# 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.

📍 Cambridge, MA

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## Experience

*Robotics and AI Institute*　　　　　*June 2023 - Present*

**Roboticist**

- Designed tendon-driven, underactuated and fully articulated hands with tactile sensing, ranging from 3-9 actuators and 6-12 DoF
- Designed 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

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|---|---|
| **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** |