Exponent®
Engineering & Scientific Consulting

Sam Masters, Ph.D.

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Professional Profile

Dr. Masters' expertise is in biomechanics, including the analysis of human movement, soft tissue mechanics, human motion modeling and simulation, and human anatomy and physiology. He has extensive experience conducting biomechanical evaluations on sports equipment and apparel, validating the use of wearable sensors, and analyzing kinematic and kinetic data to assess complex full-body movements for populations ranging from normal populations to professional athletes.

Dr. Masters' experience includes the collection and analysis of biomechanical data using high-speed motion capture, inertial measurement units (IMUs), electromyography (EMG), mechanical testing systems (MTS), wearable force- and pressure-measuring sensors, real-time sport simulation, and metabolic measurement systems.

Dr. Masters was a faculty member at Penn State prior to joining Exponent. He served as an Assistant Research Professor in the College of Health and Human Development and served as the Associate Director of the Golf Teaching and Research Center. His experience at Penn State included conducting high quality research and teaching biomechanics and human anatomy. His research focused on developing analytical techniques and algorithms for assessing complex full-body motions, as well as developing and executing testing for a wide range of sports equipment and apparel. Prior to serving as a faculty member, his doctoral research focused on the effects of soft tissue motion on the dynamics of human locomotion.

Academic Credentials & Professional Honors

Ph.D., Kinesiology, Penn State University, 2020

M.S., Kinesiology, Penn State University, 2015

B.S., Exercise and Sport Science, University of Tulsa, 2012

Academic Appointments

Assistant Research Professor, College of Health and Human Development, Penn State, 2018-2021

Associate Director, The Golf Teaching and Research Center, Penn State, 2018-2021

Prior Experience

Assistant Research Professor, Penn State, 2018-2021

Associate Director, Golf Teaching and Research Center, Penn State, 2018-2021

Graduate Assistant, Biomechanics Lab, Penn State, 2012-2018

Teaching Assistant, Biomechanics & Sports Science, University of Tulsa, 2011-2012

Professional Affiliations

American Society of Biomechanics

Gait and Clinical Movement Analysis Society

International Society of Biomechanics in Sports

Publications

Masters SE, Challis JH. The effects of wobbling mass components on joint dynamics during running. Journal of Applied Biomechanics 2022; 38(2).

Masters SE, Challis, JH. Increasing the stability of the spring loaded inverted pendulum model of running with a wobbling mass. Journal of Biomechanics 2021; 110527.

Masters SE, Challis, JH. Soft tissue vibration: A biologically-inspired mechanism for stabilizing bipedal locomotion. Bioinspiration & Biomimetics 2021; 16:026015.

Presentations

Masters SE, Challis JH. Soft tissue increases stability and propulsion during human running. Podium presentation, 41st Annual American Society of Biomechanics Conference, Boulder, CO, 2017.

Masters SE, Wager J, Challis JH. A zero-feedback and stable running model controlled by a central pattern generator. Poster presentation, 41st Annual American Society of Biomechanics Conference, Boulder, CO, 2017.

Masters SE, Challis JH. The effects of adipose tissue vibration on the total body change in energy and signal time-frequency distribution. Poster presentation, 40th Annual American Society of Biomechanics Conference, Raleigh, NC, 2016.

Masters SE, Challis JH. The dynamics of a passive-dynamic walker with a wobbling mass. Poster presentation, 40th Annual American Society of Biomechanics Conference, Columbus, OH, 2015.

Masters SE, Challis JH. Soft tissue components increase stability and effect the kinematics of a bipedal passive-dynamic walker. XXV Congress of the International Society of Biomechanics, Glasgow, UK, 2015.

Research Grants

TURC Grant, University of Tulsa

Peer Reviews

PLOS ONE

Journal of Applied Biomechanics