

Zhihai Bi

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SUMMARY

Research Interests: My interests primarily lie in the robot **motion planning** and **control** in humanoid, quadrupedal robots, UAV and autonomous vehicles. My goal is to push the boundaries of what robots can achieve and bring them closer to human capabilities.
Highlight: 6 years of robotics study experience, 3 years of research experience in robot planning and control, one semester of experience in robot arm teaching.

Relevant Courses: Robot Software Engineering(A), Principles of Automatic Control(A), Nonlinear Dynamics(A-), Geometry&Algebra(100), Advanced Mathematics(A), C++ Programming(A).

EDUCATION

- **Southeast University** Nanjing, China
Bachelor in Robot Engineering, SEU
GPA: 3.81/4.00, Ranking:5/34
Sept 2017 – Jun 2021
- **Fudan University** Shanghai, China
Master in Computer Applied Technology, FDU
Supervisor: Prof. Hongbin Fang, Institute of AI and Robotics
GPA: 3.57/4.00, Ranking:5/18
Sept 2021 – Jun 2024

PUBLICATIONS

1. **A Worm-Snake-Inspired Metameric Robot for Multi-Modal Locomotion: Design, Modeling, and Unified Gait Control**
Zhihai Bi, Q.Y. Zhou, Hongbin Fang. *International Journal of Mechanical Sciences*(**Q1,Top**), 2023
2. **Design and path planning for a Worm-Snake-Inspired Metameric(WSIM) robot**
Zhihai Bi, Jian Xu, Hongbin Fang
IEEE International Conference on Robotics and Biomimetics(ROBIO), 2022

PREPRINTS OR IN PROGRESS

1. **Dynamic models for Planar Peristaltic Locomotion of a Metameric Earthworm-like Robot**
Qinyan Zhou, Hongbin Fang, Zhihai Bi, Jian Xu
arXiv preprint 2303.11846, 2023.
2. **Multi-modal motion planning framework for the Worm-Snake-Inspired robot**
Zhihai Bi, Hongbin Fang
In progress, target journal: IEEE Robotics and Automation Letters(RA-L), 2023.

SELECTED PROJECTS

- **Design, modeling and control for a worm-snake-inspired robot** *Aug 2021 – Oct 2022*
 - A worm-snake-inspired robot with multi-modal locomotion capability is designed.
 - Dynamic models for worm-like and snake-like locomotion modes are established.
 - A unified gait control framework for the multi-modal robot is proposed.
- **Multi-modal planning for the worm-snake-inspired robot** *Oct 2022 – present*
 - Topology guidance in 2D space considering mode selection and kinematic constraint.
 - Trajectory Planning based on Hybrid A* with motion primitives of different modes.
 - Mode and trajectory optimization based on quadratic programming.

- **Vehicle Lane Keeping Assist (LKA) lateral control**
 - Vehicle lateral control based on VTD simulation software.
 - LQR lateral control algorithm based on vehicle dynamics model.

Apr 2022 – Jun 2022

TEACHING EXPERIENCE

Teaching Assistant: Introduction to Robotics INFO130371.01, FDU

Spring 2022

- Responsible for robot arm **kinematics, dynamics modeling, and trajectory planning.**

HONORS AND AWARDS

- Outstanding Graduate Student Award of Southeast University (**Top 3%**) *2021*
- Principal's scholarship of Southeast University (**Top 1%**) *2017 – 2018*
- The 10th University Robotics Competition, Jiangsu Province (**1st place**) *2019*
- China ICV Algorithms Challenge: LKA lateral control (**1st place**) *2022*
- The 15th National Student Intelligent Vehicle Competition (**2nd prize**) *2020*
- School Prize of Fudan University *2021 – 2022*
- Tang Zhongying Moral Education Scholarship (**four consecutive years**) *2017 – 2021*

SKILLS

- Robot design: Solidworks, STM32, Altium Designer
- Robot modeling: Kinematics and dynamics modeling, Newton Euler and Lagrange
- Robot simulation: Webot, RViz, Matlab Robotics Toolbox...
- Robot Programming: ROS, C/C++, Python, Matlab, Eigen, Docker, OOQP, OSQP...
- Self-learning courses: Convex Optimization I(Prof. Boyd), Motion Planning for Mobile Robots(Prof. Fei Gao), Optimal Control 2022(Prof. Zachary)...
- Language: Cantonese, Mandarin, English(**IELTS 7.0(6.0)**)