Yi Wang

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RESEARCH INTERESTS	State-of-the-art robotics optimal motion planning, bidirectional heuristic search, real-time autonomous systems, optimal controller, and graph-based optimization techniques. Focused on solving open questions in motion planning and heuristic search to push the boundaries of efficiency, scalability, and robustness in robotic autonomy.

Research Experience

Phd student (Research Assistant) at University of New Hampshire 2022-present

- Introduced the **first algorithm** that develops **lazy any incremental bidirectional heuristic search** within batch-wise sampling motion planning, setting a new benchmark in efficiency & robustness in high-dimensional continuous state space (**Open question**).
- Developed the **first algorithm** for **premature termination in bidirectional heuristic search** while ensuring **optimality** and maintaining the *meet-in-the-middle* property (**Open question**).
- Established a **lower bound** for informed sampling to **address the curse of dimensionality** in **high-dimensional continuous state spaces** for kinodynamic robotic systems (**Open question**).
- Collaborating with **Professor Oren Salzman (Technion)** on **sampling-based motion planning and bidirectional heuristic search.**

PUBLICATIONS

Peer-reviewed Conferences and Journals

- **Yi Wang**, Bingxian Mu, Oren Salzman. "Asymptotically Optimal Sampling-Based Motion Planning Through Anytime Incremental Lazy Bidirectional Heuristic Search" `Proceedings of IEEE International Conference on Robotics & Automation (ICRA)`, 2025.
- **Yi Wang**, Eyal Weiss, Bingxian Mu, Oren Salzman. "Bidirectional Search while Ensuring Meet-In-The-Middle via Effective and Efficient-to-Compute Termination Conditions". `Proceedings of International Joint Conference on Artificial Intelligence (IJCAI)`, 2025.
- Xiangyu Zhang, **Yi Wang**, Bingxian Mu, Se Young Yoon. EMPC-Based Flight Control and Collision-Free Path Planning for A Quadrotor with Unbalanced Payload. `Proceedings of IEEE/ASME Transactions on Mechatronics (TMECH)`, 2025.
- Qinkun Xiao, **Yi Wang**, Haiyun Wang. Motion Retrieval Using Weighted Graph Matching[J].Soft Computing(ISSN: 1423−76431, Volume 19,Issue 1). Soft Comput(2015) 19:133-144. DOI:10.1007/s00500-014-1237-5.
- Qinkun Xiao, **Yi Wang**, Yichuang Luo. 3D Path Planning of Ant Colony Algorithm Using Partial Differential Elevation Modeling[J]. Journal of system engineering and Electronics (ISSN:1001-506x, Volume 37, Issue 7)(2015) 37:1552-1561. DOI:10.3969/1001- 506x.2015.07.14.
- Qinkun Xiao, **Yi Wang** and Song Gao. 3D Path Planning Based on Elevation Model and Ant Colony Algorithm[C]. Intelligent Human−Machine Systems and Cybernetics, 2013 Fifth International Conference (2013) 1:, 74-77. DOI:10.1109/IHMSC.2013.25.

Under Review & Work in Progress

- Asymptotically Optimal Sampling-Based Motion Planning by Anytime Incremental Lazy Bidirectional Heuristic Search". `International Journal of Robotics Research (IJRR) (Submitting in late 2025).`

HONORS & AWARDS

Special IJCAI 2025 DC Travel Award   June, 2025

Awarded by the National Science Foundation (NSF) to selected U.S.-based Ph.D. students with accepted proceedings paper at IJCAI 2025.

TALKS & INVITED ORAL

Lightning talk, Doctoral Consortium, IJCAI 2025   Aug, 2025

Selected as one of six lightning talks of selected papers from main conference track of IJCAI.

EDUCATION

University of New Hampshire
Ph.D. in System Design.   2022–Present
M.Sc. in Computer Science.   2017–2022
Project: Batch Informed Trees (BIT*) for a Dubins vehicle amid dynamic obstacles.
Xi'An Technological University
M.Sc. in Control Theory and Control Engineering.   2011–2014
Thesis: 3D Path Planning based on Ant Colony algorithm and Elevation Model, Research
Mentor: Prof. Qinkun Xiao.
College of JinCheng of NUAA
B.Sc. in Electrical Engineering and Automation.   2006-2010
Thesis: Path Planning of Artificial Fields, Research Advisor: Prof. Congqing Wang.

PROFESSIONAL EXPERIENCE

Teaching Assistant   2017 - 2022, 2025-Present
Involved in creating assignments, exams and conducting recitation sessions for Intro to Computer Science (Java), Data Structure and Algorithms(C++), From problems to algorithms to programs(Python), An introduction to Artificial Intelligence, Systems modeling, simulations and control.

RESEARCH PROJECTS

Motion Retrieval Using Graph Modeling   07/2013-06/2014
- National Natural Science Foundation of China   NO:61271362
- Research on the data of motion retrieval involved in military training, sports, teaching, film, and game production. Based on the Graph model, we establish movement data descriptor, look for suitable motion data comparison method and then form motion data retrieval demonstration system.

Path Planning Algorithm of outdoor Environment For UGV   12/2012-06/2013
- Research Projects of Shaanxi Province Education Office   NO:12J0510
- This project consists of three parts: research for the path planning algorithm for an unmanned ground vehicle in uneven outdoor spatial environments, research on outdoor environment perception and reconstruction based on multi-sensor fusion as well as research on real-time locating and tracing.

Retrieval of Multi-Motion System In A Multi-perspective Environment 12/2012-12/2012
- National Natural Science Foundation of Shaanxi Province   NO:2012JM8028
- Research on Multi-angle moving objects and velocity measure mechanism using dynamic Bayesian Network. Measure dynamic network multi-angle moving objects and velocity mechanism.

Retrieval of Multi-View Moving Objects Under A complex Environment 01/2012-06/2012
- Special Funds of Shaanxi Province Education Office   NO:12JK0727
- Multi-view video streaming based on Content Based Retrieval System, Which can be used in airport security, major intersection security and intelligent information management.

Road Detection Based on Machine Vision   12/2012-06/2013
- Special Funds of Xi'an Technological University   NO:XG001
- Design the road recognition system of unmanned ground vehicles based on machine vision, including its hardware system, data analysis as well as real-time image processing. Transfer the video into sequential images through an image capture card, and design a set of fast and accurate video processing algorithm for identify vehicle on the road.

TECHNICAL SKILLS

Languages: C++, C, R, Python, Matlab, Java.
Robotics Tools: OMPL, MoveIt!.
Dev Tools: Linux, Github.