# Rebecca Fenton Friesen

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## Research Interests

- Friction modulation and its use in rendering surface haptic effects
- The biomechanical properties of the fingertip and their effect on tactile perception
- Texture discrimination and parameterization on surface haptic devices

## Education

2020 (expected) P.h.D. Mechanical Engineering, Northwestern University, Evanston IL
2016 M.S. Mechanical Engineering, Northwestern University, Evanston IL
2009 B.A. Physics, *summa cum laude*, Goshen College, Goshen Indiana

## Research and Professional Experience

2013-present **Mechanical Engineering Department, Northwestern University**
*Masters Student 2013-2014, Graduate Research Assistant 2014-present, Neuroscience and Robotics Laboratory*
Studying surface haptic technology with a focus on characterizing ultrasonic friction reduction and rendering texture via friction modulation

2009-2013 **Feinberg School of Medicine, Northwestern University**
*Lab Technician, The Miller Laboratory of Limb Motor Control*
Assisted with equipment maintenance, animal training, and data analysis in a neural engineering lab developing brain-machine interface technology

2006-2009 **Goshen College**
*Undergraduate Research Assistant, Biophysics Research Group*
Studied the patterned distribution of sterol molecules within cellular membranes and their role in ion channel formation

## Honors and Awards

2017 Martin Outstanding Doctoral Fellowship
2015 Best Student Presentation, World Haptics Conference
2005 National Merit Scholarship

## Teaching Experience

**Northwestern University**

2018 *Co-Instructor: Introduction to Dynamic Systems*
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)

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| 2017 | *Guest Lecturer: Experimental Engineering* |
| | Taught a class period on the principles of Psychophysics |
| 2017 | *Teaching Assistant: Experimental Engineering* |
| | Supervised lab hours, graded lab reports and homework assignments |
| 2014-2015 | *Teaching Assistant: Introduction to Dynamic Systems* |
| | Held weekly office hours, assisted flipped classroom activities, graded exams |
| | **Goshen College** |
| 2008 | *Teaching Assistant: German II* |
| | Led weekly discussion groups, administered quizzes |
| 2006-2008 | *Lab Assistant: Physical World (Introduction to Physics for non-majors)* |
| | Supervised weekly lab sessions, assisted with equipment, graded lab notebooks |
| 2006-2008 | *Academic Tutor* |
| | Met with students on a weekly basis for tutoring in essay writing and physics |

## Leadership and Professional Activities

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| | **Northwestern University** |
| 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 |
| | **Goshen College** |
| 2009 | Member of Search Committee for new Physics Professor |

## Invited Talks

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| 2019 | Science Speaker Series, Goshen College |
| 2014 | Featured Speaker, Women in Science Workshop, Goshen College |

## Peer-Reviewed Manuscripts

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.

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).

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.