Ying Fang

Department of Mechanical Engineering, Northern Arizona University
Email: yf82@nau.edu
Website: DoctorFang.github.io

Education

- **Postdoctoral Fellow, Mechanical Engineering** 2019–current
  Northern Arizona University, Flagstaff, AZ - Mentor: Zachary F. Lerner, Ph.D.
- **Ph.D., Biomedical Engineering** 2014–2018
  Worcester Polytechnic Institute, Worcester, MA - Advisor: Karen L. Troy, Ph.D.
- **M.S., Kinesiology - Biomechanics** 2012–2014
  The University of Tennessee, Knoxville, TN - Advisor: Songning Zhang, Ph.D.
- **B.S., Kinesiology** 2008–2012
  Shanghai University of Sport, Shanghai, China - Advisor: Yu Liu, Ph.D.

Peer-Reviewed Publications

In Review

Conner, B., **Fang, Y.**, Lerner, Z.F. Under Pressure: Clinical Validation and Application of Electrodeless Plantar Flexor Biofeedback for Neuromuscular Gait Training (*submitted to Journal of NeuroEngineering and Rehabilitation)*

Published

18. **Fang, Y.**, Hashe, K., Franz, J., Lerner, Z.F. Pilot evaluation of a dual-mode ankle exoskeleton to assist and restore community ambulation in older adults. *Wearable Technologies (accepted)*

17. **Fang, Y.**, Orekhov, G., Lerner, Z.F. Improving the Energy Cost of Incline Walking and Stair Ascent with Ankle Exoskeleton Assistance in Cerebral Palsy. *IEEE Transactions on Biomedical Engineering (accepted)*

16. **Fang, Y.**, Lerner, Z.F. 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. Bishe, S., Nguyen, T., **Fang, Y.**, Orekhov, G., Lerner, Z.F. Adaptive Ankle Exoskeleton Control: Validation Across Diverse Walking Conditions. *IEEE Transactions on Medical Robotics and Bionics* , 2021. 3(3):801-812

14. Orekhov, G., **Fang, Y.**, Cuddeback, C.F., Lerner, Z.F. Usability and Performance Validation of an Ultra-Light and Versatile Untethered Robotic Ankle Exoskeleton. *J of NeuroEngineering and Rehabilitation* , 2021. 18: 163

13. 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

12. **Fang, Y.**, Lerner, Z.F. 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

11. **Fang, Y.**, Morse, L.R., Nguyen, N., Battaglino, R.A., Goldstein, R., Troy, K.L. 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.

10. **Fang, Y.**, Orekhov, G., Lerner, Z.F. Adaptive Ankle Exoskeleton Gait Training Demonstrates Acute Neuromuscular and Spatiotemporal Benefits for Individuals with Cerebral Palsy. *Gait & Posture,* 2020 (*in press*)

9. Orekhov, G., **Fang, Y.**, Luque, J. Lerner, Z.F. 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, L.R., Troy, K.L. **Fang, Y.**, Nguyen, N., Battaglino, R.A., Goldstein, R., Zafonte, R., Gupta, R., Taylor, J.A. Combination Therapy with Zoledronic Acid and FES-row Training Reduces Bone Loss in the Paralyzed Legs: Results of a Randomized Comparative Clinical Trial. *J 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? *J 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. *J of Science and Medicine in Sport* , 2017, 20(10):915-920.

5. **Fang, Y.**, Morse, L.R., Nguyen, N., Tsantes, N.G., Troy, K.L. Anthropometric and Biomechanical Characteristics of Body Segments in Persons with Spinal Cord Injury. *J of Biomechanics* , 2017. 11(55):11-7.

4. **Fang, Y.**, Fitzhugh, E., Crouter, S., 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, M., Wang, L., Ren, S., Liu, Y. Surface Effects on In-shoe Plantar Pressure and Tibial Impact during Running. *J of Sport and Health Science* , 2015. 4(4):384-390.

2. Fu, W., **Fang, Y.**, Liu, Y. The Effect of High-Top and Low-Top Shoes on Ankle Inversion Kinematics and Muscle Activation in Landing on a Tilted Surface. *J of Foot and Ankle Research* , 2014. 7(1):14.

1. Fu, W., Liu, Y., **Fang, Y.** Research Advancements in Humanoid Compression Garments in Sports. *International J of Advanced Robotic Systems* , 2013. 10(1):66.

Non-Peer Reviewed Publication

Fang, Y., Troy, K.L. Effect of Adapted Ergometer Setup and Rowing Speed on Lower Extremity Loading in People with and without Spinal Cord Injury. *medRxiv* , 2021.

Grants

Funded

• **NIH F32 Individual Postdoctoral Fellowship** - PI: Ying Fang, Ph.D. 2021

"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 Spinal Cord Injury"

Not Funded

• **NIH Pathway to Independence Award (K99/R00)** - PI: Ying Fang, Ph.D. 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, Z.F. 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, Z.F. Bilateral vs. Paretic-Limb-Only Ankle Exoskeleton Assistance for Improving Hemiparetic Gait: A Case Series. International Conference on Robotics and Automation, 2022.

• Bishe, S., Liebelt, L., **Fang, Y.**, Lerner, Z.F. A Low-Profile Hip Exoskeleton for Pathological Gait Assistance: Design and Pilot Testing. International Conference on Robotics and Automation, 2022.

Podium Presentations

• **Fang, Y.**, Orekhov, G., Lerner, Z.F. 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, T., Lerner, Z.F. 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, C.M., Edwards, W.B., Haider, I.T., **Fang, Y.**, Morse, L.R., Schinitzer, T.J., Simonian, N., Troy, K.L. 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, B.C., **Fang, Y.**, Lerner, Z.F. 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, K.L. User Biomechanics of Exoskeleton-Assisted Gait, 2018 Biomedical Engineering Society Annual Meeting, Atlanta, Georgia, October 17-20, 2018.

• **Fang, Y.**, Troy, K.L. 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, K.L. 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, N.L., **Fang, Y.**, Troy, K.L. 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, L.R., Nguyen, N., Troy, K.L. 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, L.R., Nguyen, N., Tsantes, N.G., Troy, K.L. 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, J.E., Troy, K.L. 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, J.E., Troy, K.L. 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,

• **Fang, Y.**, Fitzhugh, E., Crouter, S., 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

• 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**, 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

- **Biomechatronics Lab, Northern Arizona University** 2019–current
  - Jennifer Lawson (2019)
  - Sharon Loy (2020–2021)
  - Samuel Maxwell (2021)
  - Safoura Sadegh Pour Aji Bishe (2019–2021)
  - Daniel Colley (2021–2022)
  - Karl Hashe (2021–current)
  - Emmanuella Tagoe (2022–current)
- **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