

# GAOTIAN WANG

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## RESEARCH INTERESTS

- ◇ Robot Robust Manipulation under Uncertainties, Motion Planning and Control
- ◇ Machine Learning, Deep Learning, Reinforcement Learning, Multi-modal Learning
- ◇ LLMs Applications, Embodied AI, Generative AI, 3D Computer Vision, Diffusion models

## PROFESSIONAL EXPERIENCE

SEP 2022 - PRESENT	<b>RobotII Lab</b> at Rice University, Houston, TX Graduate Student, Advisor: Prof. Kaiyu Hang <ul style="list-style-type: none"><li>◇ <b>Unified Nonprehensile Object Pushing via Non-Parametric Estimation and Model Predictive Control (UNO Push):</b> A unified framework that achieves precise pushing on random objects with continuously updated system models using in-task experiences.</li><li>◇ <b>Caging in Time for Robust Object Manipulation:</b> A novel framework for robust manipulation, enabling open-loop control without detailed object knowledge or real-time feedback, validated through extensive experiments in challenging quasi-static and dynamic tasks.</li></ul>
NOV 2021 - JUN 2022	<b>AloT Lab</b> at USTC, Hefei, China Undergraduate Researcher, Advisor: Prof. Nikolaos M. Freris <ul style="list-style-type: none"><li>◇ <b>Modeling and Control of Soft Arm via Piecewise Universal Joint Model:</b> A novel model for soft arms that enables <b>accurate prediction of interactions and dynamics</b>, as well as <b>dynamic control</b> in both configuration and task spaces for dynamic trajectory tracking.</li></ul>
APR 2021 - SEP 2021	<b>Reconfigurable Robotics Lab</b> at EPFL, Lausanne, Switzerland Guest Researcher, Supervisor: Prof. Jamie Paik <ul style="list-style-type: none"><li>◇ <b>Origami Structures Stiffness Modeling:</b> An efficient origami simulator using <b>Taichi GPU platform</b> for stiffness modeling and testing, validated on an origami joystick with <b>less than 10% error</b>.</li></ul>
AUG 2020 - OCT 2021	<b>USTC Soft Robotics Lab</b> at USTC, Hefei, China Undergraduate Researcher, Advisor: Prof. Xiaoping Chen <ul style="list-style-type: none"><li>◇ <b>Sim to Real Transfer of the Soft Robotics Arm via Q-learning:</b> A scalable 3D model for soft manipulator with realistic actuation and workspace, as well as a <b>Q-learning-based controller</b> for soft robot arm using pre-trained models from this rough simulator.</li></ul>

## SKILLS

Programming Capabilities:	ROS, ROS2, C, C++, Matlab, Python
Simulation Environments:	PyBullet, Isaac Gym/Sim, MuJoCo, Taichi, Sapien
Deep Learning Frameworks:	PyTorch, Tensorflow, Diffusion models
Others:	Ollama, 3D modeling and printing, Solidworks, Mathematica, COMSOL Multiphysics, OMPL, RViz, Blender

## EDUCATION

SEP 2022 - PRESENT	<b>Rice University, Houston, TX</b> Ph.D. in COMPUTER SCIENCE Advisor: Dr. Kaiyu Hang
SEP 2018 - JUN 2022	<b>University of Science and Technology of China, Hefei, China</b> B.S. in OPTICAL ENGINEERING and COMPUTER SCIENCE Advisor: Dr. Nikolaos M. Freris

## PROFESSIONAL SERVICE

<b>Referee:</b>	<ul style="list-style-type: none"><li>◇ IEEE International Conference on Robotics and Automation (ICRA), 2025</li><li>◇ IEEE International Conference on Robotics and Automation (ICRA), 2024</li><li>◇ IEEE Robotics and Automation Letters (RAL), 2024</li><li>◇ IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023</li></ul>
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## PUBLICATIONS

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### Preprints under review

P1. **Gaotian Wang**<sup>†</sup>, Kejia Ren<sup>†</sup>, Andrew S. Morgan, and Kaiyu Hang. “Caging in Time: A Framework for Robust Object Manipulation under Large Uncertainties.” *The International Journal of Robotics Research (IJRR)*.

<sup>†</sup> Equal Contribution. Under Review

P2. Kejia Ren, **Gaotian Wang**, Andrew S. Morgan, Lydia E. Kavraki, and Kaiyu Hang. “Object-Centric Kinodynamic Planning for Nonprehensile Robot Rearrangement Manipulation.” *The IEEE Transactions on Robotics (T-RO)*. Under Review

### Peer-Reviewed Journal Papers

J1. Yinghao Gan, Peijin Li, Hao Jiang, **Gaotian Wang**, Yusong Jin, Xiaoping Chen, and Jianmin Ji. 2022. “A Reinforcement Learning Method for Motion Control With Constraints on an HPN Arm.” *IEEE Robotics and Automation Letters (RAL)*

### Peer-Reviewed Conference Papers

C5. **Gaotian Wang**, Kejia Ren, and Kaiyu Hang. “UNO Push: Unified Nonprehensile Object Pushing via Non-Parametric Estimation and Model Predictive Control.” In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2024*.

C4. Howard Qian, Yangxiao Lu, Kejia Ren, **Gaotian Wang**, Ninad Khargonkar, Yu Xiang, and Kaiyu Hang. 2024 “RISeg: Robot Interactive Object Segmentation via Body Frame-Invariant Features.” In *IEEE International Conference on Robotics and Automation (ICRA) 2024*

C3. Zhanchi Wang, **Gaotian Wang**, Xiaoping Chen, and Nikolaos M Freris. 2024 “Kinematic Modeling and Control of a Soft Robotic Arm with Non-constant Curvature Deformation.” In *IEEE International Conference on Robotics and Automation (ICRA) 2024*

C2. Zhanchi Wang, **Gaotian Wang**, Xiaoping Chen, and Nikolaos M. Freris. 2023. “Dynamic Modeling and Control of a Soft Robotic Arm Using a Piecewise Universal Joint Model.” In *IEEE International Conference on Robotics and Biomimetics (ROBIO) 2023*

C1. Peijin Li, **Gaotian Wang**, Hao Jiang, Yusong Jin, Yinghao Gan, Xiaoping Chen, and Jianmin Ji. 2021. “A Q-Learning Control Method for a Soft Robotic Arm Utilizing Training Data from a Rough Simulator.” In *IEEE International Conference on Robotics and Biomimetics (ROBIO) 2021*

### Theses

T1. **Gaotian Wang**. A Randomized Kinodynamic Planner for Soft Robots based on Piecewise Universal Joint Model. Bachelor’s thesis, USTC, Hefei, China, 2022

## SCHOLARSHIPS AND CERTIFICATES

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2022	Mengzhilan (Dream Of Blue) China Aerospace Foundation Scholarship, USTC
2020	Outstanding Student Scholarship, <i>Gold</i> (Top 3%), USTC
2019	Endeavor Student Scholarship, USTC
2018	Yan Jici Talent Program Scholarship (Top 10%), USTC

## TEACHING

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FALL 2023	Teaching Assistant for <b>Algorithmic Robotics</b> COMP/ELEC/MECH 450/550 at Rice University
SPRING 2023	Teaching Assistant for <b>Deep Learning for Vision &amp; Language</b> COMP 646 at Rice University
FALL 2020-2022	In-lab Teaching Assistant for <b>College Physics-Comprehensive Experimentation</b> at University of Science and Technology of China