

EDUCATION:

Georgia Institute of Technology, Atlanta, GA 2017-2023
Ph.D in Robotics, researching robotic grippers and dexterous manipulation, GPA 3.91
University of Rochester, Rochester, NY 2013-2017
B.S. Mechanical Engineering, Minor in Computer Science; Magna Cum Laude, GPA 3.91

RESEARCH AND WORK EXPERIENCE:

Research Scientist, Applied Research Associates, Randolph, VT Summer 2023-Present

- Worked on system health and data recording project to interface with and manage various sensors and actuators
- Integrated 6-DOF Fanuc arm onto robotic vehicle platform and developed autonomous motion control schemes and guarded teleoperation with custom controller and custom hook end effector
- Assisted with development of software for 5-DOF vehicle motion simulator

Doctoral Research, Georgia Institute of Technology, Atlanta, GA 2017-2023

- Compliant Underactuated Grasping
 - o Designed soft robotic mechanism for controllable-stiffness gripper joints
 - o Created underactuated hand prototype with optimized controllable synergies
 - o Wrote computer vision software to track robotic fingers in 3D space
 - o Developed methodology for characterization of soft nonlinear devices
 - o Used soft device characterization to estimate kinetics from known device kinematics
 - o Wrote simulator add-on to accurately simulate motions of soft compliant underactuated hand
 - o Optimized gripper design based on grasp performance
- Wearable Devices
 - o Integrated EMG and ultrasound sensors to control prosthetic devices
 - o Characterized motions of pneumatic artificial muscles (PAMs) in cable-driven system
 - o Developed strategies to use PAMs in wearable device in parallel with human motions
 - o Characterized stretch and slip in system and designed controller to mitigate effects
 - o Built pneumatic controllers to achieve desired actuator motions
 - o Designed device to assist finger flexion and extension while minimizing grasp interference
- General Lab Work/ Smaller Projects
 - o Developed 3D printing methods for simultaneous printing of flexible and rigid components
 - o Mentored undergraduates on smaller research projects

Graduate Intern, RightHand Robotics, Somerville, MA Summer 2022

- Worked on motion tracking for steerable cameras to follow the path of piece-picking robot
- Integrated new device into the main robot system and state machine
- Successfully demonstrated the ability to track and capture data in motion, speeding up workflow

Graduate Intern, Nvidia Robotics Research Lab, Seattle, WA Summer 2020

- Simulated newly designed fully-actuated robotic hand with soft finger pads using soft materials simulator
- Helped debug novel simulator incorporating both soft and rigid structures
- Worked on machine learning process to control hand and virtual arm trajectories during grasping
- Developed control strategies to pick up flat objects by leveraging soft finger pad properties

Teaching Assistant, Georgia Institute of Technology, Atlanta, GA 2019-2023

- Lead weekly lab sections for ME 4056: Systems Laboratory and ME 4405: Fundamentals of Mechatronics
- Ensured student safety and understanding of the material
- Consulted on mechatronics project feasibility and methodology

Undergraduate Research, University of Rochester, Rochester, NY 2016-2017

- Worked in lab on opto-mechanical machinery
- Updated and created GUIs to calibrate and interface with machines
- Built and managed database interface for lab testing data
- Ran study on transient effects of laser writing on hydrogel

Robotics in the Real World REU, Oregon State University, Corvallis, OR Summer 2016

- Researched fluidic ankle actuation for bipedal walking and running robot
- Designed gerotor pump and designed actuation test setup to prove concept of offset-mass hydraulic actuation

Summer Intern, Alcoa, New Kensington, PA Summer 2015

- Designed various parts for continuous pressure casting machine
- Observed and learned about many different types of manufacturing processes

OTHER EXPERIENCE:

*Robograde*s, Georgia Institute of Technology: Treasurer 2018-2020

- Planned and managed budget for organization of graduate students performing research in robotics field
- Planned lectures and various social events

Baja SAE, University of Rochester: Club Member and Head of Manufacturing 2013-2017

- Led frame and suspension manufacturing for club-designed all-terrain vehicle
- Instructed new members in tool use and safety measures
- Designed gear webbing to reduce weight
- Met with sponsors and convinced them to continue sponsoring team

PUBLICATIONS AND PRESENTATIONS:

- “Contact Force and Synergy Matrix Estimation for Compliant Underactuated Soft Robotic Hands” [submitted], E. Fox and F. L. Hammond, *Soft Robotics Journal*, Spring 2023
- “Soft Variable Stiffness Joints for Controllable Grasp Synergies in Underactuated Robotic Hands,” E. Fox and F. L. Hammond, *IEEE International Conference on Soft Robotics (RoboSoft)*, 2020
- “Towards Sonomyography-Based Real-Time Control of Powered Prosthesis Grasp Synergies,” K. Bimbraw, E. Fox, G. Weinberg and F. L. Hammond, *International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 2020
- “Sonomyography-Based Real-Time Hand Grasp Configuration Identification via Supervised Learning to Control a Soft Robotic Gripper” [poster presentation], K. Bimbraw, E. Fox, G. Weinberg and F. L. Hammond, *International Symposium on Medical Robotics*, 2019

SKILLS:

- Programming: MATLAB, Python, C, C++
- Software/OS: ROS/ROS2, Git, Docker, Linux
- Simulation: PyBullet, Isaac sim
- Computer vision
- Data analysis
- CAD and FEA: Solidworks, NX
- Mechanical testing
- Prototyping and Fabrication
- 3D printing