Katie Fitzsimons

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Mechanical Engineering
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EDUCATION

Ph.D., Mechanical Engineering
Northwestern University, Evanston, IL 2020
Thesis: Motion as an Information Signal in Physical Human-Robot Interaction
Advisor: Todd D. Murphey, Ph.D.

M.S., Mechanical Engineering
Northwestern University, Evanston, IL 2017
Thesis: Model-based Assistance for Human-in-the-loop Control

B.S., Mechanical Engineering
Michigan State University, East Lansing, MI 2013

EMPLOYMENT

The Pennsylvania State University
Assistant Professor January 2021 – Present

PUBLICATIONS

[11] A. Kalinowska, A. Prabhakar, **K. Fitzsimons**, and T. D. Murphey. Ergodic imitation: Learning from what to do and what *not* to do. In *Int. Conf. on Robotics and Automation (ICRA)*, 2021.

[10] A. Kalinowska, K. Rudy, M. Schlafly, **K. Fitzsimons**, J. Dewald and T. D. Murphey Shoulder abduction loading affects motor coordination in individuals with chronic stroke, informing targeted rehabiliation. In *IEEE RAS/EMBS Int. Conf. on Biomedical Robotics and Biomechatronics (BioRob)*, 2020.

[9] **K. Fitzsimons**, A. Kalinowska, J. P. Dewald, and T. D. Murphey. Task-Based Hybrid Shared Control for Training Through Forceful Interaction. *International Journal of Robotics Research* 39(9):1139–1154, 2020.

[8] **K. Fitzsimons**, A. M. Acosta, J. P. Dewald, and T. D. Murphey. Ergodicity Reveals Assistance and Learning from Physical Human-Robot Interaction. *Science Robotics.* 4(29), 2019.

[7] T. Berrueta, A. Pervan, **K. Fitzsimons**, and T. D. Murphey. Dynamical System Segmentation for Information Measures in Motion. *Robotics and Automation Letters*, 4(1):169–176, 2018.

[6] A. Kalinowska, **K. Fitzsimons**[1], J. P. Dewald, and T. D. Murphey. Online User Assessment for Minimal Intervention During Task-Based Robotic Assistance. In *Robotics: Science and*

[1] A. Kalinowska and K.Fitzsimons contributed equally to this work.

Systems, 2018.

[5] **K. Fitzsimons**, E. Tzorakoleftherakis, and T. D. Murphey. Optimal human-in-the-loop interfaces based on Maxwell's Demon. In *American Control Conference (ACC)*, pages 4397–4402, July 2016.

[4] B. T. Weaver, **K. Fitzsimons**, J. Braman, and R. Haut. The role of shoe design on the prediction of free torque at the shoe–surface interface using pressure insole technology. *Sports biomechanics*, 15(3):370–384, 2016.

[3] B. T. Weaver, **K. Fitzsimons**, J. E. Braman, and R. C. Haut. Torque prediction at the shoe–surface interface using insole pressure technology. *Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology*, 227(4):219–225, 2013.

[2] B. T. Weaver, **K. Fitzsimons**, J. E. Braman, and R. C. Haut. The Use of Plantar Insole Pressure Sensors to Predict the Free Torque Produced at the Shoe-Surface Interface During Internal Rotation of the Body Relative to a Planted Foot. In *ASME Bioengineering Conference*, pages V01BT38A003–V01BT38A003. American Society of Mechanical Engineers, 2013.

[1] K. D. Button, F. Wei, E. G. Meyer, **K. Fitzsimons**, and R. C. Haut. Determination of in situ ankle ligament strains in cases of high and medial ankle sprains. In *ASME Bioengineering Conference*, pages 275–276. American Society of Mechanical Engineers, 2012.

HONORS and AWARDS

- National Defense Science & Engineering Graduate Research Fellowship 2016
- Northwestern Univ. Mechanical Engineering Graduate Leadership and Service Award 2015
- National Science Foundation Graduate Research Fellowship 2014
- Tau Beta Pi Endowed Scholarship 2013
- Tau Beta Pi Conrad Supplemental Award Scholarship 2013
- Agnes Hunt and Claude Marshall Cade Endowed Scholarship 2012
- Dr. Charles R. St. Clair, Jr. Endowed Scholarship 2012
- Charles and Mary Jane Spalding Engineering Scholarship 2011

TEACHING

Pennsylvania State University

- Taught course: Mechanical Engineering Design, ME 340 (2021-Present)

Northwestern University April – June 2018

- Co-developed and co-taught course with my advisor: Active Learning in robotics, ME 495 (Spring 2018)
- Teaching Assistant for Machine Dynamics, ME 314 (2015-2020)

PROFESSIONAL ACTIVITIES

Associate Editor for ICRA 2022
Reviewer for IEEE Transaction on Human-Machine Systems 2021
Penn State Human Powered Vehicle Team Faculty Sponsor 2021
Penn State ME Faculty Search Committee 2021-2022

Panelist for National Science Foundation	2021
Meta-Reviewer for RSS Pioneers	2021
Reviewer for ICRA/RA-L	2021
Reviewer for Conference on Robot Learning	2020
Reviewer for Robotics: Science and Systems	2019
IEEE, Student Member	2015-Present
Mechanical Engineering Graduate Student Society Executive Board	2015-Present
• Professional Development Chair	2018
• Social Activities Chair	2016
• Recruitment Chair	2015
• Peer Mentor	2015-2018
Tau Beta Pi, *Vice President*	December 2012-December 2013
Pi Tau Sigma, *Vice President & Secretary*	May 2013-December 2013

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INVITED TALKS

An Information-Theoretic Approach to Evaluation and Control of Human-Robot Motion.

University of Minnesota, MN Feb. 2019

Michigan State University, MI April 2019

Rethinking Motion Measures for Physical Human-Robot Interaction

Villanova University, PA Jan. 2020

Pennsylvania State University, PA Feb. 2020

University of Texas, TX Feb. 2020

University of Washington, WA March 2020

Harvard University, Virtual March 2020

University of Louisville, KY March 2020

University of Massachusetts, Virtual March 2020

Using Information Encoded in Motion to Close the Loop on pHRI.

ASME International Design Engineering Technical Conference: SEC-session, August 2021