

YINKAI DONG

☎ 857-799-0336 ✉ yinkai@seas.harvard.edu 🌐 yinkai-dong.github.io 🐙 github.com/yinkai-dong

EDUCATION

Southern University of Science and Technology (SUSTech), China

B.Eng. in Robotics Engineering, Dept. of Mechanical and Energy Engineering

Sept. 2020 – June. 2024

Guangdong, China 518055

- Cumulative GPA: 3.81/4.0; Class Rank: 2/53

Massachusetts Institute of Technology, USA

MIT-SUSTech special student program (Non-degree)

Sept. 2022 – May. 2023

Cambridge, MA, USA 02139

- Secured funding of 500,000 RMB (approximately 70,000 USD) for this program.
- Enrolled in courses related to robotics and control systems.

PUBLICATIONS

- [1] **Dong, Y.**, Kim, J., Patel, V. V., Feng, H., and Dollar, A. M., "Model Q-II: An Underactuated Hand with Enhanced Grasping Modes and Primitives for Dexterous Manipulation," **submitted** to *IEEE International Conference on Robotics and Automation (ICRA)*, 19-23 May 2025, Atlanta, USA.
- [2] **Dong, Y.**; Zhang, W. Multi-Mode Compound Grasping Robot Finger Driven by Linkage. *Appl. Sci.* **2023**, *13*, 5550, <https://doi.org/10.3390/app13095550>
- [3] **Y. Dong** and W. Zhang, "A Novel Coupled and Self-adaptive Anthropomorphic Robot Finger with a Dual-oblique-Belt Mechanism," *2019 IEEE 4th International Conference on Advanced Robotics and Mechatronics (ICARM)*, Toyonaka, Japan, 2019, pp. 732-737, doi: 10.1109/ICARM.2019.8834231.

EXPERIENCES AND PROJECTS

Research Fellow at Harvard Ability Lab

Supervised by Prof. Patrick Slade

July 2024 – Present

Cambridge, MA, USA

📦 Human-in-Loop Optimization for Assistive Devices

- Developed human-in-loop optimization strategies integrating reinforcement learning to enhance assistive device performance.
- Apply adaptive control to optimize assistance parameters across various activities.

📦 Optimizing Hip Exoskeleton with Passive Ankle Exoskeleton

- Assisted in collecting and processing metabolic, electromyography (EMG), and motion data for **human-in-loop optimization**.
- Leveraged thigh IMU and ankle angle data for real-time gait state estimation, enhancing exoskeleton responsiveness and adaptability across different gait modes and speeds.
- Optimized torque profiles to achieve a balanced distribution of assistance between the hip and ankle, focusing on improving walking speed, gait cycle efficiency, and user-specific performance metrics.

Research Assistant at Yale GRAB Lab

Supervised by Prof. Aaron Dollar

Aug. 2023 – Feb. 2024

New Haven, CT, USA

📦 Enhanced Robotic Gripper Design with Integrated Multi-functional Capabilities

- Designed and implemented the MulCAM gripper, an advanced underactuated robotic gripper capable of multiple grasping modes, including pinch, tripod, quadpod, and power grasping.
- Conducted experimental validation, demonstrating the gripper's efficacy in precision tasks, power-driven operations, and complex in-hand manipulative tasks.

UROP at MIT Newman Lab for Bio-mechanics and Human Rehabilitation

Supervised by Prof. Neville Hogan

Sept. 2022 – May. 2023

Cambridge, MA, USA

📦 Impedance Control Implementation on MuJoCo and Baxter Robot

- Implemented joint space, task space, and operational space impedance control on MuJoCo and the Baxter robot.
- Investigated issues related to redundancy, repeatability, and singularity in the context of impedance control.
- Conducted a comparative analysis of the impedance controller with the operational space controller.

📦 Identifying Unknown Inertial Parameters of Robotics using Machine Learning

- Implemented impedance control on MuJoCo, and quantified sim-to-real differences.
- Developed an adaptive control-based machine learning model to identify unknown friction and inertia parameters by leveraging sim-to-real differences.

College Students' Innovative Project at SUSTech

Supervised by Prof. Jian S. Dai

April 2022 - Present

Guangdong, China

- Secured research funding of 10,000 RMB (approximately 1,500 USD) for the project.

Adaptive Friction and Origami-based Underactuated End-effector

- Investigated a biomimetic surface for autonomous friction adjustment, using the Miura-ori origami mechanism.
- Combined the biomimetic surface with the underactuated gripper for enhanced adaptability and friction control.

Research Intern at Tsinghua University

Sept. 2018 – August 2023

Supervised by Professor Wenzeng Zhang

Beijing, China

Under-actuated Active Adaptive Parallel Robotic Hand with Linear Trajectory

- Designed a parallel grasping gripper using the Watt linkage mechanism for an approximated linear trajectory.
- Selected as a candidate for the 2023 ASME Student Mechanism and Robot Design Competition.

Multi-mode Compound Grasping Robot Finger

- Explored methods for combining multiple grasping modes, including parallel, coupling, and self-adaptive grasping.
- Published work in Applied Sciences.

Coupled and Self-adaptive Prosthetic Hand

- Developed a prosthetic hand with a tension mechanism to grasp objects using human-like motion.
- Selected for the International Science and Engineering Fair 2020 China Delegation.

GRANTED PATENTS

- [1] **Y. Dong**, W. Zhang. "Sliding groove double-transmission-belt linear parallel clamping self-adaptive robot finger device", *Chinese Invention Patent*, CN109571519B, 2023 Dec. 15.
- [2] **Y. Dong**, W. Zhang. "Series-parallel hybrid connecting rod linear parallel clamping self-adaptive robot finger device", *Chinese Invention Patent*, CN113400289B, 2022 Apr. 15.
- [3] **Y. Dong**. "Connecting rod type three-path parallel linear parallel clamping self-adaptive robot finger device", *Chinese Invention Patent*, CN113386115B, 2022 Mar. 18.
- [4] **Y. Dong**, W. Zhang. "Three-joint linear parallel clamping self-adaptive under-actuated robot finger device", *Chinese Invention Patent*, CN216030859U, 2022 Mar. 15.
- [5] **Y. Dong**, W. Zhang. "Parallel-connection-rod double-shifting-block linear parallel clamping self-adaptive robot finger device", *Chinese Utility Model Patent*, CN216030860U, 2022 Mar. 15.
- [6] **Y. Dong**, W. Zhang. "Multi-path differential linear parallel clamping double-finger-section self-adaptive robot finger device", *Chinese Utility Model Patent*, CN216030858U, 2022 Mar. 05.
- [7] **Y. Dong**, W. Zhang. "The connecting rod cooperatively drives multi-mode composite grabbing robot finger device", *Chinese Utility Model Patent*, CN212706822U, 2020 Sept. 02.

AWARDS AND HONORS

Top 10 Undergraduate Graduate for exceptional performance in the SUSTech	June 2024
Top Ten Undergraduate Graduates of the School of Engineering	June 2024
The Excellence Award of the "Guo Xie Birong Scholarship" at SUSTech \$ 1500	May 2024
Excellent Undergraduate Thesis Award	June 2024
MIT 2.12 Most Valuable Engineering Award	May 2023
ASME Student Mechanism and Robot Design Competition Third Place winner	May 2023
Chinese University Students' Star of Perseverance National Awards	Oct. 2022
• Honoring college students who have overcome hardships, embody the spirit of resilience, and inspire their peers.	
College Students' Outstanding Art Troupe Performance First Prize, Provincial Award	Sept. 2022
First prize of excellent scholarship \$1000	Nov. 2021, Nov. 2022
• Reward the top 5% of undergraduate students in comprehensive evaluation.	
International Science and Engineering Fair (ISEF) Third Place winner	May 2020
• Represented China as part of the delegation at the world's premier pre-college STEM competition.	
19th Awarding Program for Future Scientists Second Prize, National Awards	Nov. 2019

EXTRACURRICULAR

Bass Section leader, SUSTech Chorus	Fall 2021 – Spring 2022
Presidium Member, Minghang Education Support Society	Spring 2021 – Spring 2022
Campus Ambassador for the Teach for China Program	Spring 2021 – Spring 2024
Community Service Engagement	Fall 2020 – Present
• Accumulated over 120 hours of dedicated volunteer service.	

TECHNICAL SKILLS

Programming Languages: Python, Java, MATLAB, MuJoCo
Developer Tools: VS Code, AutoCAD, Solidworks, ABAQUS