WEI ZHU

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EDUCATION

Oct. 1st, 2020 – Sept. 25th, 2023   Tohoku University, Japan   Robotics (PhD)
Minors: reinforcement learning, social navigation, multi-agent motion planning, legged robots
Advisor: Prof. Mitsuhiro Hayashibe

Sept. 1st, 2017 – Jun. 30th, 2020   Nankai University, China   Control Science and Engineering (Master)
Minors: reinforcement learning, nonlinear control, snake robots
Advisor: Prof. Yongchun Fang

Sept. 1st, 2013 – Jun. 30th, 2017   Nankai University, China   Intelligent Science and Technology (Bachelor)
Minors: reinforcement learning, snake robots

RESEARCH INTEREST

My research interest lies at the intersection of **control, robotics, and learning**. My research aims to develop intelligent autonomous agents with **deep reinforcement learning** frameworks in either industry (e.g., robotic manipulation and autonomous driving) or human society (e.g., navigation among crowds and multi-agent motion planning). I am interested in making the end-to-end reinforcement learning algorithms applicable both in simulated and real worlds. Applications of my research include motion planning of snake robots, balancing control and motion planning of wheeled bipedal robots, navigation with quadruped robots, and robotic manipulation.

WORK EXPERIENCE

Apr.   1st, 2024 – Present   Postdoc   Georgia Institute of Technology
Minors: Reinforcement learning for social navigation with a bipedal robot

Oct. 13th, 2023 – Mar. 29th , 2024   Engineer   JD Logistics, China (Forbes TOP500)
Minors: Path planning for service mobile robots and self-driving cars

May 29th, 2023 – Oct. 12th, 2023   Internship   JD Logistics, China (Forbes TOP500)
Minors: Path planning for service mobile robots

May   9th, 2022 – Sept. 23rd, 2022   Internship   Panasonic, Japan (Forbes TOP500)
Minors: Model based deep reinforcement learning for robot manipulation

PUBLICATIONS & SUBMISSIONS

PhD Dissertation

Prior Knowledge-free Robot Navigation in Dynamic Environments through Deep Reinforcement Learning, July 2023.

Master Dissertation

Mechanical Design and Intelligent Control of Modular Snake-like Robots, June 2020.

Bachelor Dissertation

The Design of a Distributed Controller for the Modular Snake Robot, June 2017.

Submission

1. <u>W. Zhu</u> and M. Hayashibe, Sampling Efficient Deep Reinforcement Learning for Dynamic Navigation with Raw Laser Scans, under review.

Journal

1. <u>W. Zhu</u> and M. Hayashibe, Autonomous Navigation System in Pedestrian Scenarios using a Dreamer-based Motion Planner, *IEEE Robotics and Automation Letters* (RA-L), IF4.3, 2023.
2. <u>W. Zhu</u>, and M. Hayashib, A Hierarchical Deep Reinforcement Learning Framework with High Efficiency and Generalization for Fast and Safe Navigation, *IEEE Transactions on Industrial Electronics* (TIE), IF8.1, 2022.
3. <u>W. Zhu</u>, X. Guo, D. Owaki, K. Kutsuzawa, and M. Hayashibe, A Survey of Sim-to-Real Transfer Techniques applied to Reinforcement Learning for Bio-Inspired Robots, *IEEE Transactions on Neural Networks and Learning Systems* (TNNLS), IF14.2, 2021.
4. F. Raza, <u>W. Zhu</u>, M. Hayashibe, Balance Stability Augmentation for Wheel-legged Biped Robot through Arm Acceleration Control, *IEEE Access*, IF3.9, 2021.
5. <u>W. Zhu</u>, X. Guo, Y. Fang, and X. Zhang, A Path-Integral-Based Reinforcement Learning Algorithm for Path Following of an Auto-Assembly Mobile Robot, *IEEE Transactions on Neural Networks and Learning Systems* (TNNLS), IF14.2, 2020.
6. <u>W. Zhu</u>, X. Guo, Y. Fang, and X. Zhang, Development of a Reconfigurable Modular Snake-like Robot and Research on Multiple Motion Modes, *Information and Control*, 2020.
7. X. Guo, <u>W. Zhu</u>, and Y. Fang, Guided Motion Planning for Snake-like Robots Based on Geometry Mechanics and HJB Equation, *IEEE Transactions on Industrial Electronics* (TIE), IF8.1, 2019.
8. Y. Fang, <u>W. Zhu</u>, and Xian Guo, Target-Directed Locomotion of a Snake-Like Robot Based on Path Integral Reinforcement Learning, *Pattern Recognition and Artificial Intelligence*, 2018.

Conference Proceedings

1. <u>W. Zhu</u> and M. Hayashibe, Learn to Navigate in Dynamic Environments with Normalized LiDAR Scans, *IEEE International Conference on Robotics and Automation* (ICRA), 2024, accepted.
2. <u>W. Zhu</u>, F. Raza, and M. Hayashibe, Reinforcement Learning based Hierarchical Control for Path Tracking of a Wheeled Bipedal Robot with Sim-to-Real Framework, in *IEEE/SICE International Symposium on System Integration* (SII), 2022.
3. X. Zhang, X. Guo, Y. Fang, and <u>W. Zhu</u>, Reinforcement Learning-based Hierarchical Control for Path Following of a Salamander-like Robot, in *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), 2020.
4. X. Guo, <u>W. Zhu</u>, and Yongchun Fang (2019). Any Curve Path Following of Snake-like Robots, in *IEEE International Conference on Robotics and Biomimetics* (ROBIO), 2019.
5. X. Zhang, Y. Fang, <u>W. Zhu</u>, and X. Guo, A Novel Locomotion Controller Based on Coordination Between Leg and Spine for a Quadruped Salamander-Like Robot, in *International Workshop on Robot Motion and Control* (RoMoCo), 2019.
6. <u>W. Zhu</u>, X. Guo, and Y. Fang, Design of a Modular Snake Robot and Control with Internet of Things, in *Chinese Automation Congress* (CAC), 2017.

Patent

1. Y. Fang, <u>W. Zhu</u>, X. Guo, and X. Zhang, Auto-assembly Modular Robot, *Chinese Patent*, No. ZL 2019 1 0083530.X, 2022.

2. Y. Fang, <u>W. Zhu</u>, X. Guo, and X. Zhang, A Claw-bolt-baffle Mechanism, ***Chinese Patent***, No. ZL 2019 1 0083528.2, 2022.

HIGHLIGHTS

1. MEXT Scholarship from Japanese Government (2020.10-2023.9)
2. National Scholarship from Nankai University (2019.12, top 3%)
3. Paper attached video https://youtu.be/B01vbc-Lx1Q, 15K views

ACADEMIC SERVICES

Reviewer
• IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
• IEEE International Conference on Robotics and Automation (ICRA)
• IEEE Transactions on Industrial Electronics (TIE)
• IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
• IEEE Transactions on Industrial Informatics (TII)