

CV, Wyatt Felt (wfelt@umich.edu)

PhD, Mechanical Engineering
Homepage: <http://wyattfelt.com>
Google Scholar Profile ([link](#))
US Citizen



My research develops **advanced soft robotic methods** for applications in assistance, rehabilitation and medicine.

Education/Training

Postdoc.,	Swiss Federal Institute of Technology in Lausanne (EPFL)	2017-18
Ph.D.,	NSF Graduate Research Fellow ('14-'17) Mechanical Engineering, University of Michigan	August 2017
M.S.,	Mechanical Engineering, University of Michigan	April 2016
B.S.,	Mechanical Engineering, Brigham Young University	April 2013

Technical Publications and Patents (Last updated: November 27, 2018)

Journal Articles

- [1] **Wyatt Felt**. "Folded-Tube Soft Pneumatic Actuators for Bending". *Soft Robotics* (2018). (In Press).
- [2] **Wyatt Felt**, Shihan Lu, and C. David Remy. "Modeling and Design of "Smart Braid" Inductance Sensors for Fiber-Reinforced Elastomeric Enclosures". *IEEE Sensors* (2018). DOI: 10.1109/JSEN.2018.2802640.
- [3] **Wyatt Felt** and C. David Remy. "A Closed-Form Kinematic Model for Fiber Reinforced Elastomeric Enclosures". *Journal of Mechanisms and Robotics* (2018). (Technical Brief). DOI: 10.1115/1.4038220.
- [4] **Wyatt Felt**, Maria Telleria, Thomas F. Allen, Gabriel Hein, Jonathan B. Pompa, Kevin Albert, and C David Remy. "An Inductance-Based Sensing System for Bellows-Driven Continuum Joints in Soft Robots". *Autonomous Robots* (2018). (Extension of [12]). DOI: 10.1007/s10514-018-9769-7.
- [5] Matthew A. Robertson, Masato Murakami, **Wyatt Felt**, and Jamie Paik. "A Compact Modular Soft Surface with Reconfigurable Shape and Stiffness". *IEEE Transactions on Mechatronics* (2018). DOI: 10.1109/TMECH.2018.2878621.
- [6] **Wyatt Felt**, Khai Yi Chin, and C. David Remy. "Smart Braid Feedback for the Closed-loop Control of Soft Robotic Systems". *Soft Robotics* (2017). DOI: 10.1089/soro.2016.0056.
- [7] **Wyatt Felt**, Khai Yi Chin, and C. David Remy. "Contraction Sensing With Smart Braid McKibben Muscles". *IEEE/ASME Transactions on Mechatronics* (2016). **2015 Prize for Contributions to Soft Robotics Research (Harvard)**. DOI: 10.1109/TMECH.2015.2493782.
- [8] **Wyatt Felt**, Jessica C. Sellinger, J. Maxwell Donellan, and C. David Remy. ""Body-In-The-Loop": Optimizing Device Parameters Using Measures of Instantaneous Energetic Cost". *PLOS ONE* (2015). DOI: 10.1371/journal.pone.0135342.
- [9] Guido Bender, **Wyatt Felt**, and Michael Ulsh. "Detecting and localizing failure points in proton exchange membrane fuel cells using IR thermography". *Journal of Power Sources* 253 (2014), pp. 224-229. DOI: 10.1016/j.jpowsour.2013.12.045.

Note: The methods I developed in [8] inspired and enabled work by:

Prof. Steve Collins (Stanford)	Zhang et al. <i>Science</i> 2017.
Prof. Conor Walsh (Harvard)	Kim, Ding, et al. <i>PLOS One</i> 2017
	Ding, Kim et al. <i>Science Robotics</i> 2018
Prof.'s David Remy and Dan Ferris (Michigan)	Koller et al. <i>Robotics: Science & Systems</i> 2016
	Koller et al. <i>Jrnl of Appl. Physiology</i> 2017

Peer-Reviewed, Full-Length Conference Papers

- [10] **Wyatt Felt**. “An Inverting-Tube Clutching Contractile Soft Pneumatic Actuator”. (ICRA 2019, Under Review).
- [11] **Wyatt Felt**, Matthew A. Robertson, and Jamie Paik. “Modeling Vacuum Bellows Soft Pneumatic Actuators with Optimal Mechanical Performance”. *Soft Robotics (RoboSoft 2018), 2018 IEEE-RAS International Conference on*. Apr. 2018, pp. 534–540. DOI: 10.1109/ROBOSOFT.2018.8405381.
- [12] **Wyatt Felt**, Maria Telleria, Thomas F. Allen, Gabriel Hein, Jonathan B. Pompa, Kevin Albert, and C David Remy. “An Inductance-Based Sensing System for Bellows-Driven Continuum Joints in Soft Robots”. *Robotics Science and Systems XIII. Finalist for Best Systems Paper in Memory of Seth Teller*. 2017. DOI: 10.15607/RSS.2017.XIII.027.
- [13] **Wyatt Felt**, Michelle Suen, and C David Remy. “Sensing the Motion of Bellows through Changes in Mutual Inductance”. *Intelligent Robots and Systems (IROS 2016), 2016 IEEE/RSJ International Conference on*. IEEE. 2016. DOI: 10.1109/IROS.2016.7759772.
- [14] **Wyatt Felt** and C David Remy. “Smart Braid: Air Muscles that Measure Force and Displacement”. *Intelligent Robots and Systems (IROS 2014), 2014 IEEE/RSJ International Conference on*. IEEE. 2014, pp. 2821–2826. DOI: 10.1109/IROS.2014.6942949.

Conference Presentations (Extended Abstract)

- [15] **Wyatt Felt** and Jamie Paik. “Folded-Tube Membrane Soft Pneumatic Actuators, Initial Work”. *Soft Robotics (RoboSoft 2018), 2018 IEEE-RAS International Conference on; Late breaking results*.
- [16] **Wyatt Felt**, Khai Yi Chin, and C. David Remy. “Dynamic Tracking of Joint Motion with Antagonized Smart Braids”. *Fluid Power Innovation & Research Conference (FPIRC15)*. 2015.
- [17] **Wyatt Felt**, Khai Yi Chin, and C. David Remy. “Using Conductive Fibers as “Smart Braids” to Sense Deflection through Changes in Inductance”. *ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS2015)*. 2015.
- [18] **Wyatt Felt**, Emily S. Gardinier, Jeffrey Wensman, Deanna H. Gates, and C. David Remy. “Body-in-the-Loop Optimization for the Selection of Prosthetic Control Parameters—A Pilot Study”. *39th Annual Meeting of the American Society of Biomechanics*. 2015.
- [19] **Wyatt Felt**, Jessica Selinger, J Maxwell Donelan, and C David Remy. “Body-in-the-Loop—Optimizing Actual Human Walking”. *Dynamic Walking*. 2014.
- [20] Guido Bender, **Wyatt Felt**, and Michael Ulsh. “The Spatial Performance Effect of Electrode Defects in PEMFC”. *Meeting Abstracts*. 13. The Electrochemical Society. 2012, pp. 1588–1588.

Conference Posters

- [21] **Wyatt Felt**, Khai Yi Chin, and C David Remy. “Self-Sensing Pneumatic Artificial Muscles for Feedback Control using the Inductance of “Smart Braids””. *Dynamic Walking*. 2016.

- [22] Audra Davidson, Emily S. Gardinier, **Wyatt Felt**, Jeffrey Wensman, C. David Remy, and Deanna H. Gates. “Changes in Metabolic Cost with Varying Power Settings of a Powered Ankle Prosthesis”. *39th Annual Meeting of the American Society of Biomechanics*. 2015.
- [23] Emily S. Gardinier, **Wyatt Felt**, Jeffrey Wensman, C. David Remy, and Deanna H. Gates. “Compensations Exist in Persons with Transtibial Amputation using Powered Ankle Prosthesis”. *39th Annual Meeting of the American Society of Biomechanics*. 2015.

Patents and Applications

- [24] **Wyatt Felt** and C. David Remy. *Sensing method for fiber-driven motion systems*. U.S. Application No. 14/743,062. 2015.
- [25] Kurt Gibbons Workman, Tanor G. Hodges, Jacob B. Colvin, **Wyatt Felt**, Jordan Monroe, and Zachary David Bomsta. *Wireless infant health monitor*. WO2014035836 A1. 2014.

PhD Dissertation

Wyatt Felt. *Sensing Methods for Soft Robotics*. Univ. of Michigan, Rackham Graduate School. 2017. DOI: 2027.42/138590.

—*Other presentations (e.g. workshops) and misc. publications listed at the end*—

Employment History

Postdoctoral Fellow, Swiss Federal Institute of Technology in Lausanne (EPFL) <i>Developed soft robotic actuators for wearable/rehab applications</i>	2017-2018
Graduate Research Assistant and Lab Manager, Prof. C. David Remy (U. of Michigan) <i>Developed unique, inductance-based sensing system for soft robotics</i> <i>Developed “body-in-the-loop” methods for the online optimization of wearable robotic devices</i>	2013-2017
Part-time Instructor, Eastern Michigan University <i>Sole instructor of undergraduate course in creative concept development for product design</i>	Winter 2017
Founding Member and Head of Product Development, Owlet Baby Care (owletcare.com) <i>Led design team for an innovative at-home SpO₂ monitor for at-risk infants</i>	2012–2013
Intern, National Renewable Energy Lab (NREL) <i>Analyzed and tested non-destructive inspection techniques for fuel-cell materials</i>	Summer 2012
Intern, iRobot Corporation <i>Developed automated testing equipment and procedures for micro-gearmotor clutches</i>	Summer 2011
Full-time Volunteer Ecclesiastical Instructor, Ecuador <i>Trained new instructors, Managed groups of 14 instructors</i>	2008–2010

Awards and Fellowships

Finalist for Best Systems Paper in Memory of Seth Teller, <i>Robotics: Science and Systems</i> <i>Bellows-driven continuum joint with inductance-based sensing</i> , see [12]	July 15, 2017
Graduate Research Fellowship, National Science Foundation (NSF)	2014–2017
2015 Prize for Contributions in Soft Robotics Research, Soft Robotics Toolkit (Harvard) <i>Based on work published in [7], Announcement of Winners</i> <i>Selected from among 82 teams from over 20 countries</i> Learn more: The 2015 Soft Robotics Competition. <i>IEEE Robotics & Automation Magazine</i> . 2016. https://doi.org/10.1109/MRA.2016.2587959	2015
Third Place, Optics Demo Contest, Cntr. for Engr. Diversity and Outreach, U. of Michigan	2013
First Place, Student Innovator of the Year Competition, Brigham Young University News release, Popular press	2012
Crocker Innovation Fellowship <i>Year-long program to train multi-disciplinary innovation and entrepreneurship.</i>	2012
Third Prize with “PosterBot,” iRobot Create Constest, Instructables.com <i>This inspired GaTech’s “PrintBot,” now in the iRobot Hall of Fame.</i> Popular press: Engadget, Make Magazine Blog, Hack-a-day	2007
First Place, National Technology Bowl, Technology Student Association (TSA) Popular press	2007

Teaching, Outreach, and Mentorship

Mentored PhD students , EPFL	2017-2018
Supervised undergraduate and graduate design teams , EPFL	Fall 2017
Instructor of Product Design and Development course “Concept Development Studio” (PDD 316), Eastern Michigan Univesity	Spring 2017
Directly supervised undergraduate research assistants , University of Michigan	
Juliet Lawton	Jun.–Aug. 2016
Khai Yi Chin	Jan. 2015–Jun. 2016
Michelle Suen	Jan. 2015–Feb. 2016
Shaun Marshall	May.–Sept. 2015
Kevin Green	Jan.–Apr. 2014
Jalen Wize	Sept.–Dec. 2013
Participated in graduate course on “Teaching Engineering” College of Engineering, University of Michigan	Fall 2016
Participated in five-week seminar on College Teaching with Outcomes-Centered Course Design Center for Research on Learning and Teaching, University of Michigan	May 2016
Assisted the Design and Facilitation of Workshops on the Science of Walking and Running Ann Arbor Hands-On Museum	Dec. 3, 2015; Apr. 7, 2016; Aug. 10, 2016

Technical Mentor for Undergraduate Design Team - PeriOperative University of Michigan M-HEAL Program	April-Sept., 2016
Mentored a Multi-Disciplinary “Design Immersion” team of incoming freshman University of Michigan College of Engineering.	Sept. 2–4, 2015
Supported a hands-on robotics workshop for the “Xplore Engineering” outreach event University of Michigan College of Engineering	June 26, 2015

Professional Membership and Service

Membership

Tau Beta Pi

IEEE: Robotics and Automation Society, Technical Committee on Soft Robotics, Sensors Council

Invited Reviews

# of reviews*	Publication	Publisher	Type
31	Transactions of Mechatronics	IEEE/ASME	Journal
4	Mechatronics	Elsevier	Journal
3	Journal of Mechanisms and Robotics	ASME	Journal
3	Robotics and Automation Letters (RA-L)	IEEE	Journal
1	Transactions on Robotics	IEEE	Journal
1	Sensors & Actuators: A. Physical	Elsevier	Journal
1	International Conference on Intelligent Robots and Systems (IROS)	IEEE/RSJ	Conference
1	Robotics: Science & Systems	RSS	Conference
1	International Conference on Humanoid Robots	IEEE-RAS	Conference

**includes reviews of revised submissions*

Other Presentations and Publications

Workshop Presentations

- [1] **Wyatt Felt** and C David Remy. “Soft Actuators with Integrated Inductance Sensing for Material Robotics”. *Robotics: Science and Systems Conference, Workshop on Advances on Material Robotics*. 2017.
- [2] **Wyatt Felt** and C David Remy. “Variable Inductance Structures for Self-Sensing Soft Actuation in Wearable Robotic Devices”. *Joint Workshop on Wearable Robotics and Assistive Devices; Intelligent Robots and Systems (IROS 2016), 2016 IEEE/RSJ International Conference on*. 2016.
- [3] **Wyatt Felt** and C David Remy. “How to Create Self-Sensing Air Muscles from Conductive Fibers”. *Robotics: Science and Systems Conference, Workshop on Advances on Soft Robotics*. 2014.

Invited Presentations

- [1] **Wyatt Felt**, Emily Gardinier, Deanna H. Gates, C. David Remy, and Arthur D. Kuo. “Reducing Effort Through an Augmented Lower Limb Prosthesis”. *MCubed Symposium, University of Michigan*. 2014.
- [2] **Wyatt Felt**, Ryan Butler, Brandon Hanna, Boris Martinez, Braeden Brown, Kevin Farr, and Steven Charles. “Lunch Presentation on TAG Brace Modification for PC Patients”. *International Pachyonychia Congenita Consortium (IPCC)*. 2013.

Misc. Publications and Projects

- [1] **Wyatt Felt** and C. David Remy. *Self-Inductance of Smart Braid Fiber Reinforced Elastomeric Enclosures*. <https://ch.mathworks.com/matlabcentral/fileexchange/62507-self-inductance-of-smart-braid-fiber-reinforced-elastomeric-enclosures>. 2017.
- [2] **Wyatt Felt**. *Lorentz Force Pendulum*. <https://vimeo.com/152736258>. 2016.
- [3] **Wyatt Felt**. *Self-Inductance with Neumann Formula*. <http://www.mathworks.com/matlabcentral/fileexchange/50708-self-inductance-with-neumann-formula>. 2015.
- [4] **Wyatt Felt**, Khai Yi Chin, Kevin Green, and C. David Remy. *“Smart Braids”–Conductive Reinforcing Fibers*. <http://softroboticstoolkit.com/book/smart-braids>. 2015.
- [5] **Wyatt Felt** and C. David Remy. *Instantaneous Cost Mapping*. <http://www.mathworks.com/matlabcentral/fileexchange/51328-instantaneous-cost-mapping>. 2015.
- [6] **Wyatt Felt**. *Laser-Cut Posable Refrigerator Magnets*. <http://www.instructables.com/id/Laser-Cut-Posable-Refrigerator-Magnets/>. 2014.
- [7] **Wyatt Felt**. *The Egg Cage: Boil an Egg in your Microwave*. <https://vimeo.com/83734306>. 2014.
- [8] **Wyatt Felt**, Ryan Butler, Brandon Hanna, Boris Martinez, Braeden Brown, Kevin Farr, and Steven Charles. *Pain-Reducing Device for PC Patients*. <http://capstone.byu.edu/previous-projects/pain-reducing-device-pc-patients>. 2013.
- [9] **Wyatt Felt**. *Electromagnetic Excitation Methods for Thermographic Defect Detection in Fuel Cell Materials*. <https://wyattfelt.files.wordpress.com/2016/11/electromagneticexcitation-methodsforthermographicdefectdetectioninfuelcellmaterials.pdf>. 2012.
- [10] **Wyatt Felt**. *Twisty Balloon Pneumatic Actuator*. <http://www.instructables.com/id/Twisty-Balloon-Pneumatic-Actuator/>. 2012.
- [11] Scott Taysom, Steve White, Brettany Rupert, **Wyatt Felt**, Clifton Dudley, and Ryan Anderson. *Giant Clicker Pen*. <http://www.instructables.com/id/Giant-Clicker-Pen/>. 2012.
- [12] **Wyatt Felt**, Rahul Koneru, Joel Cheong, and Hannah Spece. *Flowdometer: The Intelligent Showerhead*. <https://wyattfelt.com/2011/05/30/flowdometer-the-intelligent-showerhead/>. 2011.
- [13] **Wyatt Felt**. *PosterBot: Make a Marker-Writing Robot out of an Old Inkjet printer and an iRobot Create*. <http://www.instructables.com/id/PosterBot%3A-Make-a-Marker-Writing-Robot-out-of-an-0/>. 2007.

News and Media

- [1] *David Remy's Smart Braid Team wins Soft Robotics Toolkit Prize*. <http://rehabrobotics.umich.edu/news/david-remys-smart-braid-team-wins-soft-robotics-toolkit-prize/>. 2015.
- [2] *BYU students earn science fellowships*. http://www.heraldextra.com/news/local/byu-students-earn-science-fellowships/article_15394da9-dcf6-5b4a-8d70-b39aabc8280.html. 2014.
- [3] *BYU students Invent Device to Prevent SIDS Fatalities*. http://www.heraldextra.com/news/local/central/provo/byu-students-invent-device-to-prevent-sids-fatalities/article_c27a5100-41f2-5166-8330-80808da30761.html. 2012.
- [4] *While you were sleeping: Monitor alerts parents if baby stops breathing*. <http://news.byu.edu/archive12-nov-studentinnovator.aspx>. 2012.
- [5] *3 Utahns win 'nerd fight'*. <http://www.deseretnews.com/article/695198145/3-Utahns-win-nerd-fight.html>. 2007.
- [6] *HOW TO–Make a PosterBot with the iRobot Create*. <http://makezine.com/2007/09/08/how-to-make-a-posterbot-w/>. 2007.

Wyatt Felt

- [7] *iRobot Poster-making-Bot makes up for shaky hands*. <http://www.engadget.com/2007/09/09/irobot-poster-making-bot-makes-up-for-shaky-hands/>. 2007.
- [8] *PosterBot-Hack a Roomba into Poster Printer*. <http://hackaday.com/2007/09/07/posterbot-hack-a-roomba-into-poster-printer/>. 2007.

Last updated: November 27, 2018