

Bohao Zhang

PHD CANDIDATE · ROBOTICS

University of Michigan, 2505 Hayward St, Ann Arbor, MI 48109

✉ jimzhang@umich.edu | 🏠 cfather.github.io/jimzhang.github.io/ | 🌐 linkedin.com/in/bohao-zhang-8815101ba/

Education

University of Michigan

PHD CANDIDATE IN ROBOTICS

- Advisor: Prof. Ram Vasudevan

Ann Arbor

Aug 2020 - May 2025 (anticipated)

University of Michigan

BS IN COMPUTER ENGINEERING

- Minor in Mathematics

Ann Arbor

Aug 2018 - May 2020

Shanghai Jiaotong University

BS IN ELECTRICAL & COMPUTER ENGINEERING

- Dual degree with University of Michigan

Shanghai

Aug 2016 - Aug 2020

Skills

Languages C++, MATLAB, CUDA, Python

Softwares Eigen, Pinocchio, fmincon, IPOPT, MuJoCo, PyBullet, PyTorch

Soft skills Professional academic communication, Project leadership, Independent research ability

Research Projects

Provably-Safe, Real-time Planning & Control For Bipedal Robots Using Reachability-Based Trajectory Design

2021 - present

WORKED ON AGILITY ROBOTICS' DIGIT-V3 HUMANOID ROBOT

- Generated a library of multiple-step gaits offline using nonlinear optimization toolbox Ipopt
- Applied a passivity-based robust controller to achieve bounded tracking error given model uncertainty
- Generated whole-body reachable sets for collision checking in real-time during online planning
- Leader of the project

Autonomous Robust Manipulation via Optimization with Uncertainty-aware Reachability

2021 - 2023

WORKED ON KINOVA GEN3 ROBOTIC ARM

- Applied a passivity-based robust controller to achieve bounded tracking error given model uncertainty
- Performed reachability-based planning to achieve guaranteed-safe performance
- Designed and implemented algorithms in CUDA for generating reachable sets and online real-time planning

Real-Time, Safe Motion Planning and Control for Manipulation of Unsecured Objects

2022 - present

WORKED ON KINOVA GEN3 ROBOTIC ARM

- Generated reachable sets of contact constraints to guarantee safety of manipulating unsecured objects
- Designed and implemented algorithms in CUDA for generating reachable sets and online real-time planning

Real-Time, Certified, Chance-Constrained Motion Planning using the Parallel Bernstein Algorithm

2020 - 2021

WORKED ON A TWO-WHEELED SEGWAY

- Applied parallel Bernstein algorithm to find the global optimum of the online optimization problem in real-time
- Implemented algorithms in CUDA for online real-time planning

Safe, Optimal, Real-time Trajectory Planning with a Parallel Constrained Bernstein Algorithm

2019 - 2020

WORKED ON A TWO-WHEELED SEGWAY

- Applied parallel Bernstein algorithm to find the global optimum of the online optimization problem in real-time
- Designed and implemented algorithms in CUDA for online real-time planning

Publications

PUBLISHED

Shreyas Kousik*, **Bohao Zhang***, Pengcheng Zhao*, Ram Vasudevan. 2021. Safe, Optimal, Real-time Trajectory Planning with a Parallel Constrained Bernstein Algorithm. IEEE Transactions on Robotics, vol. 37, no. 3, pp. 815-830.

Patrick Holmes, Shreyas Kousik, **Bohao Zhang**, Daphna Raz, Corina Barbalata, Matthew Johnson-Roberson, Ram Vasudevan. 2020. Reachable Sets for Safe, Real-Time Manipulator Trajectory Design. Robotics: Science and Systems.

IN REVIEW

Jonathan Michaux, Patrick Holmes, **Bohao Zhang**, Che Chen, Baiyue Wang, Shrey Sahgal, Tiancheng Zhang, Sidhartha Dey, Shreyas Kousik, Ram Vasudevan. 2023. Can't Touch This: Real-Time, Safe Motion Planning and Control for Manipulators Under Uncertainty. arxiv.org/abs/2301.13308 (submitted to IEEE T-RO)

Zachary Brei, Jonathan Michaux, **Bohao Zhang**, Patrick Holmes, Ram Vasudevan. 2023. Serving Time: Real-Time, Safe Motion Planning and Control for Manipulation of Unsecured Objects. arxiv.org/abs/2309.03111 (submitted to IEEE RA-L)

Awards & Fellowships

2018 & 2019 **Dean's list**, University of Michigan

2017 **Honorable Mention**, COMAP Mathematical Contest in Modeling

2016 **John Wu & Jane Sun Outstanding Scholarship**, Shanghai Jiaotong University

Outreach & Professional Development

SERVICE AND OUTREACH

2022 **Girls in Science and Engineering (WISE GISE) Summer Day Camp**, Mentor

PEER REVIEW

Reviewed one publication for IEEE Transactions on Robotics (T-RO)

Reviewed one publication for IEEE Transactions on Machine Learning in Communications and Networking (TMLCN)

Reviewed one publication for IEEE International Conference on Robotics and Automation (ICRA)