

## Rebecca Fenton Friesen

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### Education

2020	P.h.D. Mechanical Engineering, Northwestern University, Evanston IL
2016	M.S. Mechanical Engineering, Northwestern University, Evanston IL
2009	B.A. Physics, <i>summa cum laude</i> , Goshen College, Goshen Indiana

### Research Interests

- Actuation and perception of tactile cues for enhancing virtual interactions and prosthetic control
- Texture discrimination and parameterization on friction-modulated haptic displays
- The biomechanical properties of the body and their effect on tactile perception

### Skills

- Psychophysical testing design and implementation for perceptual studies of haptic displays
- Electromechanical design and construction of haptic displays and measurement apparatus
- MATLAB, Python, and C for data collection and analysis on PCs and microcontrollers
- LaTeX, Adobe Illustrator, and Powerpoint for science communication
- Teaching and mentoring undergraduate and graduate students in the lab and classroom

### Research and Professional Experience

2020-present	<b>Department of Cognitive Robotics, TU Delft</b> <i>Post-Doctoral Researcher</i> Exploring novel methods of tactile feedback during active exploration of haptic surfaces
2013-2020	<b>Neuroscience and Robotics Laboratory, Northwestern University</b> <i>Masters Student 2013-2014, Graduate Research Assistant 2014-2020</i> Exploring surface haptic technology with a focus on characterizing ultrasonic friction reduction and rendering texture via friction modulation
2009-2013	<b>Miller Laboratory of Limb Motor Control, Northwestern University</b> <i>Lab Technician</i> Assisted with equipment maintenance, animal training, and data analysis in a neural engineering lab developing brain-machine interface technology
2006-2009	<b>Biophysics Research Group, Goshen College</b> <i>Undergraduate Research Assistant</i> Studied the role of sterol molecules within cell membranes in ion channel formation

### Honors and Awards

2019	Co-authored paper nominated for Best Paper, World Haptics Conference (WHC)
2017	Winner of Martin Outstanding Doctoral Fellowship
2015	Winner of Best Student Presentation and nominated for Best Paper, WHC
2005	Winner of National Merit Scholarship

## Teaching Experience

	<b>Northwestern University</b>
2018	<i>Co-Instructor: Introduction to Dynamic Systems</i> Co-taught a senior level ME class of 90 students. Responsibilities included lecturing, creating homework assignments, and administrative work (e.g. managing learning accommodations, attendance, grading)
2017	<i>Guest Lecturer: Experimental Engineering</i> Taught a class period on the principles of Psychophysics
2017	<i>Teaching Assistant: Experimental Engineering</i> Supervised lab hours, graded lab reports and homework assignments
2014-2015	<i>Teaching Assistant: Introduction to Dynamic Systems</i> Held weekly office hours, assisted flipped classroom activities, graded exams
	<b>Goshen College</b>
2008	<i>Teaching Assistant: German II</i> Led weekly discussion groups, administered quizzes
2006-2008	<i>Lab Assistant: Physical World (Introduction to Physics for non-majors)</i> Supervised weekly lab sessions, assisted with equipment, graded lab notebooks
2006-2008	<i>Academic Tutor</i> Met with students on a weekly basis for tutoring in essay writing and physics

## Leadership and Professional Activities

2020-present	Member of Hesston College Engineering Advisory Board
2018	Participant in Rising Stars in Mechanical Engineering Workshop at MIT
2018	Workshop leader for Northwestern's New TA Conference
2017-present	Peer reviewer for World Haptics and Transactions on Haptics technical papers
2015	Member of Local Arrangements Committee for World Haptics Conference
2014-2017	Neuroscience and Robotics Lab Tour Coordinator
2009	Member of Goshen College Search Committee for new Physics Professor

## Invited Talks

2020	Rehabilitation Neural Engineering Labs, University of Pittsburgh
2019	Science Speaker Series, Goshen College
2014	Featured Speaker, Women in Science Workshop, Goshen College

## Papers

(submitted) Friesen, R.F., Klatzky, R.L., Peshkin, M.A. and Colgate, J.E., "Building a navigable fine texture design space," Submitted to Transactions on Haptics June 2020. arXiv:2006.07294 [cs.HC]

Bodas, P., Friesen R.F., Nayak A., Tan H.Z., and Klatzky, R. (2019, July). Roughness Rendering by Sinusoidal Friction Modulation: Perceived Intensity and Gradient Discrimination. In World Haptics Conference (WHC), 2019 IEEE. *Nominated for Best Paper Award*

Friesen, R.F., Klatzky, R.L., Peshkin, M.A. and Colgate, J.E. (2018, March). Single Pitch Perception of Multi-frequency Textures. Haptics Symposium (HAPTICS), 2018 IEEE. (pp. 290–295).

Friesen, R. F., Wiertlewski, M., Peshkin, M. A., & Colgate, J. E. (2017, June). The Contribution of Air to Ultrasonic Friction Reduction. In World Haptics Conference (WHC), 2017 IEEE. (pp. 517-522).

Friesen, R. F., Wiertlewski, M., & Colgate, J. E. (2016, April). The role of damping in ultrasonic friction reduction. In Haptics Symposium (HAPTICS), 2016 IEEE (pp. 167-172).

Wiertlewski, M., Friesen, R. F., & Colgate, J. E. (2016). Partial squeeze film levitation modulates fingertip friction. *Proceedings of the National Academy of Sciences*, 113(33), 9210-9215.

Friesen, R. F., Wiertlewski, M., Peshkin, M. A., & Colgate, J. E. (2015, June). Bioinspired artificial fingertips that exhibit friction reduction when subjected to transverse ultrasonic vibrations. In World Haptics Conference (WHC), 2015 IEEE (pp. 208-213). *Nominated for Best Paper Award*

Weber, D. J., Friesen, R., & Miller, L. E. (2012). Interfacing the somatosensory system to restore touch and proprioception: essential considerations. *Journal of Motor Behavior*, 44(6), 403-418.

### **Meeting Abstracts, Posters, and Demonstrations**

Friesen, R. F., M.A. Peshkin and J. E. Colgate, "Discriminating Gradients: Communicating via Continuous Change in Texture. *Proceedings of the World Haptics Conference (WHC), IEEE, 2019.*

Friesen, R. F., R.L. Klatzky, M.A. Peshkin and J. E. Colgate, "Two Frequencies, One Pitch: Exploring Pitch Perception When Scanning Multi-frequency Textures", *Hand, Brain and Technology Conference, 2018.*

Friesen, R. F., R.L. Klatzky, M.A. Peshkin and J. E. Colgate, "Single Pitch Perception of Multi-frequency Textures", *Proceedings of Haptics Symposium, IEEE, 2018.*

Friesen, R. F., M. Wiertlewski, M.A. Peshkin and J. E. Colgate, "Stroboscopic investigation of ultrasonic friction reduction on a vibrating plate", *Proceedings of the World Haptics Conference (WHC), IEEE, 2015.*

Oby E.R., R. Friesen, and L.E. Miller. "Muscle-like neurons for a muscle-like BMI: No evidence for extrinsic neurons in M1," *Society for Neuroscience annual meeting, San Diego, CA, 2010.*

Friesen, R., C. Helrich, E. Sucipto, and K. Steiner. "Monte Carlo Simulations of Sterol Superlattice Mosaics in Bilayers Yield Simultaneous Agreement with Concentration and Chemical Potential Data," *Biophysical Society annual meeting, Boston, MA, 2009.*

Friesen, R., C. Helrich, E. Sucipto, K. Steiner, and D. Woodbury, "Experimental and Monte Carlo Investigations of Nystatin Channel Current Decay and Sterol Mosaics in Mixed Lipid/Ergosterol Domains at Moderate Ergosterol Mol Fraction," *Biophysical Society annual meeting, Long Beach, CA, 2008.*

Friesen, R. "Monte Carlo Investigations of Sterol Microstructure Mosaics in Mixed Lipid/Ergosterol Domains at Moderate Ergosterol Mol Fraction," *Proceedings of The National Conference On Undergraduate Research (NCUR), Salisbury, MD, 2008.*