

Exponent®
Engineering & Scientific Consulting

Lindsey Molina, Ph.D.

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Professional Profile

Dr. Molina's expertise is in human biomechanics, including human kinematics, dynamics, and performance. She has experience evaluating human kinematics and loading during vehicular accidents and slip, trip, and fall events and developing and analyzing models and simulations of human movement. She has developed and analyzed models and simulations of human movement and applied machine learning algorithms on sensor data to classify human movement. Dr. Molina has expertise in the collection and analysis of biomechanical data using high-speed motion capture systems, inertial measurement units (IMUs), force transducers, and electromyography (EMG).

Prior to joining Exponent, Dr. Molina was a Graduate Research Assistant in the Neuromuscular Biomechanics Lab at The University of Texas at Austin. Her research focused on using machine learning to detect falls for lower limb amputees, understanding strategies used for balance recovery in healthy individuals, and analyzing the relationship between muscle coordination and turning performance in individuals post-stroke.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Texas, Austin, 2022

M.S., Mechanical Engineering, University of Texas, Austin, 2020

B.S., Mechanical Engineering, University of Texas, Austin, 2016

1st Place, ME Graduate Student Poster Session

2nd Place, American Society of Biomechanics 3-Minute Thesis Competition

Honorable Mention, NSF Graduate Research Fellowship Program

Best Student Poster Award, CARE Research Day Poster Competition

College Scholar, Cockrell School of Engineering

Tau Beta Pi Engineering Honor Society

Gamma Beta Phi Honor Society

Licenses and Certifications

Certified English XL Tribometrist (CXLT) (AZ)

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Prior Experience

Design Engineer, 3M Design and Engineering Solutions, 2016-2018

Technical Aide, 3M Communication Markets Division, 2014-2016

Professional Affiliations

American Society of Biomechanics (ASB)

Patents

US Patent 10, 663, 679 B2: Assembly tool and optical fiber connector assembly method, May 2020 (Sawicki JC, Lurie EB, Lewallen LK, Borer VJ, Van Allen JM)

Publications

Mohasel SM, Sheppard J, Molina LK, Neptune RR, Wurdeman SR, Pew CA. MicroNAS: an automated framework for developing a fall detection system. Engineering Applications of Artificial Intelligence 2026.

Bertelson S, Molina L, Neptune R, Djurdjanovic D. System-based monitoring of muscular fatigue in lower-extremity movement. Annual Conference of the PHM Society 2023; 15 (1).

Molina LK, Small GH, Neptune RR. The influence of step width on balance control and response strategies during perturbed walking in healthy young adults. Journal of Biomechanics 2023; 157:111731.

Small GH, Molina LK, Neptune RR. The influence of altered foot placement and cognitive load on balance control during walking in healthy young adults. Gait & posture 2023; 103:37–43.

Lewallen LK, Srivastava S, Kautz SA, Neptune RR. Assessment of Turning Performance and Muscle Coordination in Individuals Post-Stroke. Journal of Biomechanics 2021; 114:110113

Presentations

Molina LK, Neptune RR. The influence of step width on individual muscle contributions to frontal plane balance control. Thematic Poster Presentation, 47th Annual Meeting of the American Society of Biomechanics, Knoxville, TN, 2023.

Molina LK, Small GH, Neptune RR. The influence of step width on balance response strategies during perturbed walking. Poster Presentation, 47th Annual Meeting of the American Society of Biomechanics, Knoxville, TN, 2023.

Mohasel M, Molina LK, Wurdeman SR, Neptune RR, Pew CA. Development of an automated framework for a TinyML-based fall detection system. Poster presentation, 47th Annual Meeting of the American Society of Biomechanics, Knoxville, TN, 2023.

Lewallen LK, Small GH, Neptune RR. The influence of step width on frontal plane balance control following mediolateral perturbations during healthy walking. Poster presentation, North American Congress on Biomechanics, Ottawa, ON, Canada, 2022.

Lewallen LK, Small GH, Neptune RR. The influence of mediolateral perturbation timing on frontal plane balance control during healthy walking. Podium presentation, 9th World Congress of Biomechanics, Taipei, Taiwan, 2022.

Lewallen LK, Pew CA, Wurdeman SR, Neptune RR. Detection of different fall types in healthy young

adults. Poster presentation, ME Graduate Student Poster Session, Austin, TX, 2022.

Small GH, Lewallen LK, Neptune RR. The effect of dual-tasks on frontal plane balance control while walking with altered step lengths. Podium presentation, 9th World Congress of Biomechanics, Taipei, Taiwan, 2022.

Mohasel M, Lewallen LK, Wurdeman SR, Neptune RR, Pew CA. A Machine Learning Scheme to Identify Falling for Lower Limb Amputees. Poster presentation, North American Congress on Biomechanics, Ottawa, ON, Canada, 2022.

Small GH, Lewallen LK, Neptune RR. The effect of dual-tasks on cognitive performance and balance control during walking with altered step widths. Podium presentation, North American Congress on Biomechanics, Ottawa, ON, Canada, 2022.

Lewallen LK, Pew CA, Wurdeman SR, Neptune RR. Detection of different fall types in healthy young adults. Podium presentation, 45th Annual Meeting of the American Society of Biomechanics, Atlanta, GA, 2021.

Lewallen LK, Pew CA, Wurdeman SR, Neptune RR. Detection of different fall types in healthy young adults. Poster presentation, CARE Research Day, Austin, TX, 2021.

Lewallen LK, Kautz SA, Neptune RR. Assessment of turning performance and coordination in individuals post-stroke. Poster presentation, ME Graduate Student Poster Session, Austin, TX, 2021.

Lewallen LK, Kautz SA, Neptune RR. Assessment of turning performance and coordination in individuals post-stroke. Poster presentation & 3-minute thesis competition, 44th Annual Meeting of the American Society of Biomechanics, Atlanta, GA, 2020.

Lewallen LK, Kautz SA, Neptune RR. Assessment of turning performance and coordination in individuals post-stroke. Poster presentation, ME Graduate Student Poster Session, Austin, TX, 2020.

Lewallen LK, Kautz SA, Neptune RR. Assessment of turning performance and coordination in individuals post-stroke. Poster presentation, Graduate and Industry Networking Poster Session, Austin, TX, 2020.

Ghonasgi K, Lewallen LK*, Pew CA, Klute GK, Deshpande AD, Neptune RR. Optimization of a Variable Stiffness Transverse Adaptor. Poster presentation, CARE Research Day, Austin, TX, 2019. (*contributed equally to this study)

Additional Education & Training

Northwestern University Center for Public Safety, Traffic Crash Reconstruction