

YUHAO JIANG

Post-doctoral Researcher, EPFL

CONTACT

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RESEARCH STATEMENT

I advance soft robotics by designing innovative, compliant mechanisms that enhance robot-environment interactions. My research focuses on developing novel compliant structures to optimize robotic locomotion, integrating dynamic modeling and AI-driven methods for more efficient and complex design and control. Through my work, I aim to broaden the accessibility and functionality of soft robotic systems, addressing key challenges in actuation, manufacturing, and control of complex robotic systems.

EDUCATIONAL EXPERIENCE

Arizona State University, Tempe *Jan. 2019 - Aug. 2023*
Ph.D. in Mechanical Engineering
Advisor: Prof. Daniel Aukes
Dissertation: Design and Modeling of Soft Curved Reconfigurable Anisotropic Mechanisms

University of Florida, Gainesville *Sep. 2015 - May 2017*
Master of Science in Mechanical Engineering

Donghua University, Shanghai *Sep. 2011 - Jun. 2015*
Bachelor of Engineering in Mechanical Engineering

PROFESSIONAL EXPERIENCE

EPFL, Lausanne *Sep. 2023 - Present*
Post-doctoral Researcher, Reconfigurable Robotics Lab
Supervisor: Prof. Jamie Paik

SELECTED PROJECTS

MOZART: Morphing Computerized mats with Embodied Sensing and Artificial Intelligence *Sep. 2023 - Present*
<https://mozart-robotics.eu/>

EPFL, Reconfigurable Robotics Lab
Funded by: European Union Horizon Europe Research and Innovation Programme

SCRAM: Soft Curved Reconfigurable Anisotropic Mechanisms *Jan 2020 - May 2023*
<https://www.scrambots.com/>
Arizona State University, IdeaLab
Funded by: NSF EFRI C3 SoRo

FIRE: Fish-Inspired Robots for Extreme Environments *Jan.2019 - Jan. 2020*
Arizona State University, IdeaLab
Funded by: Salt River Project

TEACHING AND STUDENT MENTORING

Course Instructor

Course Name	Affiliation	Period
ME410: Mechanical Engineering Product Design and Development	STI, EPFL	Fall 2024
ME420: Advanced Design for Sustainable Future	STI, EPFL	Fall 2024
ME410: Mechanical Engineering Product Design and Development	STI, EPFL	Fall 2023

Master's Thesis and Semester Project Advisor

Name	Topic	Program	Period
Aurora Ruggeri ¹	Study on soft metamaterials for object sensing and geometry generation	MS in Mechanical	Spring 2024
Louis Flahault ¹	Kinematic study and design for spatial reconfigurable modular robotic platform	MS in Robotics	Spring 2024
Serge Asmar ¹	Locomotion design and control using surface wave change generated by ori-pixel platform	MS in Robotics	Spring 2024
Nicolas Nouel ^{2*}	Programmable surface using bistable structure	MS in Robotics	Spring 2024

¹ Semester Project

² Thesis

* Co-advisor

PEER-REVIEWED PUBLICATIONS

Journal Publications

- [1] **Y. Jiang**, S. Asmar, Z. Wang, S. Demirtas, and J. Paik, "CPG-based Manipulation with Multi-Module Origami Robot Surface," submitted, October 2024
- [2] **Y. Jiang**, F. Chen, J. Paik, and D. M. Aukes, "Locomotion via Vibration of Soft, Twisted Beams with an Under-actuated Quadruped," submitted, June 2024
- [3] **Y. Jiang**, F. Chen and D. M. Aukes, "Tunable Dynamic Walking via Soft Twisted Beam Vibration," IEEE Robotics and Automation Letters, vol. 8, no. 4, pp. 1967-1974, April 2023, <https://doi.org/10.1109/LRA.2023.3244716>
- [4] M. Sharifzadeh, **Y. Jiang**, A. Lafmejani, K. Nichols, and D. M. Aukes, "Maneuverable gait selection for a novel fish-inspired robot using a CMA-ES-assisted workflow," in Bioinspiration & Biomimetics, vol. 16, no. 5, pp. 056017, August 2021, <https://doi.org/10.1088/1748-3190/ac165d>
- [5] M. Sharifzadeh, **Y. Jiang**, and D. M. Aukes, "Reconfigurable Curved Beams for Selectable Swimming Gaits in an Underwater Robot," in IEEE Robotics and Automation Letters, vol. 6, no. 2, pp. 3437-3444, April 2021, <https://doi.org/10.1109/LRA.2021.3063961>

Conference Publications

- [1] **Y. Jiang**, M. Sharifzadeh, and D. M. Aukes, "Reconfigurable Soft Flexure Hinges via Pinched Tubes," 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020, pp. 8843-8850, <https://doi.org/10.1109/IROS45743.2020.9341109>
- [2] **Y. Jiang**, M. Sharifzadeh, and D. M. Aukes, "Shape Change Propagation Through Soft Curved Materials for Dynamically-Tuned Paddling Robots," 2021 IEEE 4th International Conference on Soft Robotics (RoboSoft), 2021, pp. 230-237, <https://doi.org/10.1109/RoboSoft51838.2021.9479208>
- [3] P. Bupe, **Y. Jiang**, J. Lin, T. Nguyen, M. Han, D. Aukes, C. Harnett, "Embedded Optical Waveguide Sensors for Dynamic Behavior Monitoring in Twisted-Beam Structures," 2024 IEEE 7th International Conference on Soft Robotics (RoboSoft), San Diego, CA, USA, 2024, pp. 139-144, <https://doi.org/10.1109/RoboSoft60065.2024.10521938>

- [4] M. Sharifzadeh, **Y. Jiang**, A. Lafmejani, D. M. Aukes, “Compensating for Material Deformation in Foldable Robots via Deep Learning – A Case Study,” 2022 IEEE International Conference on Robotics and Automation (ICRA), 2022, <https://doi.org/10.1109/ICRA46639.2022.9811752>
- [5] M. Sharifzadeh, **Y. Jiang**, R. Khodambashi, D. M. Aukes, “Increasing the Life Span of Foldable Manipulators With Fabric.” Proceedings of the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 10: 44th Mechanisms and Robotics Conference (MR). Virtual, Online. August 17–19, 2020. V010T10A087. ASME, <https://doi.org/10.1115/DETC2020-22757>

PATENTS

- [1] “Pinched tubes for reconfigurable robots”, Daniel Aukes, Mohammad Sharifzadeh, **Yuhao Jiang**, Nicholas Gravish, Mingsong Jiang - US Patent US20230127106A1
- [2] “Buckling beams for underwater and terrestrial autonomous vehicles”, D Aukes, M Sharifzadeh, **Y Jiang** - US Patent US20230121727A1
- [3] “Mechanisms for steering robotic fish”, D Aukes, M Sharifzadeh, K Nichols, **Y Jiang** - US Patent US11124281B2

TALKS

Seminar Talks

- [1] “Empowering Actuation of Soft Robotic Systems via Soft Curved Reconfigurable Anisotropic Mechanism”, hosted by Prof. Nick Gravish and Prof. Michael Tolley, UCSD, Feb. 2023.

Conference Proceedings Talks

- [1] **RoboSoft 2023**: “Tunable Dynamic Walking via Soft Twisted Beam Vibration”
- [2] **ICRA 2022**: “Compensating for Material Deformation in Foldable Robots Via Deep Learning – a Case Study”, <https://youtu.be/AwS4vabv-JQ>
- [3] **ICRA 2021**: “Reconfigurable Curved Beams for Selectable Swimming Gaits in an Underwater Robot”, <https://youtu.be/EszTDc9slyw>
- [4] **Robosoft 2021**: “Shape Change Propagation Through Soft Curved Materials for Dynamically-Tuned Paddling Robots”
- [5] **IROS 2020**: “Reconfigurable Soft Flexure Hinges via Pinched Tubes”, <https://youtu.be/J5heXXD6mVo>

Workshop Presentations

- [1] **RoboSoft 2023**: “Model Order Reduction for Vibrational Soft Twisted Beams Using Pseudo-rigid-body Modeling – A Case Study”
- [2] **ICRA 2022**: “Modular Robots Using Soft Curved Reconfigurable Anisotropic Mechanisms”

ACADEMIC SERVICE

Journal Reviewer

The International Journal of Robotics Research (IJRR)
IEEE Transactions on Robotics (T-RO)
IEEE Robotics and Automation Letters (RA-L)
Soft Robotics (SoRo)
Journal of Field Robotics (JFR)
ASME Journal of Mechanisms and Robotics (JMR)

Conference Reviewer

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

International Conference on Robotics and Automation (ICRA)

International Conference on Soft Robotics (Robosoft)

ACM Symposium on Computational Fabrication (SCF)

PUBLIC OUTREACH

Media Interview

- [1] **RTS Education and Scientific Program:** feature in “A guide to the future: Seiss Federal Institute of Technology 02”, <https://youtu.be/9yoNLg5Qho0?si=T48imzSqyShXc3ks>

Organized Events

- [1] **Robosoft 2021 Workshop:** “Breaking the Mold: Challenging Current Paradigms in Soft Robotics”, <https://www.scrambots.com/robosoft-2021-workshop>
- [2] **2023 RRL Demo Day:** Full-day public event for projects from RRL and ME-410 class, <https://sites.google.com/view/rrl-me410/home>
https://youtu.be/wza144iqfco?si=_HfGVhsnzebmp7ZM

Demos and Expositions

- [1] RRL lab tours (~6 times per year)
- [2] 2024 RRL Demo Day
- [3] 2024 Swiss Robotics Day
- [4] 2023 RRL Demo Day
- [5] 2023 Swiss Robotics Day
- [6] IdeaLab lab tours (~4 times per year)
- [7] 2019 Southwest Robotics Symposium (SWRS)