

XIANGYU PENG

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[Homepage](#) [Google Scholar](#) [LinkedIn](#)

EDUCATION

University of Michigan (Ann Arbor), USA

August 2021 - Present

Ph.D. in Robotics, GPA: 4.0/4.0

University of Michigan (Ann Arbor), USA

August 2019 - April 2021

M.S. in Robotics, GPA: 4.0/4.0

Shanghai Jiao Tong University, China

September 2015 - June 2019

B.E. in Mechanical Engineering, GPA: 86.4/100

RESEARCH INTERESTS

My research is centered on the field of **wearable technologies** and **medical devices**, with a particular emphasis on the **human-robot interaction**, **biomechanics** and **human factors**. I am especially interested in understanding how individuals interact with and utilize wearable devices and medical technologies. My work aims to develop training paradigms that facilitate the learning and adaptation process for users, while also examining user behaviors to guide the design of intelligent, user-centric wearable systems.

SKILLS

Programming Languages

Python, MATLAB, C/C++

Packages & Tools

PyTorch, NumPy, Pandas, Scikit-learn, Git

Others

Eye Tracking, Motion Capture, OpenSim, Human Study

PUBLICATIONS

- [1] **Xiangyu Peng**, Shunzhang Li, and Leia Stirling, “[Improving Complex Task Performance in Powered Upper Limb Exoskeletons with Adaptive Proportional Myoelectric Control for User Motor Strategy Tracking](#)”, *IEEE Robotics and Automation Letters (RA-L)*, 2024
- [2] Leia Stirling, Man I Wu, and **Xiangyu Peng**, “[Measuring Trust for Exoskeleton Systems](#)”, Workshop on *19th Annual ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Boulder, CO, March 11-15, 2024
- [3] **Xiangyu Peng** and Leia Stirling, “[Examination of Biofeedback to Support the Use of Upper-Extremity Exoskeletons Under Proportional Myoelectric Control](#)”, *IEEE Transactions on Medical Robotics and Bionics (T-MRB)*, 2024
- [4] **Xiangyu Peng** and Leia Stirling, “[Effects of Biofeedback on Muscle Effort Reduction when Holding Positions with a Powered Upper Limb Exoskeleton](#)”, *67th Annual Meeting of the Human Factors and Ergonomics Society (HFES)*, Washington DC, October 23-27, 2023 (**OETG (Occupational Ergonomics Technical Group) Best Experimental Paper**)
- [5] **Xiangyu Peng**, Yadrianna Acosta-Sojo, Man I Wu, and Leia Stirling, “[Actuation Timing Perception of a Powered Ankle Exoskeleton and its Associated Ankle Angle Changes During Walking](#)”, *IEEE Transactions on Neural Systems and Rehabilitation Engineering (TNSRE)*, 2022
- [6] **Xiangyu Peng**, Yadrianna Acosta-Sojo, Man I Wu, and Leia Stirling, “[Perception of Powered Ankle Exoskeleton Actuation Timing During Walking: A Pilot Study](#)”, *The 43rd Annual International*

Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Guadalajara, Mexico, October 31 - November 4, 2021

[7] **Xiangyu Peng**, Ningbin Zhang, Lisen Ge, and Guoying Gu, “[Dimension Optimization of Pneumatically Actuated Soft Continuum Manipulators](#)”, *The 2nd IEEE International Conference on Soft Robotics (RoboSoft)*, Seoul, Korea, April 14-18, 2019

RESEARCH EXPERIENCE

Investigating Training for Effective Biofeedback in Exoskeleton Use *Sep 2023 - Present*

- ▶ Designed a between-subject study to compare two groups using an exoskeleton with EMG biofeedback, investigating whether targeted biofeedback training paradigms enhance the efficiency of user benefits from the biofeedback.
- ▶ Evaluated user performance through both an assessment task (target matching) and a functional task (bimanual lifting). Analyzed biomechanics data using motion capture markers to assess user interactions and adaptive strategies while using the exoskeleton.
- ▶ Employed an eye-tracking system to identify when biofeedback offers the greatest benefit to users.

Developing Adaptive Controller that Tracks User Motor Strategy *Oct 2022 - Aug 2023*

- ▶ Designed and developed a data-driven myoelectric controller with real-time adaptive parameters, enabling continuous tracking of the user’s evolving motor program to improve intent classification.
- ▶ Conducted a human study with 12 participants, demonstrating the controller’s effectiveness in reducing both intention classification error magnitude and muscular effort during movement initiation.

Examination of Biofeedback to Support Exoskeleton Usage *Sep 2021 - Oct 2022*

- ▶ Conducted a human study with 36 participants to investigate the effects of visual and haptic EMG biofeedback on task performance using an EMG-based powered upper limb exoskeleton.
- ▶ Identified challenges in implementing effective biofeedback due to users’ difficulty in adopting the required exoskeleton motor program, while demonstrating its positive impact on movement smoothness and participant perceptions.

Human Perception of Exoskeleton Control Parameters *May 2020 - August 2021*

- ▶ Designed and implemented a two-alternative forced choice (2AFC) task to evaluate user perception of exoskeleton control parameters.
- ▶ Conducted a human study with 15 participants, quantifying just-noticeable difference (JND) of $2.8 \pm 0.6\%$ in stride period, demonstrating the high sensitivity of humans to exoskeleton control parameters.

AWARDS AND HONORS (SELECTED)

HFES OETG Best Experimental Paper Award	2023
Robotics Outreach Ambassadors	2023
Rackham Travel Grant (\$900)	2023
NIOSH PPRT award (\$20,000)	2023
Robotics PhD Fellowship	2021
Excellent Undergraduate in Shanghai	2019
Honors degree for outstanding scholastic and scientific research performances in SJTU	2019
1 st Prize NPIC Scholarship	2016, 2017
Excellent Student of SJTU selected with overall performance (Top 5%)	2016, 2017

RELEVANT GRADUATE COURSES

Robotics	Machine Learning (EECS 545)
	Computational Machine Learning & Data Science (EECS 505)
	Robotics Systems Lab (ROB 550)
	Math for Robotics (ROB 501)
	Introduction to Algorithmic Robotics (EECS 498)
	Control Systems Analysis and Design (EECS 460)
	Foundations of Computer Vision (EECS 504)
BioMede	Neural Engineering (BIOMEDE 517)
	Locomotor Mechanics and Design / Control of Wearable Robotic Systems (ROB 646)
Others	Design of Experiment (IOE 465)
	Dynamic Programming (IOE 512)
	Nonlinear Programming (IOE 611)

OTHERS

Membership	IEEE Student Member, 2021, 2023, 2024
	EMBS Graduate Student Member, 2021, 2024
	HFES Student Member, 2021, 2023
Reviewer	IEEE Robotics and Automation Letters (RA-L), 2022
	IEEE Transactions on Neural Systems and Rehabilitation Engineering (TNSRE), 2022
	Human Factors and Ergonomics Society Annual Meeting (HFES), 2023, 2024
Outreach	Discover Engineering Camp, 2022
	WISE Camp, 2022, 2023
	Wines Elementary School, 2022
	Allen Elementary School Robotics Visit, 2023
	Pittsfield Elementary School, 2023