

# Vi T. Vo

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## TECHNICAL SKILLS

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**Programming:** MATLAB, Python, Python (NumPy, Pandas, scikit-learn, OpenCV, TensorFlow), LaTeX, C/C++, JavaScript

**Software:** SolidWorks, PCB Design (KiCad, EAGLE), Adobe Creative Cloud, LabVIEW, ABAQUS, Microsoft Suite

**Hardware Platforms:** Arduino, Raspberry Pi, Universal Robot Arm, ATI Force/Torque Sensor, NI DAQ, Electromagnetic (EM) Tracker

**Prototyping and Fabrication Equipment:** FDM & SLA 3D printing, CO<sub>2</sub> laser Cutting, UV laser micro-machining, Heat Press, Vinyl Cutting, Water Jet Cutting, Soldering, Instron, Soft Materials Processing (e.g., vacuum chambers, heat sealers, molding/casting tools)

## RELEVANT EXPERIENCE

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### Morphable Biorobotics Lab, Boston University

09/2023 – Present

Graduate Student Researcher | Advisor: Prof. Tommaso Ranzani

Boston, MA

- Designed a low-profile, electropermanent magnet (EPM) valves to enable decentralized control of fluidic actuators. Optimized driving electronics and custom PCB layouts to handle high-current transient loads during switching.
- Developed a bio-inspired artificial camouflage system featuring a photochromic dye delivery module and a custom LED illumination array for programmable color modulation. Implemented a Python-based computer vision pipeline and predictive models to autonomously synchronize the system's color with surrounding environment.
- Characterized the frequency response of variable-stiffness jamming metal sheets for tunable structural damping and stiffness modulation. Developed an automated computer vision pipeline to extract oscillation data from high-speed video, quantifying damping ratios and mechanical settling times across varying layer configurations.
- Developed a multi-modal sensor suite for origami-inspired fluidic actuators, integrating IMUs and optoelectronic force sensors to enable high-fidelity state estimation during ground-contact phases. Implemented a Jacobian-based, closed-loop controller for tip-trajectory tracking, facilitating the use of soft actuators as functional limbs for soft robotic locomotion.
- Developed high-force, fiber-reinforced bellow actuators using a layer-by-layer fabrication process involving heat-sealable textiles and laser machining. Conducted mechanical bench testing and material characterization to validate reinforcement strategies, achieving an 88.2% increase in pushing force and a 39.5% increase in pulling force.

### Preston Innovation (PI) Lab, Rice University

09/2021 – 08/2023

Undergraduate Researcher | Advisor: Prof. Daniel J. Preston

Houston, TX

- Designed sheet-based fluidic diodes using a layered fabrication process with heat-sealable textiles, enabling mechanical computation and fluidic logic for electronics-free control of soft devices.

### Interaction Lab, University of Southern California

06/2022 – 08/2022

Robotics and Autonomous Systems REU Student | Advisor: Prof. Maja Mataric

Los Angeles, CA

- Adapted the open-source soft social robot Blossom as a study companion for students with ADHD by developing a programming interface for user-defined behaviors and prototyping crochet appendages to enhance social and functional perception.

### Damage Poromechanics Laboratory, Georgia Institute of Technology

05/2020 – 08/2020

Undergraduate Student Researcher | Advisor: Prof. Chloé Arson

Atlanta, Georgia (Remote)

- Developed an algorithm to calculate the normal vectors of the tangent plane for a selected face of aggregates to maximize contact area between adjacent aggregates.

## RELEVANT PUBLICATIONS

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### Peer-reviewed Journal Publications

- J6. **V.T. Vo\***, H.C. Lee\*, Y. Zhu, S. Mueller, S. Russo, T. Ranzani, "Color Modulation using Photochromic Dye in Hydraulic Actuators for Environmental Blending," *in preparation*. \*equal contribution
- J5. **V.T. Vo**, J. Hutchison, E.A. Davis, Y. Wang, T. Ranzani, "Contact-Guided Tip Motion Control of Sensorized Soft Limb," *under review*.
- J4. S.Y. Lee, L. Zamora Yañez, J. Rogatinsky, **V.T. Vo**, T. Shingade, T. Ranzani, "Simplifying Data-Driven Modeling of the Volume-Flow-Pressure Relationship in Hydraulic Soft Robotic Actuators," *IEEE Robotics and Automation Magazine*, 2026.
- J3. L.T. Gaeta, **V.T. Vo**, S.Y. Lee, S. Raste, M. Venkatesam, J. Rogatinsky, M.D. Albaryrak, T. Ranzani, "Jamming Metal Sheets Using Electropermanent Magnets for Stiffness Modulation," *IEEE Robotics and Automation Letters*, 10(8), 2025.

- J1. A.M. Moran\*, V.T. Vo\*, K.J. McDonald, P. Sultania, E. Langenbrunner, J.H.V. Chong, A. Naik, L. Kinnicutt, J. Li, T. Ranzani, "An Electropermanent Magnet Valve for the Onboard Control of Multi-Degree of Freedom Pneumatic Soft Robots," *Nature Communications*, 3(1), 2024. \*equal contribution

## TEACHING EXPERIENCE

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### Graduate Student Teacher, Boston University ME 416

Fall 2024

*ME 416: Intro to Robotics.* Developed the course project, including the full written assignment, grading rubric, and structured checkpoints aligned with course outcomes. Delivered lectures to guide students through MATLAB-based robotics programming and Robotics Toolbox workflows.

### Seminar Speaker, Boston University RASTIC

Fall 2025

*RASTIC Soft Robotics Seminar.* Delivered an invited lecture at Boston University's Robotics and Autonomous Systems Teaching and Innovation Center (RASTIC), providing an overview of simulation and control strategies for soft robots. Covered modeling tradeoffs, real-time control architectures, and application-driven approaches for sensorized actuators and compliant systems.

### Graduate Student Teacher, Boston University ME 310

Fall 2024

*ME 310: Instrumentation and Measurement Techniques.* Supervised students during lab experiments involving oscilloscope use, circuit design, data analysis, and sensor characterizations for RTDs, thermistors, and strain gages. Deliver in-class exercises on signal conditioning and processing, focusing on statistical data analysis including on uncertainty quantification and linear regression to validate sensor performance and reliability; guided students through force sensor calibration using LabQuest DAQ systems.

## EDUCATION

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### Boston University, PhD Mechanical Engineering

Sept. 2023 – Present

Advised by *Prof. Tommaso Ranzani*

*Boston, MA*

### Rice University, BS Mechanical Engineering

Aug. 2019 - May 2023

Minor in Computational and Applied Mathematics and Operations Research (CMOR)

*Houston, TX*

## INTERESTS

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Endurance/Long-distance running, Cooking and baking, Badminton, Creative design and photo editing