Mohsen Alizadeh Noghani

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Education

Ph.D. in Mechanical Engineering 2026
University of Notre Dame *Notre Dame, U.S.*

M.Sc. in Applied & Computational Mathematics & Statistics 2025
University of Notre Dame *Notre Dame, U.S.*

M.Sc. in Mechanical Engineering 2021
University of Maine *Orono, U.S.*

B.Sc. in Mechanical Engineering 2018
Ferdowsi University of Mashhad *Mashhad, Iran*

Publications

Mohsen Alizadeh Noghani, Sebastian Green, Edgar Bolívar-Nieto. (2025). **Whole-body optical marker and ground reaction force data of healthy humans performing non-cyclic activities**. *Scientific Data* [DOI]

Mohsen Alizadeh Noghani, Edgar Bolívar-Nieto. (2025). **Predicting center of mass position in non-cyclic activities: The influence of acceleration, prediction horizon, and ground reaction forces**. *Journal of Biomechanics*. [DOI]

Mohsen Alizadeh Noghani*, Jingshu Peng*, Edgar Bolívar-Nieto. (2025). **Center of mass estimation during non-cyclic activities: Comparison of marker-based methods and their fusion with ground reaction forces**. *Journal of Biomechanics*. [DOI]

Mohsen Alizadeh Noghani, Ehsan Sharafian M., Ben Sidaway, Babak Hejrati. (2025). **Increasing thigh extension with haptic feedback affects leg coordination in young and older adult walkers**. *Journal of Biomechanics*. [DOI]

Mohsen Alizadeh Noghani, Edgar Bolivar-Nieto. (2024). **Prediction of Whole-Body Center of Mass using Joint Angles and Ground Reaction Forces: A Framework for Human Intent Prediction**. *2024 10th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)*. [DOI]

Jacob Bloom, Mohsen Alizadeh Noghani, Babak Hejrati. (2023). **A Wearable Upper Extremity Rehabilitation Device for Inducing Arm Swing in Gait Training**. *2023 International Conference on Rehabilitation Robotics (ICORR)*. [DOI]

Md. Tanzid Hossain, Mohsen Alizadeh Noghani, Ben Sidaway, Babak Hejrati. (2023). **Investigating the Efficacy of a Tactile Feedback System to Increase the Gait Speed of Older Adults**. *Human Movement Science*. [DOI]

Mohsen Alizadeh Noghani, Md. Tanzid Hossain, Babak Hejrati. (2023). **Modulation of Arm Swing Frequency and Gait Using Rhythmic Tactile Feedback**. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. [DOI]

Mohsen Alizadeh Noghani, Mohsen Shahinpoor, Babak Hejrati. (2022). **Design and Validation of a Smartphone-based Haptic Feedback System for Gait Training**. *IEEE Robotics and Automation Letters*. [DOI]

*Co-first authors.

Mohsen Alizadeh Noghani, Drew Browning, Vincent Caccese, Elizabeth DePoy, Stephen Gilson, Ryan Beaumont, Babak Hejrati. (2021). **Design and Evaluation of the Afari: A Three-wheeled Mobility and Balance Support Device for Outdoor Exercise**. *Assistive Technology*. [DOI]

Conference abstracts & presentations

Mohsen Alizadeh Noghani, Edgar Bolivar-Nieto. (2024) **A Framework for Prediction of Center of Mass Trajectory**, *Workshop: AI-Based Estimation and Control of Wearable Robotic Systems for Enhancing Human Mobility, BioRob 2024, Heidelberg, Germany*

Mohsen Alizadeh Noghani, Edgar Bolivar-Nieto. (2024). **A Framework for Prediction of Center of Mass Trajectory**. *Dynamic Walking 2024. Pensacola, FL, U.S.* [Video abstract] [Poster]

Mohsen Alizadeh Noghani, Edgar Bolivar-Nieto. (2023). **Prediction of Human Center of Mass Position from Ground Reaction Forces**. *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Detroit, MI, U.S.* [Abstract] [Poster]

Mohsen Alizadeh Noghani, Mohsen Shahinpoor, Babak Hejrati (2021). **Design and Validation of a Smartphone-based Haptic Feedback System for Gait Training**. *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Virtual.* [Video presentation]

Theses and Dissertations

Impedance Control of Powered Prosthetic Legs Using Data-Driven Prediction and Convex Optimization. (2026). *University of Notre Dame*.

Development of a Novel Haptic Feedback System for Gait Training Applications. (2021). *University of Maine*. [PDF]

Analysis and Optimization of a 4-UPS Parallel Robot. (2018). *Ferdowsi University of Mashhad*.

Experience

Wearable Robotics Lab, University of Notre Dame 2022-2026
Research Assistant *Notre Dame, U.S.*

- Developed a predictive impedance control framework for powered prosthetic legs, using a neural network to predict knee and ankle angles and moments and convex optimization to select joint impedance parameters
- Implemented the controller for real-time operation on the Open Source Leg and tested it during walking with a participant with transfemoral amputation

Department of Aerospace and Mechanical Engineering, University of Notre Dame 2022-2026
Teaching Assistant *Notre Dame, U.S.*

- Teaching Assistant for Design of Machine Elements; Intermediate Controls; AME Laboratory II; and Differential Equations, Vibrations, and Control I

Biorobotics & Biomechanics Lab, University of Maine 2019-2022
Research Assistant *Orono, ME*

- Developed a wireless haptic feedback system for gait training controlled by a smartphone
- Contributed to the NIH R15 grant “A Wearable Haptic Feedback System for Home-based Gait Training for Older Adults” and the NSF CAREER grant “Interlimb Neural Coupling to Enhance Gait Rehabilitation”

Department of Mechanical Engineering, University of Maine 2019-2021
Teaching Assistant *Orono, ME*

- Teaching Assistant for Robot Dynamics and Control, Engineering Dynamics, and Mechanism Analysis and Design

FUM Center for Advanced Rehabilitation and Robotics Research (FUM CARE) 2017-2019
Undergraduate Research Assistant *Mashhad, Iran*

- Developed a real-time EtherCAT motion control system in PREEMPT_RT Linux (worst-case jitter: 37 µs; 99.5th percentile jitter: less than 6 µs)
- Optimized the design of a 4-UPS parallel robot for a large workspace, small size, and low power usage using the genetic algorithm

Professional activities

Peer review

- Journal of Biomechanics; IEEE Robotics and Automation Letters; AAAI Conference on Artificial Intelligence (AAAI); IEEE Journal of Translational Engineering in Health & Medicine; BMC Sports Science, Medicine and Rehabilitation; BMC Geriatrics; Scientific Data; Journal of NeuroEngineering and Rehabilitation; Scientific Reports; IEEE Transactions on Neural Systems and Rehabilitation Engineering; BioMedical Engineering OnLine; IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob); IEEE International Conference on Robotics and Automation (ICRA)

Training

- Bootlin Real-Time Linux with PREEMPT_RT [Certificate]
- Bootlin Embedded Linux Kernel and Driver Development [Certificate]

Membership

- American Society of Biomechanics (ASB) 2024-2025
- National Organization for Development of Exceptional Talents (NODET) 2007-2013

Courses

Statistics, mathematics, robotics

- Applied Probability; Applied Bayesian Statistics; Advanced Biostatistical Methods; Statistical Inference; SQL for Data Science; Applied Linear Models; Statistical Methods in Data Mining and Prediction; Deep Neural Networks; Optimization for Data Science; Applied Generalized Linear Models; Spatio-temporal Statistics for Environmental Applications; Basic Topology and Geometry; Optimization-based Robotics; Analytical Dynamics; Differential Geometry; Advanced Control Systems

Computer science and engineering

- Cluster Computing; Embedded Systems; Operating Systems; Computer Vision