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**, with a particular emphasis on the **human-robot interaction**, **biomechanics** and **human factors**. I am particularly focused on understanding how individuals interact with and utilize wearable devices, developing training paradigms to facilitate their learning process, and studying user behaviors to inform the development of intelligent, user-centric wearable systems.

SKILLS

Programming Languages	Python (Proficient), MATLAB (Porficient), C/C++
Packages & Tools	PyTorch, NumPy, Pandas, Scikit-learn, Git
Others	Arduino, Raspberry Pi, Android Studio, LaTeX, Solidworks, ABAQUS

PUBLICATIONS

[1] **Xiangyu Peng**, Shunzhang Li, and Leia Stirling, "Improving Complex Task Performance in Powered Upper Limb Exoskeletons with Adaptive Proportional Myoelectirc Control for User Motor Strategy Tracking", *IEEE Robotics and Automation Letters (RA-L)*, 2024 (accepted)

[2] Leia Stirling, Man I Wu, and **Xiangyu Peng**, "Measuring Trust for Exoskeleton Systems", *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2024 (accepted)

[3] **Xiangyu Peng** and Leia Stirling, "Examination of Biofeedback to Support the Use of EMG-Based Upper-Extremity Exoskeletons Under Proportional Myoelectric Control", *IEEE Transactions on Medical Robotics and Bionics (T-MRB)*, 2024 (accepted)

[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

Adaptive Controller for User Motor Strategy Tracking *Oct 2022 - Aug 2023*

- Introduced a novel proportional myoelectric controller with real-time adaptive parameters designed to continuously track the user's evolving motor program to enhance intent classification.
- Conducted human study to demonstrate the effectiveness of the proposed controller, showing reductions in both intention classification error magnitudes and muscular effort during movement initiation.

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

- Investigated the impact of visual and haptic EMG biofeedback on users when they performed matching task with a EMG-based powered upper limb exoskeleton.
- Highlighted the challenges in implementing effective biofeedback due to users' difficulty in adopting the necessary exoskeleton motor program, but demonstrated its positive impact on movement smoothness and participant perceptions.

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

- Implemented torque profile algorithms with the two-alternative forced choice (2AFC) task to assess user perception, and developed an Android app to facilitate user-friendly interaction with the system.
- Performed human study to quantify the just-noticeable difference (JND) of 2.8±0.6% in stride period across participants, highlighting the remarkable sensitivity of humans to exoskeleton control parameters.

AWARDS AND HONORS (SELECTED)

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
	EMBS Graduate Student Member, 2021
	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
Outreach	Discover Engineering Camp, 2022
	WISE Camp, 2022, 2023
	Wines Elementary School, 2022
	Allen Elementary School Robotics Visit, 2023
	Pittsfield Elementary School, 2023