

Gregory Xie

Full-stack roboticist focusing on robot hand design, with experience spanning from mechanisms to software. Expert at optimizing high performance robots by systems integration and tightly coupling electromechanical design to software and controls.

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Experience

Robotics and AI Institute

June 2023 - Present

Roboticist

- Led the design of tendon-driven, underactuated and fully articulated hands with tactile sensing, ranging from 3-9 actuators and 6-12 DoF
- Led the design of a forearm with a 2 DoF parallel wrist and also housing finger actuators, used FEA to optimize for size, weight, and strength using loads extracted from robot simulations
- Designed and integrated rotary and linear quasi-direct drive finger and wrist actuators ranging from 20 - 40mm in diameter
- Designed a handheld, hand evaluation platform allowing for quick evaluation of hands via grasp synergy based teleoperation
- Performed workspace analysis and optimization for a bimanual manipulator, optimized motor sizing/gearing and determined design requirements (structure and bearing loads, power supply impedance, etc) through trajectory optimization
- Developed simplified models to investigate the effects of various parameters (friction, mass, latency, etc) on the dynamic performance of hands
- Developed simulation tools to evaluate candidate hand morphologies and kinematics
- Created detailed part drawings using GD&T, performed tolerance analyses to ensure accurate and repeatable assemblies

MIT CSAIL (PI: Prof. Daniela Rus)

Sep 2022 - May 2023

Graduate Research Assistant

- Designed two robotic grippers for in-hand manipulation and grasp proprioception, resulting in publications [3, 4]

Realtime Robotics

Sep 2022 - May 2023

Robotics Software Engineering Intern

- Developed planning, filtering, and simulation features for a motion planning stack interfacing with industrial robot arms (Kuka, Fanuc, Mitsubishi, etc)

Nimble Robotics

June 2021 - Aug 2021

Mechatronics Intern

- Wrote firmware for BLDC motor drivers, improving actuator torque accuracy and field weakening performance
- Built electromechanical and thermal models of actuators using a dynamometer

Formlabs

June 2020 - Aug 2020

Mechanical Engineering Intern

- Designed and ran lifetime and design verification tests for the Form Wash L and Form Cure L
- Created part and assembly drawings

MIT CSAIL (PI: Prof. Daniela Rus)

June 2019 - June 2021

Undergraduate Research Assistant

- Designed modular expanding robots, resulting in publications [2, 5]

Education

2022 - 2023 Massachusetts Institute of Technology

M. Eng. in Electrical Engineering and Computer Science (GPA: 5.0/5.0)

2018 - 2022 Massachusetts Institute of Technology

B.S. in Electrical Engineering and Computer Science and B.S in Mechanical Engineering (GPA: 5.0/5.0)

Patents and Publications

[1] Xie, G and Rojas, N. Wrist Mechanism for a Robot Arm U.S. Patent Application 19/043,948, filed February 3, 2025.

[2] Chin, L., Xie, G., Lipton, J., Rus, D. "Large-Expansion Bi-Layer Auxetics Create Compliant Cellular Motion" in *IEEE ICRA*. 2025

[3] Xie, G., Chin, L., Kim, B., Holladay, R., Rus, D. "Strong Compliant Grasps Using a Cable-Driven Soft Gripper" in *IEEE IROS*. 2024

[4] Xie, G., Holladay, R., Chin, L., Rus, D. "In-Hand Manipulation With a Simple Belted Parallel-Jaw Gripper" in *IEEE RA-L*. 2024

[5] Chin, L., Burns, M.*, Xie, G.*, Rus, D. "Flipper-Style Locomotion through Strong Expanding Modular Robots" in *IEEE RA-L*. 2023

Areas of Expertise

Mechanical and Electrical

CAD (Solidworks, Onshape), FEA (Ansys), GD&T, DFM/DFA, KiCAD, LTSpice

Programming

Python, C++, MATLAB

Robotics

Robot kinematics, modeling, computational design optimization, MuJoCo, Drake