



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## Bruce Miller, Ph.D., P.E.

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### Professional Profile

Dr. Miller's expertise includes human kinematics, dynamics, and injury mechanics. He has conducted a variety of experimental evaluations for the purpose of investigating injury mechanics and injury potential, including through the use of anthropomorphic test devices (ATDs). His work includes the analysis of injuries occurring in vehicular, pedestrian, occupational, and recreational accidents.

Prior to joining Exponent, Dr. Miller was a post-doctoral researcher in the Scansorial and Terrestrial Robotics and Integrated Design (STRIDe) Lab at Florida State University where he completed the Intelligence Community (IC) Postdoctoral Research Fellowship Program. His research projects focused on analysis of human and animal locomotion for rapid and robust movement on level, vertical, and inclined surfaces. This included modeling and simulation as well as robot design, fabrication, and experimental testing.

Dr. Miller is proficient in the collection of kinematic and kinetic data using high-speed motion capture, force/torque transducers, and joint position sensors as well as analyses using advanced computational software. He also has extensive experience developing and analyzing reduced-order and multi-body dynamic models (Working Model 2D and ADAMS) and in the fabrication of electromechanical systems.

### Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Florida State University, 2013

B.S., Biomedical Engineering, Boston University, *magna cum laude*, 2009

Intelligence Community Postdoctoral Fellow

Florida State University - University Fellow

Boston University Trustee Scholar

### Licenses and Certifications

Licensed Professional Engineer, Mechanical, Arizona, #71560

Northwestern University Center for Public Safety, Traffic Crash Reconstruction

Motorcycle Safety Foundation Basic Rider Course

## Professional Affiliations

Society of Automotive Engineers (SAE)

American Society of Mechanical Engineers (ASME)

## Publications

Toney-Bolger M, Campbell I, Miller B, Davis M, Fisher J. Evaluation of Occupant Loading in Low- to Moderate-Speed Frontal and Rear-End Motor Vehicle Collisions. SAE Technical Paper 2019-01-1220, 2019.

Brown JM, Austin MP, Miller BD, Clark JE. Evidence for multiple dynamic climbing gait families. *Bioinspiration & Biomimetics* 2019; 14(3).

Blackman DJ, Nicholson JV, Ordonez C, Miller BD, Clark JE. Gait development on Minitaur, a direct drive quadrupedal robot. SPIE Unmanned Systems Technology XVIII, Baltimore, MD, 2016.

Brown JM, Miller BD, Clark JE. Classification of dynamical vertical climbing gaits. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Daejeon, Korea, 2016.

Miller BD, Clark JE. Towards highly-tuned mobility in multiple domains with a dynamical legged platform. *Bioinspiration & Biomimetics* 2015; 10(4).

Miller BD, Clark JE. Dynamic similarity and scaling for the design of dynamical legged robots. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hamburg, Germany, 2015.

Miller BD, Rivera PR, Dickson JD, Clark JE. Running up a wall: the role and challenges of dynamic climbing in enhancing multi-modal legged systems. *Bioinspiration & Biomimetics* 2015; 10(2).

Miller BD, Brown J, Clark JE. On prismatic and torsional actuation for running legged robots. *Experimental Robotics* 2016; 109.

Miller BD, Cartes D, Clark JE. Adaptive control of leg stiffness for hopping on unknown terrains. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Tokyo, Japan, 2013.

Miller BD, Darnell A, Clark JE. Running in the horizontal plane with a multi-modal dynamical robot. IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Germany, 2013.

Miller BD, Ordonez C, Clark JE. Examining the effect of rear leg specialization on dynamic climbing with SCARAB: a dynamic quadrupedal robot for locomotion on vertical and horizontal surfaces. International Symposium on Experimental Robotics (ISER), Quebec City, Canada, 2012.

Miller BD, Schmitt J, Clark JE. Quantifying disturbance rejection of SLIP-like running systems. *The International Journal of Robotics Research* 2012; 31(5).

Andrews B, Miller BD, Schmitt J, Clark JE. Running over unknown rough terrain with a one-legged planar robot. *Bioinspiration & Biomimetics* 2011; 6(2).

Miller BD, Andrews B, Clark JE. Improved stability of running over unknown rough terrain via prescribed energy removal. International Symposium on Experimental Robotics (ISER), New Dehli, India, 2010.

Shill J, Miller BD, Schmitt J, Clark JE. Design of a dynamically stable horizontal plane running. IEEE International Conference on Robotics and Automation (ICRA), Anchorage, AK, 2010.

## **Presentations**

On prismatic and torsional actuation for running legged robots. International Symposium on Experimental Robotics (ISER) 2014, June 15 - 18, Marrakech/Essaouira, Morocco.

Dynamic, multi-modal locomotion with miniature, legged platforms, Intelligence Community Postdoctoral Research Fellowship Consortium 2014, April 29 - May 1, Washington, DC.

A novel platform for locomotion in vertical and horizontal regimes, Florida Conference on Recent Advances in Robotics 2013, May 14, Tallahassee, FL.

Dynamic quadrupedal vertical running and designs for dynamic running using monolithic compliant legs, Dynamic Walking 2012, May 21 - 24, Pensacola Beach, FL.