loose, *Towards Under-ice Sensing using a Portable ROV*, OCEANS 2022, Hampton Roads, VA, USA, 2022, pp. 1-8. (**Student Poster Competition Finalist**) [code](#)
4. E. C. Gezer, M. Zhou, **L. Zhao** and W. McConnell, *Working toward the development of a generic marine vehicle framework: ROS-MVP*, OCEANS 2022, Hampton Roads, VA, USA, 2022, pp. 1-5. [code](#)
5. E. C. Gezer, **L. Zhao**, J. Beason and M. Zhou, *Towards seafloor mapping using an affordable micro-UUV*, OCEANS 2021, San Diego, CA, USA, 2021, pp. 1-5.
6. **L. Zhao**, M. Zhou, B. Loose, V. Cousens and R. Turrisi, *Modifying an Affordable ROV for Under-ice Sensing*, OCEANS 2021, San Diego, CA, USA, 2021, pp. 1-5.
7. M. Zhou, J. Shi and **L. Zhao**, *Towards the Development of an Online Coverage Path Planner for UUV-based Seafloor Survey using an Interferometric Sonar*, IEEE/OES Autonomous Underwater Vehicles Symposium (AUV), St. Johns, NL, Canada, 2020, pp. 1-5.
8. Z. Cook, **Lin Zhao**, J. Lee and Woosoon Yim, *Unmanned aerial system for first responders*, 12th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Goyang, 2015, pp. 306-310. [code](#)

Dissertations

1. **L. Zhao**, *Multi-sensor fusion for UUV localization at the ice-water interface*, Ph.D. thesis, University of Rhode Island, Narragansett, RI, USA, August 2024.
2. **L. Zhao**, *3D Obstacle Avoidance for Unmanned Autonomous System (UAS)*, Master's thesis, University of Nevada, Las Vegas, Las Vegas, NV, USA, August 2015.

SKILLS

Programming:	C/C++, Python, Matlab, Arduino
Libraries:	ROS1/ROS2, OpenCV, Open3D, PCL, PyTorch
Robots:	UAV, UGV, ROV, AUV, USV
Sensors:	LiDAR, Camera, RGBD-Camera, Imaging/Bathymetric Sonar, IMU, DVL

HONORS & AWARDS

- **Student Poster Competition Finalist**, IEEE/MTS OCEANS 2022, Hampton Roads, VA. 2022
- **Academic Innovation Scholarship**, College of Engineering, Zhejiang University City College. 2013

PROFESSIONAL ACTIVITIES

Membership:

- IEEE Member
- IEEE Robotics and Automation Society (RAS) Member
- IEEE Oceanic Engineering Society (OES) Member

Conference Review:

- IEEE International Conference on Robotics and Automation (2024)

Journal Review:

- IEEE Robotics and Automation Letters (2024)
- IEEE Journal of Oceanic Engineering (2024)

- Ocean Engineering (2024-2025)
- IEEE Systems Journal (2024)

MENTORSHIP

The Summer Undergraduate Research Fellowship in Oceanography (SURFO), URI

- Benjamin Ginnet, Utah State University 2023
- Manavi Panjnani, Stevens Institute of Technology 2024

FIELD TRIPS

- Under-ice multi-sensor data collection in freshwater. Houghton, MI, 2021
- Under-ice multi-sensor data collection in seawater. Utqiagvik, AK, 2022

OUTREACH

Science Saturday, Graduate School of Oceanography, URI 2021/2022/2024

Exhibits, tours and conversations centered on marine exploration, discovery, science and management

E-Week Research Showcase, College of Engineering, URI 2024

Poster judge for undergraduate research posters.

Robotics meetup for FIRST outreach 2024

- FIRST Tech Challenge: team Zoobotix (middle school) from Kalamazoo, Michigan.
- FIRST Lego League: team Hampton Meadows (5th grade) from Barrington, Rhode Island.