

# Fuchen Chen

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## EDUCATION

PhD Candidate (defended), Systems Engineering

January 2021 – December 2025 (expected)

Arizona State University, Mesa, AZ

Dissertation: Toward Informed Optimal Design of Task-Aware Robots

Master of Science, Robotics Engineering

August 2016 - December 2017

Worcester Polytechnic Institute, Worcester, MA

Bachelor of Science, Robotics Engineering

August 2012 - May 2016

Worcester Polytechnic Institute, Worcester, MA

## RESEARCH EXPERIENCE

**Graduate Research Assistant**, IDEA Lab, Arizona State University, Mesa, AZ

January 2021 - Present

Advisor: Professor Daniel M. Aukes

- Designed and built a quadruped robot's hardware and software architecture to study the effect of leg design parameters, including leg length, gear ratio, and stiffness, on locomotion performance.
- Developed and deployed simulation environments and reinforcement learning frameworks with MuJoCo and PyTorch for controlling the quadruped and testing its leg designs in the real world.
- Created a planar linkage synthesis tool with PyTorch to generate multi-DoF multi-bar designs in minutes.
- Designed and conducted experiments with a robot arm, a load cell, and a motion capture system to collect data for system identification, performance validation, and model improvement.
- Modeled, optimized, and validated leg designs for faster and more efficient locomotion.
- Authored multiple published papers in top robotics venues (IJRR, ICRA, IROS).

**Research Assistant**, Soft Robotics Lab, Worcester Polytechnic Institute, Worcester, MA May 2013 - May 2016

Advisor: Professor Cagdas Onal

- Developed an origami-inspired fabrication method to design low-cost, lightweight legged and aerial robots.
- Designed and fabricated soft pneumatic actuators with integrated sensors for robotic snake research.
- Coauthored multiple published papers and helped secure further funding.

## PROFESSIONAL EXPERIENCE

**Robotics Internship**, Robotics and AI Institute, Cambridge, MA

June 2024 - September 2024

Advisor: Professor Aaron M. Dollar

- Explored, designed, built, and evaluated various hydraulic transmission systems for robotics applications.
- Constructed and programmed a testing platform to collect displacement and force data to characterize the transmission systems' friction, damping, and stiffness.
- Designed a rolling diaphragm cylinder with over 10 times the stroke length and nearly 5 times less friction than a commercial off-the-shelf option.

**Cofounder**, Orimagi, Inc., Boston, MA

December 2017 - December 2020

- Commercialized my origami-inspired robot research into an educational robot toy product and sold over 1000 sets to families and schools.
- Developed, playtested, and iterated all technical aspects of the product, including the mechanical parts, PCBs, firmware, Android and iOS apps, and packaging.
- Contacted and worked with manufacturers to mass-produce and certify the product.

## SELECTED PUBLICATIONS

- **F. Chen** and D. M. Aukes, “Informed Repurposing of Quadruped Legs for New Tasks,” in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, May 2025, pp. 2584–2590.
- **F. Chen** and D. M. Aukes, “Curating Tunable, Compliant Legs for Specialized Tasks,” *The International Journal of Robotics Research*, May 2025.
- W. Tao, **F. Chen**, Y. Xu, A. Johnson, and W. Zhang, “Bistable Inflatable Fabric Actuators to Amplify Force and Energy Output for In-Pipe Soft Robots,” *IEEE/ASME Transactions on Mechatronics*, pp. 1–12, 2025.
- **F. Chen**, W. Tao, and D. M. Aukes, “Development of A Dynamic Quadruped with Tunable, Compliant Legs,” in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Detroit, MI, USA: IEEE, Oct. 2023, pp. 495–502.
- Y. Jiang, **F. Chen**, and D. M. Aukes, “Tunable Dynamic Walking via Soft Twisted Beam Vibration,” *IEEE Robot. Autom. Lett.*, vol. 8, no. 4, pp. 1967–1974, Apr. 2023.
- **F. Chen** and D. M. Aukes, “Direct Encoding of Tunable Stiffness Into an Origami-Inspired Jumping Robot Leg,” *Journal of Mechanisms and Robotics*, vol. 16, no. 3, Mar. 2023.
- M. Luo *et al.*, “Toward Modular Soft Robotics: Proprioceptive Curvature Sensing and Sliding-Mode Control of Soft Bidirectional Bending Modules,” *Soft Robotics*, vol. 4, no. 2, pp. 117–125, Jun. 2017.
- S. G. Faal, **F. Chen**, W. Tao, M. Agheli, S. Tasdighikalat, and C. D. Onal, “Hierarchical Kinematic Design of Foldable Hexapedal Locomotion Platforms,” *Journal of Mechanisms and Robotics*, vol. 8, no. 1, Aug. 2015.
- M. Agheli, S. G. Faal, **F. Chen**, H. Gong, and C. D. Onal, “Design and fabrication of a foldable hexapod robot towards experimental swarm applications,” in *2014 IEEE International Conference on Robotics and Automation (ICRA)*, May 2014, pp. 2971–2976.

## PRESENTATIONS

- Informed Repurposing of Quadruped Legs for New Tasks, IEEE International Conference on Robotics and Automation (ICRA), May 2025
- Steerable Walking with Vibrating Soft Twisted Beams, Democratization Workshop, IEEE-RAS International Conference on Soft Robotics (RoboSoft), April 2024
- Development of A Dynamic Quadruped with Tunable, Compliant Legs, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), October 2023
- Direct Encoding of Tunable Stiffness Into an Origami-Inspired Jumping Robot Leg, ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE), August 2023
- Design, fabrication, experimental analysis, and test flight of an origami-based fixed-wing aerial vehicle: μPlane, ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC-CIE), August 2016

## AWARDS

- Best Paper Award Finalist, IEEE International Conference on Robotics and Automation (ICRA), Informed Repurposing of Quadruped Legs for New Tasks, 2025
- First Place in IEEE Robotics and Automation Society Soft Material Robot Challenge (SMRC) Soft Robot Speed Challenge, IEEE International Conference on Robotics and Automation (ICRA), 2017