

XUN FU

2505 Hayward St
Ann Arbor, MI 48109 USA

Email: xunfu@umich.edu
Website: xunfu.github.io

Education

University of Michigan, Ann Arbor, MI USA

Ph.D. in Robotics Aug. 2020 – May. 2024 (Expected)

University of Michigan, Ann Arbor, MI USA

M.S. in Mechanical Engineering Aug. 2018 – Dec. 2019

Northwestern Polytechnical University (NPU), Xi'an, Shaanxi China

B.E. in Mechatronics Engineering Aug. 2014 – June. 2018

Professional Appointment

University of Michigan, Ann Arbor, MI USA

Research Engineer, ROAHM Lab Jan. 2020 – Aug. 2020

Awards and Scholarships

- Graduation with honors at NPU June. 2018
- National Scholarship Nov. 2017
- NPU Outstanding Student Award & First Prize Scholarship Nov. 2017
- Samsung Scholarship Dec. 2016
- NPU Outstanding Student Award & First Prize Scholarship Dec. 2016
- NPU Outstanding Student Award & First Prize Scholarship Nov. 2015

Publications

- **Xun Fu**, Bohao Zhang, Ram Vasudevan, and Talia Moore. Enhancing three-dimensional inertial maneuverability through articulated tail systems. *In preparation*.
- **Xun Fu**, Jack Wither, Juri Miyamae, and Talia Moore. ArborSim: Articulated, branching, OpenSim routing for constructing models of multi-jointed appendages with complex muscle-tendon architecture. *In review*. [\[link\]](#)
- Daniel Bruder, **Xun Fu**, and Ram Vasudevan. Advantages of bilinear Koopman realizations for the modeling and control of systems with unknown dynamics. *IEEE Robotics and Automation Letters (RA-L)*, 2021. [\[link\]](#)
- Daniel Bruder, **Xun Fu**, Brent Gillespie, C. David Remy, and Ram Vasudevan. Koopman-based control of a soft continuum manipulator under variable loading conditions. *IEEE Robotics and Automation Letters (RA-L)*, 2021. [\[link\]](#)
- Daniel Bruder, **Xun Fu**, Brent Gillespie, C. David Remy, and Ram Vasudevan. Data-driven control of soft robots using Koopman operator theory. *IEEE Transactions on Robotics (T-RO)*, 2020. [\[link\]](#)
- **Xun Fu**, and Xiaojuan Mo. The application of wearable sensors on the diagnosis and monitoring of Parkinson's disease. *DEStech Trans. Eng. Technol. Res, AMEE*, 2018. [\[link\]](#)

Teaching

- ROB599 002: Bio-inspiration, University of Michigan, *Graduate Student Instructor* Winter 2021
- ROB599 003: Bio-inspiration, University of Michigan, *Teaching Assistant* Winter 2020

Research Summary

In my research, I leverage modern optimization techniques to develop explicit dynamical models of complex systems including continuum robots and mammalian tails. These models inform evolutionary studies of functional biomechanics and robotic controllers.

Selected Research Experience

EMBiR Lab, University of Michigan, *Advisor: Dr. Talia Moore* Jan. 2020 - Present

- **Computational musculoskeletal modeling of rodent tails**

Developed a customized software that facilitates constructing OpenSim musculoskeletal models of highly jointed systems with complex muscle-tendon branching networks.

Building computational musculoskeletal models of rodent tails and leveraging optimal control methods to generate predictive, three-dimensional muscle-driven simulations of the tails to explore their contributions to locomotion.

- **Articulation for enhancing inertia maneuverability**

Conducted a comparative analysis of the impact of articulation in robotics systems on 3D maneuverability through physics-based simulations and trajectory optimization.

ROAHM Lab, University of Michigan, *Advisor: Dr. Ram Vasudevan* April. 2019 - Present

- **Data-driven modeling and control of soft robots**

Utilized Koopman operator to construct linear, bilinear, and nonlinear models of soft robots.

Applied model predictive control methods to control soft robots and achieved over three times more accuracy than a benchmark method in terms of average tracking error.

Accomplished the first demonstration of autonomous pick and place of objects of unknown mass on a soft continuum manipulator.

- **System identification for autonomous rovers**

Built rovers integrated with various types of sensors including LiDAR, camera, and IMU operating in Robot Operating System (ROS).

Applied data-driven methods to identify the dynamical model of the rovers.

Internship

Beijing Jingdiao Group Co., Ltd., Beijing, China July. 2017 – Aug. 2017

Optimized planned machining path and improved machining precision and accuracy.

Reviewer

IEEE Transactions on Robotics (T-RO)

IEEE Robotics and Automation Letters (RA-L)

IEEE International Conference on Robotics and Automation (ICRA)

European Control Conference (ECC)