ZISHI XU

PhD Student, Zhejiang University

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EDUCATION

Zhejiang University, China **PhD Student** **2020 ~ present**
Control Theory and Engineering

- Research interest: marine crafts, autonomous vehicles, robotic control
- Supervisor: Professor Ji Xiang

Beijing Institute of Technology, China **BSc** **2016 ~ 2020**
Electrical Engineering

- Distinction (ranked 2 of 32)
- Dissertation: "Design of Parameter Identification Method for USV Motion Model"

RESEARCH

Motion control for underactuated unmanned surface vehicles

- Developing a novel control method of path following task for underactuated unmanned surface vehicles based on output redefinition technique.
- Developing a path following method to suppress the sideslip angle on the curved path for underactuated unmanned surface vehicles.
- Developing a robust trajectory tracking control algorithm for differential-driven unmanned surface vehicles with consideration of propeller servo loop.
- Designing the trajectory tracking controller for underactuated unmanned surface vehicles in the view of port-Hamiltonian approach.
- Designing the parameter identification method of unmanned surface vehicles motion model to improve the accuracy of model predictive controller.
- Designing a prototype of differential-driven unmanned surface vehicle and verifying the effectiveness of the proposed control algorithms.

Redundant autonomous underwater vehicles

- Designing a trajectory tracking controller for redundant underwater vehicles to automatically reconfigure kinematics when suffering from actuator faults.
- Designing a prototype of autonomous underwater vehicles and performing experiments.

SKILLS

- Coding with C/C++, Python
- Simulation verification by Matlab/Simulink, Python
- Robotics experiment platform by STM32, ROS
- Document writing with LaTeX, Word, Markdown

ADDITIONAL EXPERIENCES

Huzhou Institute of Zhejiang University, China **2022 ~ 2023**

- Cross-domain heterogeneous cooperation of unmanned surface vehicles and unmanned aerial vehicles.
- Unmanned surface vehicles for water surface garbage cleaning.
- Cooperation of unmanned surface vehicles and manipulators.

PUBLICATIONS

Zishi Xu, Shiming He, Weijun Zhou, Yanjun Li and Ji Xiang, "Path Following Control With Sideslip Reduction for Underactuated Unmanned Surface Vehicles," *IEEE Transactions on Industrial Electronics*, 2024, early access.

Zishi Xu, Tao Han, Weijun Zhou, Shiming He and Ji Xiang, "Trajectory Tracking Control for Differential-Driven Unmanned Surface Vessels Considering Propeller Servo Loop," *IEEE Transactions on Industrial Informatics*, 2024, early access.

Zishi Xu and Ji Xiang, "A Path Following Control Method for Underactuated Unmanned Surface Vehicles Based on Output Redefinition," *IEEE International Conference on Control & Automation*, 2024, [Under review].

Weijun Zhou, **Zishi Xu**, Yongxin Wu, Ji Xiang and Yanjun Li, "Energy-based trajectory tracking control of under-actuated unmanned surface vessels," *Ocean Engineering*, vol. 288, pp. 116166, 2023.

Shiming He, **Zishi Xu**, Yanjun Li and Ji Xiang, "Fault diagnosis and reconfigurable control for underwater vehicles," *Ocean Engineering*, vol. 239, pp. 109813, 2021.

AWARDS

Honor for Graduate, Zhejiang University, 2021
Luoci—Linwenzhen Scholarship, Zhejiang University, 2021
Scholarship for Postgraduate Freshman, Zhejiang University, 2020
Graduation with Honors, Beijing Municipal Education Commission, 2020
National Scholarship, Ministry of Education of P. R. China, 2018