

Education

Carnegie Mellon University (CMU)

PH.D. CANDIDATE IN ELECTRONIC AND COMPUTER ENGINEERING

Pittsburgh, United States

Aug. 2023 - now

Tsinghua University (THU)

BACHELOR OF ELECTRONIC ENGINEERING

Beijing, China

Sep. 2019 - July 2023

Research Interests

My research interests lie at the intersection of **physics-based robot data generation** and the **understanding of generative models in control**.

Honors & Awards

2025	ICRA 2025 Best Paper Finalist , IEEE	Atlanta, GA
2024-2025	Hsu Chang Memorial Fellowship , Carnegie Mellon University	Pittsburgh, PA
2021-2022	National Scholarship (0.2%) , Tsinghua University	China
2020-2021	National Scholarship (0.2%) , Tsinghua University	China
2019-2020	National Scholarship (0.2%) , Tsinghua University	China
2020	First Prize (1%) , Chinese Undergraduate Students' Physics Competition	China
2020	First Prize (1%) , Hardware Design Competition	China
2021	Spark Innovative Talent Cultivation Program Member (2/256) , Tsinghua University	China
2022	Undergraduate Visiting Research Program Member (2/256) , Stanford University	Stanford
2022	Tsinghua University Future Scholar (1/256) , Tsinghua University	China

Publications (* equal contribution, † equal advising)

PREPRINTS

SPIDER: Scalable Physics-Informed Dexterous Retargeting

Chaoyi Pan*, Changhao Wang, Haozhi Qi, Zixi Liu, Homanga Bharadhwaj, Akash Sharma, Tingfan Wu, Guanya Shi[†], Jitendra Malik, Francois Hogan
arXiv preprint (2025). 2025

Whole-Body Model-Predictive Control of Legged Robots with MuJoCo

John Z Zhang, Taylor A Howell, Zeji Yi, **Chaoyi Pan**, Guanya Shi, Guannan Qu, Tom Erez, Yuval Tassa, Zachary Manchester
arXiv preprint (2025). 2025

CONFERENCE PROCEEDINGS

Learning Gentle Humanoid Locomotion and End-Effector Stabilization Control

Yunfei Li, Yuanhang Zhang, Wenli Xiao, **Chaoyi Pan**, Huazhe Weng, Guanqi He, Tairan He, Guanya Shi
Conference of Robot Learning, 2026

Much Ado About Noising: Dispelling the Myths of Generative Robotic Control

Chaoyi Pan, Giri Anantharaman, Nai-Chieh Huang, Claire Jin, Daniel Pfrommer, Chenyang Yuan, Frank Permenter, Guannan Qu, Nicholas Boffi, Guanya Shi, Max Simchowitz
International Conference on Learning Representations, 2026

ASAP: Aligning Simulation and Real-World Physics for Learning Agile Humanoid Whole-Body Skills

Tairan He, Jiawei Gao, Wenli Xiao, Yuanhang Zhang, Zi Wang, Jiashun Wang, Zhengyi Luo, Guanqi He, Nikhil Sobanbabu, **Chaoyi Pan**, Zeji Yi, Guannan Qu, Kris Kitani, Jessica Hodgins, Linxi "Jim" Fan, Yuke Zhu, Changliu Liu, Guanya Shi
Conference of Robot Learning, 2025

Full-Order Sampling-Based MPC for Torque-Level Locomotion Control via Diffusion-Style Annealing

Haoru Xue*, **Chaoyi Pan***, Zeji Yi, Guannan Qu, Guanya Shi
IEEE International Conference on Robotics and Automation, *Best Paper Final List*, 2025

Model-based Diffusion for Trajectory Optimization

Chaoyi Pan*, Zeji Yi*, Guanya Shi[†], Guannan Qu[†]
Advances in Neural Information Processing Systems, 2024

CoVO-MPC: Theoretical Analysis of Sampling-based MPC and Optimal Covariance Design

Zeji Yi*, **Chaoyi Pan***, Guanqi He, Guannan Qu[†], Guanya Shi[†]

Efficient Bimanual Handover and Rearrangement via Symmetry-Aware Actor-Critic Learning

Yunfei Li*, Chaoyi Pan*, Huazhe Xu, Xiaolong Wang, Yi Wu

IEEE International Conference on Robotics and Automation, 2023

In-Hand Manipulation of Unknown Shapes with Tactile Sensing

Chaoyi Pan*, Marion Lepert*, Shenli Yuan, Rika Antonova, Jeannette Bohg

IEEE/RSJ International Conference on Intelligent Robots and Systems, 2023

Flexible Decentralized Displacement-Based Formation Control: An Multi-agent Reinforcement Learning Approach

Chaoyi Pan, Yuzi Yan, Zexu Zhang, Yuan Shen

European Signal Processing Conference, 2022

Research Experience

Amazon Frontier AI and Robotics Lab

San Francisco, USA

RESEARCH INTERN

Jan 2026 - Present

- Working on understanding of action representation and large-scale behavior cloning data collection under supervision of Prof. Guanya Shi and Prof. Rocky Duan

Meta FAIR Embodiment & Actions Research Team

Pittsburgh, USA

RESEARCH SCIENCE INTERN

June 2025 - August 2025

- Developed **universal human to robot physics-based retargeting system** to convert raw human object interaction trajectory to feasible robot trajectory under supervision of Francois Hogan

Carnegie Mellon University

Pittsburgh, USA

PH.D. STUDENT

June 2023 - Present

- Developed **generative model for control**, bridging learning-based generative models with model-based control for contact-rich real-world tasks under supervision of Prof. Guanya Shi and Prof. Guannan Qu

Stanford Interactive Perception and Robot Learning Lab

Stanford, USA

SUMMER INTERN

June 2022 - September 2022

- Implemented **tactile-based in-hand manipulation system** using Bayesian optimization without object shape prior or vision information under supervision of Prof. Jeannette Bohg

Tsinghua WuLab

Beijing, China

RESEARCH ASSISTANT

September 2021 - June 2022

- Developed **bimanual coordination system** for handover and rearrangement tasks using structured reinforcement learning under supervision of Prof. Yi Wu

Tsinghua SLab

Beijing, China

RESEARCH ASSISTANT

October 2020 - September 2021

- Designed **decentralized formation control system** for mobile robots using MARL and Hausdorff distance under supervision of Prof. Yuan Shen

Academic Service

Reviewer

AAAI 2024, CoRL 2024, ICLR 2024, ICLR 2025, ACC 2025, CoRL2025, NeurIPS 2025, ICRA 2026, ICLR 2026

Skills

Programming Python, Jax, PyTorch, Matlab, C/C++

Robotics Tools Mujoco, IsaacGym, PyBullet, ROS, ROS2, Gazebo

Hardware Platforms Franka Emika Panda, Roller Grasper Dexterous Hand, Unitree Go2, Unitree H1, Unitree G1, Fourier GR-1

Drawing and Typesetting Photoshop, Illustrator, Office, \LaTeX

Invited Talks

CMU Locomotion Seminar

Pittsburgh, USA

FULL-ORDER SAMPLING-BASED MPC FOR TORQUE-LEVEL LOCOMOTION CONTROL VIA DIFFUSION-STYLE ANNEALING [LINK]

Oct. 2024

NTU CARTIN Seminar

Singapore

MODEL-BASED DIFFUSION FOR TRAJECTORY OPTIMIZATION AND MODEL-PREDICTIVE CONTROL

Nov. 2024