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Engineering & Scientific Consulting

Heidi Fehr, Ph.D.

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Professional Profile

Dr. Fehr combines expertise in biomechanics and mechanical engineering to study human movement and injury mechanics. Her work focuses on biomechanical reconstruction and the evaluation of injury mechanisms across motor vehicle, occupational, recreational, and fall-related incidents, including slips and trips. Building on her background specializing in human movement analysis and wearable technology, Dr. Fehr integrates real-world evidence with injury biomechanics to provide comprehensive insights into injury risk, mechanism, and human performance.

Prior to joining Exponent, Dr. Fehr's research focused on using wearable sensors to conduct long-term, real-world studies of gait in populations with impairments. As a graduate researcher at the University of Wisconsin–Madison Biomechatronics, Assistive Devices, Gait Engineering & Rehabilitation Lab (BADGER Lab) she worked to develop custom algorithms for wearable-sensor data to quantify mobility and measure minimum foot clearance—a trip-risk indicator—in prosthesis users and persons with Multiple Sclerosis. Her work evaluated real-world conditions contributing to the likelihood of catching a toe or stumbling, and how changes in device design can affect the likelihood of a trip or fall. Research conducted by Dr. Fehr has been presented at scientific conferences and published in peer-reviewed journals.

During her work, Dr. Fehr utilized motion capture, inertial measurement units (IMUs), 3D scanning, prosthetic embedded load cells, electromyography and metabolic systems (COSMED). She has extensive experience creating custom algorithms to analyze and understand human movement. In her experience at the Ford Motor Company, she participated in the development and testing of safety and restraint systems. Dr. Fehr interned at Lockheed Martin Aeronautics, Cummins Inc., and McGill University where she tested and prototyped various devices.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Wisconsin, Madison, 2025

M.S., Mechanical Engineering, University of Wisconsin, Madison, 2022

B.S., Mechanical Engineering, University of Texas, El Paso, 2018

Graduate Engineering Research Fellow, UW–Madison

University of Texas at El Paso Top Ten Senior

Prior Experience

Research Assistant, University of Wisconsin–Madison Biomechatronics, Assistive Devices, Gait Engineering & Rehabilitation Lab, 2019-2025

Teaching Assistant, Mechanical Engineering, University of Wisconsin–Madison, 2024-2025

Combustion R&D Intern, McGill University, 2019

Product Development Engineering Intern (Safety & Restraints and Climate Controls), Ford Motor Company, 2017 & 2018

Development Engineer Co-op, Cummins Inc., 2017

Rapid Manufacturing Intern, Lockheed Martin, 2016

Professional Affiliations

Society of Women Engineers, former Collegiate President−UTEP Chapter

American Society of Biomechanics

Latinx in Biomechanix

International Women in Biomechanics

Publications

Fehr KH, Bartloff JN, Wang Y, Hetzel S, Adamczyk PG. Estimation of minimum foot clearance using a single foot-mounted inertial sensor and personalized foot geometry scan. Scientific Reports 2024; 14(1):13640.

Fehr KH, Kent JA, Major MJ, Adamczyk PG. Changes in dynamic mean ankle moment arm in unimpaired walking across speeds, ramps, and stairs. Journal of Biomechanical Engineering 2024; 146(094501).

Wang Y, Fehr KH, Adamczyk PG. Impact-aware foot motion reconstruction and ramp/stair detection using one foot-mounted inertial measurement unit. Sensors 2024; 24(5):1480.

Leestma JK, Fehr KH, Adamczyk PG. Adapting semi-active prostheses to real-world movements: sensing and controlling the dynamic mean ankle moment arm with a variable-stiffness foot on ramps and stairs. Sensors 2021; 21(18):6009.

Presentations

Fehr KH, Wang Y, Bartloff J, Acasio JC, Hendershot BD, Adamczyk PG. Striding confidently; prosthetic foot clearance in free-living, unsupervised neighborhood walks. Society of Women Engineers Conference WE24, Chicago, IL, 2024.

Fehr KH, Bartloff J, Wang Y, Acasio JC, Hendershot BD, Adamczyk PG. Detailed gait kinematics from a single wearable sensor: comparing four ankle-foot prostheses in free-living, unsupervised neighborhood walks. American Society of Biomechanics Annual Meeting, Madison, WI, 2024.

Fehr KH, Bartloff J, Wang Y, Koniezcka K, Mastej J, Adamczyk PG. Determining whole-foot minimum clearance by augmenting imu trajectory with personalized 3D scans. North American Congress of Biomechanics, Ottawa, ON, Canada, 2022.

Fehr KH, Bartloff J, Wang Y, Koniezcka K, Mastej J, Adamczyk PG. Real-world whole foot ground clearance. Dynamic Walking Conference, Madison, WI, 2022.

Fehr KH, Kent JA, Nakum J, Major MJ, Adamczyk PG. The effect of walking speed, slopes, and stairs on dynamic mean ankle moment arm. American Society of Biomechanics, Virtual, 2021.

Fehr KH, Boyea A, Orozco D, Pariente H. Front end control design and analysis of the gimbaled 2000lb CROME-X rocket engine for the JANUS vehicle. Southwest Emerging Technology Symposium, El Paso, TX, 2018.

Peer Reviews

Journal of Biomechanical Engineering