Xianyi Cheng

Email: xianyi.cheng@duke.edu
Website: https://xianyicheng.github.io

Duke University
Durham, NC 27708, United States

EXPERIENCE

Duke University
Incoming Assistant Professor — 2024 - present
Department of Mechanical Engineering & Materials Science

EDUCATION

Carnegie Mellon University
Ph.D. in Mechanical Engineering — 2019 - 2024
Advisor: Matthew T. Mason

Carnegie Mellon University
M.S. in Robotics, School of Computer Science — 2017 - 2019
Advisor: Matthew T. Mason

RESEARCH INTERESTS

Robotic Manipulation; Robot Dexterity; Dexterous and In-hand Manipulation; Planning, Control, Learning, and State Estimation with Contacts; Contact Mechanics; Force and Compliance Control

PUBLICATIONS

[1] **Characterizing Robustness in Manipulation through Energy Margin and Dynamic Caging Analysis**
Yifei Dong, Xianyi Cheng, Florian T. Pokorny
Robotics and Automation Letter (RAL), 2024

[2] **Enhancing Dexterity in Robotic Manipulation via Hierarchical Contact Exploration**
Xianyi Cheng, Sarvesh Patil, Zeynep Temel, Oliver Kroemer, Matthew T. Mason
Robotics and Automation Letters (RAL), 2023

[3] **Autogenerated Manipulation Primitives**
Eric Huang, Xianyi Cheng, Yuemin Mao, Arnav Gupta, Matthew T Mason
The International Journal of Robotics Research (IJRR), 2023

[4] **Learning Preconditions of Hybrid Force-Velocity Controllers for Contact-Rich Manipulation**
Jacky Liang, Xianyi Cheng, Oliver Kroemer
The Conference on Robot Learning (CoRL), 2022

[5] **Extrinsic Dexterous Manipulation with a Direct-Drive Hand: A Case Study**
Arnav Gupta, Yuemin Mao, Ankit Bhatia, Xianyi Cheng, Jonathan King, Yifan Hou, Matthew T Mason
International Conference on Intelligent Robots and Systems (IROS), 2022

[6] **Contact Mode Guided Motion Planning for Quasidynamic Dexterous Manipulation in 3D**
Xianyi Cheng, Eric Huang, Yifan Hou, Matthew T. Mason
IEEE International Conference on Robotics and Automation (ICRA), 2022

[7] **Contact Mode Guided Sampling-Based Planning for Quasistatic Dexterous Manipulation in 2D**
Xianyi Cheng, Eric Huang, Yifan Hou, Matthew T. Mason
IEEE International Conference on Robotics and Automation (ICRA), 2021

[8] **Efficient Contact Mode Enumeration in 3D**
Eric Huang, Xianyi Cheng, Matthew T. Mason
International Workshop on the Algorithmic Foundations of Robotics (WAFR), 2020

[9] **Manipulation with Suction Cups Using External Contacts**
Xianyi Cheng, Yifan Hou, Matthew T. Mason
International Symposium on Robotics Research (ISRR), 2019

[10] **Data-Efficient Process Monitoring and Failure Detection for Robust Robotic Screwdriving**
Xianyi Cheng, Zhengzhong Jia, Matthew T. Mason
IEEE International Conference on Automation Science and Engineering (CASE), 2019

[11] **Sensor Selection and Stage & Result Classifications for Automated Miniature Screwdriving**
Xianyi Cheng, Zhengzhong Jia, Ankit Bhatia, Reuben M Aronson, Matthew T. Mason
IEEE/RSJ International Conference on Intelligent Robots (IROS), 2018

[12] **WebArena: A Realistic Web Environment for Building Autonomous Agents**
Shuyan Zhou, Frank F. Xu, Hao Zhu, Xuhui Zhou, Robert Lo, Abishek Sridhar, Xianyi Cheng, Tianyue Ou, Yonatan Bisk, Daniel Fried, Uri Alon, Graham Neubig.
Agent Learning in Open-Endedness Workshop (ALOE), 2023

SELECTED HONORS & AWARDS

MIT EECS Rising Stars 2021
Foxconn Fellowship 2018

TEACHING

Dynamics, CMU 24-351, Undergraduate-level Fall 2022
Teaching Assistant and Instructor for Weekly Recitations
Robot Dynamics and Analysis, CMU 24-760, Graduate-level Fall 2021
Teaching Assistant and Instructor for Weekly Recitations

INVITED TALKS

Broadening Robot Dexterity: Leveraging Various Elements in Manipulation Task Environments
RoboGrads Seminar, Georgia Tech, *Hosted by Sonia Chernova* 2023
Intelligent Robot Lab, Brown University, *Hosted by George Konidaris* 2023
DAIR Lab, University of Pennsylvania, *Hosted by Michael Posa* 2023
Contact Mode Guided Motion Planning for Nonprehensile Dexterous Manipulation
The Machines in Motion Lab, New York University, *Hosted by Ludovic Righetti* 2022
R-PAD Lab, Carnegie Mellon University, *Hosted by David Held* 2022
AIRLab, Lehigh University, *Hosted by Jeff Trinkle* 2021

SERVICE

Reviewer at RAL, TRO, RSS, IROS, ICRA, Humanoids, MRS
Co-organizer of IROS Workshop on Leveraging Models for Contact-rich Manipulation 2023
Panelist of Women in MechE, Graduate School Application 2021

MENTORSHIP

Undergraduate Students: Yuemin Mao (CMU ME, now PhD Student at CMU Robotics), Karen Li (CMU CS), Leo Nicolussi (CMU ME)
Master Students: Tianxin Li (CMU ECE), Divya Aggarwal (CMU ECE), Elizabeth Amy Santoso (CMU ME), Yifu Jin (CMU ECE)

WORK EXPERIENCE

Applied Scientist Intern, **Amazon Robotics AI**, *Stow Team* 2022
- Developed manipulation motion strategies for stowing processes in warehouse automation
Research Intern, **ABB Robotics Research** 2020
- Developed deep learning vision algorithms for grasp planning