

Ying Fang, PhD

Department of Physical Therapy

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Education

- **Postdoc, Mechanical Engineering**, Northern Arizona University, Flagstaff, AZ 2019–2023
- **PhD, Biomedical Engineering**, Worcester Polytechnic Institute, Worcester, MA 2014–2018
- **MS, Kinesiology - Biomechanics**, The University of Tennessee, Knoxville, TN 2012–2014
- **BS, Kinesiology**, Shanghai University of Sport, Shanghai, China 2008–2012

Academic Positions

- **Assistant Professor**, Department of Physical Therapy 2023-current
Rosalind Franklin University of Medicine and Science, North Chicago, IL

Peer-Reviewed Publications

In Review

Fang Y, Lerner ZF. How does ankle exoskeleton assistance and plantar pressure biofeedback affect incline walking mechanics and muscle activity in Cerebral Palsy? (*submitted to Journal of Biomechanics*)

Tagoe AE., **Fang Y**, Williams JR, Lerner ZF. Improving Real-World Walking with A Hybrid Ankle Exosuit in Cerebral Palsy (*submitted to Nature Biomedical Engineering*)

Hashe K, **Fang Y**, Lerner ZF. How Dorsiflexion Assistance Affects Metabolic Cost During Walking with a Robotic Ankle Exoskeleton (*submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems*)

Published

21. **Fang Y**, Lerner ZF. How Adaptive Ankle Exoskeleton Assistance Affects Stability during Perturbed and Unperturbed Walking in the Elderly. *Annals of Biomedical Engineering* (*accepted*)

20. Mazur CM, Edwards WB, Haider IT, **Fang Y**, Morse LR, Schnitzer TJ, Simonian N, Troy KL. Bone Mineral Loss at the Distal Femur and Proximal Tibia following Spinal Cord Injury in Men and Women. *Journal of Clinical Densitometry*, 2023. 26(3), 103830.

19. Conner BC, **Fang Y**, Lerner ZF. Under Pressure: Clinical Validation and Application of Electroless Plantar Flexor Biofeedback for Neuromuscular Gait Training. *Journal of NeuroEngineering and Rehabilitation*, 2022. 19(1), 135.

18. **Fang Y**, Harshe K, Franz JR, Lerner ZF. Pilot Evaluation of A Dual-Mode Ankle Exoskeleton to Assist and Restore Community Ambulation in Older Adults. *Wearable Technologies*. 2022;3:E13.

17. **Fang Y**, Orekhov G, Lerner ZF. Improving the Energy Cost of Incline Walking and Stair Ascent with Ankle Exoskeleton Assistance in Cerebral Palsy. *IEEE Transactions on Biomedical Engineering*. 2022, 69(7), 2143-52.

16. **Fang Y**, Lerner ZF. Bilateral vs. Paretic-Limb-Only Ankle Exoskeleton Assistance for Improving Hemiparetic Gait: A Case Series. *IEEE Robotics and Automation Letters*, 2022. 7(2): 1246-1253.

15. **Fang Y**, Orekhov G, Lerner ZF. Adaptive Ankle Exoskeleton Gait Training Demonstrates Acute Neuromuscular and Spatiotemporal Benefits for Individuals with Cerebral Palsy. *Gait&Posture*, 2022. 95:256-263.

14. Bishe SSPA, Nguyen T, **Fang Y**, Lerner ZF. Adaptive Ankle Exoskeleton Control: Validation Across Diverse

- Walking Conditions. *IEEE Transactions on Medical Robotics and Bionics* , 2021. 3(3): 801-812.
13. Orekhov G, **Fang Y**, Cuddeback CF, Lerner ZF. Usability and Performance Validation of an Ultra-Light and Versatile Untethered Robotic Ankle Exoskeleton. *Journal of NeuroEngineering and Rehabilitation* , 2021. 18: 163.
 12. Deng L, Yang Y, Yang C, **Fang Y**, Zhang X, Liu L, Fu W. Compression Garments Reduce Soft Tissue Vibrations and Muscle Activations during Drop Jumps: An Accelerometry Evaluation. *Sensors* , 2021.21(16):5644
 11. **Fang Y**, Lerner ZF. Feasibility of Augmenting Ankle Exoskeleton Walking Performance with Step Length Biofeedback in Individuals with Cerebral Palsy. *IEEE Transactions on Neural Systems and Rehabilitation Engineering* , 2021. 29: 442-449.
 10. **Fang Y**, Morse LR, Nguyen N, Battaglino RA, Goldstein RF, Troy KL. Functional Electrical Stimulation (FES) Assisted Rowing Combined with Zoledronic Acid, but Not Alone, Preserves Distal Femur Strength and Stiffness in People with Chronic Spinal Cord Injury. *Osteoporosis International* . 2021. 32: 549-558.
 9. Orekhov G, **Fang Y**, Luque J, Lerner ZF. Ankle Exoskeleton Assistance Can Improve Over-Ground Walking Economy in Individuals With Cerebral Palsy. *IEEE Transactions on Neural Systems and Rehabilitation Engineering* , 2020. 28(2): 461-467.
 8. Morse LR, Troy KL, **Fang Y**, Nguyen N, Battaglino R, Goldstein RF, Gupta R, Taylor JA. Combination Therapy with Zoledronic Acid and FES-row Training Reduces Bone Loss in the Paralyzed Legs: Results of a Randomized Comparative Clinical Trial. *Journal of Bone and Mineral Research* , 2019. 3(5): e101067 .
 7. Yang Y, **Fang Y**, Zhang X, He J, Fu W. Does Shoe Collar Height Influence Ankle Joint Kinematics and Kinetics in Sagittal Plane Maneuvers? *Journal of Sports Sciences and Medicine* , 2017. 16(4):543-505.
 6. Fu W, **Fang Y**, Gu Y, Huang L, Li L, Liu Y. Shoe Cushioning Reduces Impact and Muscle Activation during Landings from Unexpected, but not Self-initiated Drops. *Journal of Science and Medicine in Sport* , 2017, 20(10):915-920.
 5. **Fang Y**, Morse LR, Nguyen N, Tsantes NG, Troy KL. Anthropometric and Biomechanical Characteristics of Body Segments in Persons with Spinal Cord Injury. *Journal of Biomechanics* , 2017. 11(55):11-7.
 4. **Fang Y**, Fitzhugh EC, Crouter SE, Gardner JK, Zhang S. Effects of Workloads and Cadences on Frontal Plane Knee Biomechanics in Cycling. *Medicine and Science in Sports and Exercise* , 2016. 48(2):260-6.
 3. Fu W, **Fang Y**, Liu D, Wang L, Ren S, Liu Y. Surface Effects on In-shoe Plantar Pressure and Tibial Impact during Running. *Journal of Sport and Health Science* , 2015. 4(4):384-390.
 2. Fu W, **Fang Y**, Liu Y, Hou J. The Effect of High-Top and Low-Top Shoes on Ankle Inversion Kinematics and Muscle Activation in Landing on a Tilted Surface. *Journal of Foot and Ankle Research* , 2014. 7: 1-10
 1. Fu W, Liu Y, **Fang Y**. Research Advancements in Humanoid Compression Garments in Sports. *International Journal of Advanced Robotic Systems* , 2013. 10(1):66.

Grants

Funded

- **NIH F32 Individual Postdoctoral Fellowship** - PI: Ying Fang, PhD 2022
"Can ankle assistance and ankle moment biofeedback improve gait mechanics and joint loads during incline walking in cerebral palsy?"
- **American Society of Biomechanics Grant-In-Aid** - PI: Ying Fang, MS 2017
"The Effect of Ergometer Setup and Rowing Technique on Joint Loading during FESRowing among People with

Not Funded

- **NIH Pathway to Independence Award (K99/R00)** - PI: Ying Fang, PhD 2020
"Whole-Body vs. Joint-Isolated Ankle Power Training to Improve Ankle Function and Mobility in Cerebral Palsy"

Conference Proceedings

Full Conference Papers

- **Fang Y**, Lerner ZF. How Ankle Exoskeleton Assistance Affects the Mechanics of Incline Walking and Stair Ascent in Cerebral Palsy. *International Conference on Rehabilitation Robotics*, 2022.
- **Fang Y**, Lerner ZF. Bilateral vs. Paretic-Limb-Only Ankle Exoskeleton Assistance for Improving Hemiparetic Gait: A Case Series. *International Conference on Robotics and Automation*, 2022.
- Bishe SSPA, Liebelt L, **Fang Y**, Lerner ZF. A Low-Profile Hip Exoskeleton for Pathological Gait Assistance: Design and Pilot Testing. *International Conference on Robotics and Automation*, 2022, 5461-5466.

Podium Presentations

- **Fang Y**, Orekhov G, Lerner ZF. The Effects of Ankle Exoskeleton Assistance on Metabolic Efficiency of Incline Walking and Stair Ascent in Cerebral Palsy, *45th Annual Meeting of the American Society of Biomechanics*, August 10-13, 2021.
- **Fang Y**, Harvey TA, Lerner ZF. Augmenting Ankle Exoskeleton Walking Performance with Step Length Biofeedback in Cerebral Palsy, *44th Annual Meeting of the American Society of Biomechanics*, August 4-7, 2020.

Poster Presentations

- Mazur CM, Edwards WB, Haider IT, **Fang Y**, Morse LR, Schnitzer TJ, Simonian N, Troy KL. Sex-specific Differences in Bone Mass are Maintained following Spinal Cord Injury, *American Society for Bone and Mineral Research 2020 Annual Meeting*, September 11-14, 2020.
- Conner BC, **Fang Y**, Lerner ZF. Functional Adaptive Locomotor Training Optimizes Motor Re-Learning for Improved Walking Ability in Individuals with Cerebral Palsy, *5th Annual ABRC-Flinn Research Conference*, Phoenix, AZ, February 26, 2020.
- Kasen E, **Fang Y**, Fabara E, Bonato P, Smith N, Troy KL. User Biomechanics of Exoskeleton-Assisted Gait, *2018 Biomedical Engineering Society Annual Meeting*, Atlanta, Georgia, October 17-20, 2018.
- **Fang Y**, Troy KL. Muscle Force and Knee Loading under Functional Electrical Stimulation (FES) and during FES-Rowing, *42nd Annual Meeting of the American Society of Biomechanics*, Rochester, Minnesota, August 8-11, 2018.
- **Fang Y**, Troy KL. How Does Ergometer Setup and Rowing Speed Affect Biomechanics during Rowing on an Adapted Ergometer Designed for People with Spinal Cord Injury, *42nd Annual Meeting of the American Society of Biomechanics*, Rochester, Minnesota, August 8-11, 2018.
- Zaino NL, **Fang Y**, Troy KL. Novel Axial Forearm Loading Causes Short-term Changes to Distal Radius Microstructure in Young Women, *2017 Biomedical Engineering Society Annual Meeting*, Phoenix, Arizona, October 11-14, 2017.

- **Fang Y**, Morse LR, Nguyen N, Troy KL. The Effect of Functional Electrical Stimulation Assisted Rowing and Intravenous Zoledronic Acid on Bone Stiffness in Spinal Cord Injury, *41st Annual Meeting of the American Society of Biomechanics, Boulder, Colorado, August 8-11, 2017.*
- **Fang Y**, Morse LR, Nguyen N, Tsantes NG, Troy KL. Anthropometric and Biomechanical Characteristics of Body Segments in Persons with Spinal Cord Injury, *40th Annual Meeting of the American Society of Biomechanics, Raleigh, North Carolina, August 2-5, 2016.*
- **Fang Y**, Johnson JE, Troy KL. The Effect of Strap Location on Tibial Strain in Simulated Exoskeleton-Assisted Gait, *Orthopaedic Research Society 2016 Annual Meeting, Orlando, Florida, March 4-8, 2016.*
- **Fang Y**, Smith N, Johnson JE, Troy KL. Comparison of Tibia Strain between Exoskeleton-Assisted Gait and Normal Gait, *39th Annual Meeting of the American Society of Biomechanics, Columbus, Ohio, August 5-8, 2015.*
- **Fang Y**, Fitzhugh EC, Crouter SE, Gardner JK, Zhang S. Effects of Workload on Frontal Plane Knee Biomechanics during Cycling, *ACSM's 62nd Annual Meeting, San Diego, California, May 26-30, 2015.*
- **Fang Y**, Liu Y. The Effect of Isometric Strength of Ankle and MPJ on Jumping Performance, *5th Asia-Pacific Conference on Exercise and Sports Science, Shanghai, China, November 2011.*

Invited Presentations

- "One (Small) Step for an Active Life" *Ability & Innovation Lab, University of Washington. 2022*
- "Exoskeleton Usability and Performance during Incline Walking, Stair Climbing, and All-Terrain Walking" *BiOMOTUM/Gillette Children's Specialty Healthcare. 2021*

Awards and Honors

- **American Society of Biomechanics Student Travel Awards** 2015, 2017
- **Graduate Student Travel Fund**, Worcester Polytechnic Institute 2016, 2017, 2018
- **The Edward C. and Catherine D. Cifers Fellowship**, Department of Kinesiology, Recreation and Sport Studies, University of Tennessee, Knoxville 2013
- **First-Class Scholarship**, Shanghai University of Sport 2010, 2011, 2012

Teaching Experience

- **Guest Lecturer**, Worcester Polytechnic Institute, Worcester, MA 2022
"Integrating Technology to Assist and Motivate Improved Movement," *Biomechanics (ME/BME 4504)*
- **Guest Lecturer**, Northern Arizona University, Flagstaff, AZ 2021
"Human-Robot Interactions," *Introduction to Robotics (ME599)*
- **Supervisor**, Northern Arizona University, Flagstaff, AZ 2019, 2020
Engineering Design: The Methods (EGR386W)
- **Guest Lecturer**, Northern Arizona University, Flagstaff, AZ 2020
"Introduction to Movement Analysis," *Innovations And Specializations In Physical Therapy Practice (PT657)*
- **Guest Lecturer**, Northern Arizona University, Flagstaff, AZ 2019
"Kinetics: Inverse Dynamics," *Biomechanics (BIO442)*
"Kinetics: Work, Energy, and Power," *Biomechanics (BIO442)*
- **Graduate Teaching Assistant**, Worcester Polytechnic Institute, Worcester, MA 2014–2015
Skeletal Biomechanics Lab (BME3503), Biotransport Lab (BME3605)

- **Graduate Teaching Associate**, The University of Tennessee, Knoxville, TN 2013
Biomechanics of Human Movement (KNS422)
- **Instructor**, The University of Tennessee, Knoxville, TN 2012–2014
Swimming (PYED230), Jogging (PYED229), Walking (PYED231)

Mentoring Experience

- **Biomechanics Lab, Northern Arizona University** 2019–2023
 - Jennifer Lawson (2019)
 - Sharon Loy (2020–2021)
 - Samuel Maxwell (2021)
 - Safoura Sadegh Pour Aji Bishe (2019–2021)
 - Daniel Colley (2021–2022)
 - Karl Hashe (2021–2022)
 - Gray Becker(2021–2023)
 - Jack Williams (2022–2023)
 - Emmanuella Tagoe (2022–2023)
- **NSF Research Experiences for Undergraduates (REU)** 2017–2018
 - Nicole Zaino, Mechanical Engineering, Clarkson University (2017)
 - Erika Cason, Biomedical Engineering, Trine University (2018)
- **Musculoskeletal Biomechanics Lab, Worcester Polytechnic Institute** 2016–2018
 - Nour Krayem (2016)
 - Stephany Ruiz (2016–2017)
 - Tyler Marshall (2016–2017)
 - Jason Lowder (2017)
 - Hannah Sattler (2017–2018)
 - Aaron Rosenthal (2018)
 - Michael DiStefano (2018)

Professional Affiliations and Services

Memberships

- Institute of Electrical and Electronics Engineers (IEEE) 2019–current
- American Society of Biomechanics (ASB) 2015–current
- American College of Sports Medicine (ACSM) 2014–2015

Journal Reviewer

- Neuralrehabilitation and Neural Repair 2020–current
- Scientific Report 2020–current
- IEEE Transactions on Neural Systems and Rehabilitation Engineering 2018–current
- Sports Biomechanics 2018–current