Milad Azizkhani

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Education

Georgia Institute of Technology — *Atlanta, GA, USA*
Ph.D. in Robotics *GPA: 4/4* — *2022-2026 est.*

Amirkabir University of Technology (AUT) — *Tehran, Iran*
M.Sc. in Mechatronics Engineering *GPA: 17.28/20-3.63/4* (Ranked 2nd in program) — *2017-2020*

Bu Ali Sina University — *Hamedan, Iran*
B.Sc. in Mechanical Engineering *GPA: 16.62/20 – 3.48/4* (Ranked 3rd in program) — *2013-2017*

Research Interests

I design, build, model, control, and integrate robots for various applications. My primary objective is to develop innovative control methods that synergize model-based and learning approaches. My research, both current and past, revolves around **Adaptive Control, Control Theory, Learning-Based Control, Optimal Control, Trajectory Optimization, Robot Learning, Imitation Learning, Reinforcement Learning, Deep Learning, Soft Robots, Continuum Robots**, and **Visual Servoing**.

Honors and Awards

- **Flowers Family Topping Fellowship** — *Fall 2024, Georgia Institute of Technology*
  Awarded by the Mechanical Engineering Department for achieving the highest number of first-author citations.

Publications

Journal Published

- **[J1]** **M. Azizkhani**, I. S. Godage, and Y. Chen, "Dynamic control of soft robotic arm: A simulation study," in *IEEE Robotics and Automation Letters* (with presentation at ICRA), vol. 7, no. 2, pp. 3584-3591.
- **[J2]** **M. Azizkhani**, M. Zareinejad, and M. A. Khosravi, "Model reference adaptive control of a soft bending actuator with input constraints and parametric uncertainties," in *Mechatronics*, vol. 84, pp. 102800, Elsevier.
- **[J3]** **M. Azizkhani**, A. L. Gunderman, I. S. Godage, and Y. Chen, "Dynamic control of soft robotic arm: An experimental study," in *IEEE Robotics and Automation Letters*, vol. 8, no. 4, pp. 1897-1904.
- **[J4]** J. Shen, Y. Wang, **M. Azizkhani**, D. Qiu, and Y. Chen, "Concentric Tube Robot Redundancy Resolution via Velocity/Compliance Manipulability Optimization," in *IEEE Robotics and Automation Letters*, vol. 8, no. 11, pp. 7495-7502.
- **[J5]** A. L. Gunderman, **M. Azizkhani**, S. Sengupta, K. Cleary, and Y. Chen, "Modeling and Control of an MR-Safe Pneumatic Radial Inflow Motor and Encoder (PRIME)," in *IEEE/ASME Transactions on Mechatronics*, 2023, Early Access, doi: 10.1109/TMECH.2023.3329296.

Conference Published

- **[C1]** **M. Azizkhani** and Y. Chen, "Supervised Adaptive Fuzzy Control of LVAD with Pulsatility Ratio Modulation," in *2022 IEEE 18th International Conference on Automation Science and Engineering (CASE)*, pp. 2429-2434.
- **[C2]** A. Qiu, C. Young, A. L. Gunderman, **M. Azizkhani**, Y. Chen, and A.-P. Hu, "Tendon-Driven Soft Robotic Gripper with Integrated Ripeness Sensing for Blackberry Harvesting," in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 11831-11837.
- **[C3]** A. L. Gunderman, **M. Azizkhani**, S. Sengupta, K. Cleary, and Y. Chen, "Open Source MR-Safe Pneumatic Radial Inflow Motor and Encoder (PRIME): Design and Manufacturing Guidelines," in *2023 International Symposium on Medical Robotics (ISMR)*, pp. 1-7.

In Preparation and Submitted

- **M. Azizkhani**, J. Ha, A. L. Gunderman, and Y. Chen, "Soft Robot Kinematic Control via Manipulability-Aware Redundancy Resolution". Submitted to *ASME Journal of Mechanisms and Robotics.*
- **M. Azizkhani**, and Y. Chen, "Dynamic Task Space Control of a Redundant Pneumatically Actuated Soft Arm". Submitted to *IEEE Robotics and Automation Letters.*
- A. L. Gunderman, Y. Wang, B. O. Gunderman, A. Qiu, **M. Azizkhani**, J. Sommer, and Y. Chen, "Kinetostatics and Retention Force Analysis of Soft Robot Grippers with External Tendon Routing," Submitted to *IEEE Robotics and Automation Letters*.

Skills

Programming:

MATLAB, Python, C++, C, Git & Github, Linux, LaTeX

Technologies & Tools:

ROS, TensorFlow, PyTorch, StableBaseline3, Drake, MuJuCo, PyBullet, OpenCV, Arduino, Simulink, LabVIEW, Maple, Mathematica, SolidWorks, ABAQUS, ANSYS, FlowCode, MoCap

Experience

Georgia Institute of Technology, Atlanta, GA, USA 2022 - Present

Senior Graduate Research Assistant, BioMedical Mechatronics (BM2) Lab

- **Research:**
  - Dynamic Task Space and Joint Space Control of Redundant Pneumatically Soft Robotic Arm
  - Gain Scheduled Redundancy Resolution Resolved Rate Kinematic Control for a Redundant Pneumatically Soft Robotic Arm
  - Control of MR-SAFE Pneumatic Radial Inflow Motor
  - Supervised Adaptive Fuzzy Control of Left Ventricular Assistive Devices
- **Teaching and Supervision Responsibilities:**
  - TA for VIP course, Soft Elbow Rehabilitation Device Development.
  - Senior Mentor for Graduate Students
    * Locomotion + Manipulation control of Cassie+Soft Arm using Reinforcement Learning (Kanishk Kanishk)
    * Soft Underwater Robot with Shape Memory Alloy Actuation (Thanapol Tantagunninat)
    * Tendon Driven Continuum Robot (Man Wo Lui)
  - Senior Mentor for Undergraduate Students
    * Soft Gripper (Alex S. Qiu)
    * Design rotary encoder for soft robot elongation measurement (Nyah M. Ebanks)
    * Solving forward and inverse kinematic with machine learning (Benjamin Gunderman)

University of Arkansas, AR, USA 2021 - 2022

Senior Graduate Research Assistant, Medical Robotics Lab (Advisor: Yue Chen)

- Projects: Dynamic Control of Soft Robotic Arm, Left Ventricular Assistive Devices, Redundancy Resolution.

New Technologies Research Center, Amirkabir University of Technology, Tehran, Iran 2017 - 2020

Research Assistant, Soft Robotics Lab

- Control of a Soft Longitudinal Actuator Using MPC-NN Approach.
- Design and Build Longitudinal and Bending Soft Actuator Experimental Setups.
- Robust Model Reference Adaptive Control of a Soft Bending Actuator with Input Constraints.
- Adaptive Control of Soft Bending Actuator Using Modified Adaptive + RISE Control.

Amirkabir University of Technology, Tehran, Iran 2018 - 2019

Mechatronics Engineer of a research team working on MotoGP Simulator

- Control of a simulator using Arduino and AVR.

Bu Ali Sina University, Hamedan, Iran 2016

Instructor

- Introduction on SolidWorks

Professional Service

Membership:

Robo Public Relation Vice President (RoboGrads in GT)

Graduate Student Member in Institute of Electrical and Electronics Engineers (IEEE)

IEEE Young Professionals

IEEE Robotics and Automation Society

Technical Reviews:

IEEE Robotics and Automation Letters (RA-L), IEEE Access, IEEE Transaction on Haptics, IEEE Transaction on Automation Science and Engineering, Nonlinear Dynamics, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE International Conference on Robotics and Automation (ICRA), IEEE International Symposium on Medical Robotics (ISMR), Scientific Reports