

Exponent®
Engineering & Scientific Consulting

Victoria Hussain, Ph.D.

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Professional Profile

Dr. Hussain specializes in the analysis of human motion, with expertise in gait and balance assessment, fall prevention, sports performance analysis, and impact biomechanics. Her research experience spans clinical research, consumer health applications, and sports biomechanics. She integrates inertial measurement units (IMUs), force plates, motion capture to study stability, motor control, and injury risk.

Dr. Hussain's expertise includes the design and execution of studies assessing fall risk in high-risk populations, validation of wearable systems for continuous monitoring, and evaluation of rehabilitation and intervention strategies. She also develops algorithms for motion detection and analysis, fall risk assessment, and performance feedback, enabling the translation of biomechanics data into practical health, safety and performance solutions. Dr. Hussain is skilled in analytical techniques including nonlinear dynamics, feature extraction, statistical modeling, and time-frequency analysis.

Her recent work has emphasized the development and validation of wearable technologies for continuous health and performance monitoring. This includes gait and fall detection systems for wrist-worn devices. In addition, she has experience in advanced sports biomechanics by quantifying swing mechanics in various sports using IMUs and motion capture. She has conducted impact biomechanics studies using instrumented mouthguards and anthropomorphic test devices to characterize head loading during sports collisions.

Academic Credentials & Professional Honors

Ph.D., Biomedical Engineering, Arizona State University, 2019

M.S., Biomedical Engineering, Arizona State University, 2016

B.S., Biomedical Engineering, Arizona State University, 2014

NSF LSAMP Bridge to the Doctorate Fellow

Prior Experience

Senior Algorithm Engineer, Blast Motion, 2023-2025

Senior Algorithm Engineer, Masimo Inc., 2021-2023

Founding Algorithm Engineer, Force Impact Technologies, 2020-2021

Clinical Researcher, Barrow Neurological Institute, 2016-2019

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Graduate Researcher, Arizona State University, 2014-2019

Professional Affiliations

American Society of Biomechanics, Student Member, 2016-2019

Biomedical Engineering Society, Student Member, 2013-2019

Publications

Hussain VS, Frames CW, Lockhart TE. "Length of time-series gait data on Lyapunov exponent for fall risk detection." International Journal of Prognostics and Health Management 2021; 12(4):2917.

Hussain VS, Spano ML, Lockhart TE. "Effect of data length on time delay and embedding dimension for calculating local dynamic stability in walking." Journal of Royal Society Interface 2020; 17(168): 20200311.

Godzik J, Frames CW, Hussain VS, Olson MC, Kakarla UK, Uribe JS, Lockhart TE, Turner JD. "Postural stability and dynamic balance in adult spinal deformity: prospective pilot study." World Neurosurgery 2020; 141:e783-e791.

Khanwalker M, Johns J, Honikel MM, Smith V, Maxwell S, Santhanaraman S, La Belle JT. "Electrochemical Detection of Fertility Hormones." Crit Rev Biomed Eng. 2019;47(3):235-247.

Lieberman A, Lockhart TE, Olson MC, Smith Hussain VA, Frames CW, Sadreddin A, McCauley M, and Ludington E. "Nicotine bitartrate reduces falls and freezing of gait in Parkinson disease: a reanalysis." Frontiers in Neurology 2019; 10:424.

Smith VA, Lockhart TE, Spano ML. "Basins of attraction in human balance." Eur. Phys. J. Special Topics 2017; 226:3315-3324.

Presentations

Smith VA, Frames SW, Lockhart TE. Length of Time-Series Gait Data on Lyapunov Exponent for Fall Risk Detection. Oral Presentation, Annual Conference of the Prognostics and Health Management (PHM) Society, Scottsdale, Arizona, 2019.

Smith VA, Frames CW, Godzik J, Turner J, Lockhart TE. Evaluating the Severity of Adult Spinal Deformity using Timed-Up and Go. Oral Presentation, American Society of Biomechanics Annual Meeting, Mayo Clinical Rochester, Minnesota, 2018.

Smith VA, Frames CW, Olson MC, Lockhart TE, Lieberman A. No Postural Stability differences between Asymptomatic and Symptomatic Neurological Orthostatic Hypotension in Parkinson's disease – A Pilot Study. Poster presentation, American Academy of Neurology Annual Meeting, Los Angeles, CA, 2018.

Smith VA, Frames CW, Olson MC, Lieberman A, Lockhart TE. Discriminative Power of Sway Area Measures for Fall Risk Identification in Parkinson's Disease. Poster presentation, Rocky Mountain Bioengineering Symposium, Aurora, CO, 2017.

Smith VA, Lockhart TE, Spano ML. Application of Basins of Attraction to Postural Stability. Oral presentation, 14th Experimental Chaos & Complexity Conference, Banff, Alberta, Canada, 2016.

Smith VA, Lockhart TE, Spano ML. Application of Basin of Attraction to Postural Stability, Poster

presentation, Louis Stokes Alliances for Minority Participation Research Symposium, National Harbor, MD, 2016