

Mechanical and Materials Engineering  
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## EDUCATION

### **Carnegie Mellon University** Pittsburgh, PA

Ph.D. in Robotics, August 2018  
Center for Machine Learning and Health Fellow (CMU)  
Thesis: Robust soft-matter robotic materials

### **Carnegie Mellon University** Pittsburgh, PA

M.S. in Robotics, May 2017  
National Science Foundation (NSF) Graduate Research Fellow

### **University of Nebraska-Lincoln** Lincoln, NE

M.S. in Mechanical Engineering, August 2014  
National Science Foundation (NSF) Graduate Research Fellow  
Thesis: Design and development of a miniature in vivo surgical robot with distributed motor control for laparoendoscopic single-site surgery

### **University of Nebraska-Lincoln** Lincoln, NE

B.S. in Mechanical Engineering, December 2011

## PROFESSIONAL EXPERIENCE

### **University of Nebraska—Lincoln, Assistant Professor** Lincoln, NE

Mechanical and Materials Engineering

Jan. 2019 - Present

### **Carnegie Mellon University, Visiting Researcher** Pittsburgh, PA

Mechanical Engineering, Prof. Carmel Majidi

Aug. 2018 - Dec. 2018

### **Arieca LLC, Senior Design Engineer** Pittsburgh, PA

Development of thermally conductive rubber for wearable thermal management

Aug. 2018 - Dec. 2018

### **Carnegie Mellon University, Graduate Research Assistant** Pittsburgh, PA

Integrated Soft Materials Laboratory, Directed by Prof. Carmel Majidi

Sept. 2014 - July 2018

### **Air Force Research Laboratory (AFRL), Visiting Researcher** WPAFB, Dayton, OH

Mentor: Dr. Chris Tabor, Dr. Tim White

April 2018, Oct. 2017

### **Lyndon B. Johnson Space Center (JSC), Visiting Researcher** Houston, TX

Mentor: Dr. Bill Bluethmann

March 2017

### **University of Nebraska, Graduate Research Assistant** Lincoln, NE

Advanced Surgical Technologies Lab, Directed by Prof. Shane Farritor

Jan. 2012 - Aug. 2014

### **University of Nebraska, Undergraduate Research Assistant** Lincoln, NE

Advanced Surgical Technologies Lab, Directed by Prof. Shane Farritor

Jan. 2008 - Dec. 2011

### **Honeybee Robotics Spacecraft Mechanisms Corp., Intern** Longmont, CO

NASA Nebraska Space Grant Intern, Mentor: Erik Mumm

Summer of 2012

- Lyndon B. Johnson Space Center (JSC), Intern** Houston, TX Summer of 2010  
NASA Nebraska Space Grant Intern, Mentor: Larry Dungan
- Jet Propulsion Laboratory (JPL), Intern** Pasadena, CA Summer of 2009  
NASA Nebraska Space Grant Intern, Mentor: Brett Kennedy
- Honeybee Robotics Spacecraft Mechanisms Corp., Intern** New York, NY Summer of 2008  
NASA Nebraska Space Grant Intern, Mentor: Erik Mumm

## TEACHING

- Dynamics and Control of Engineering Systems (MECH 350)** Spring 2019  
University of Nebraska-Lincoln

## JOURNAL PUBLICATIONS † denotes equal contribution

- [J13] **Eric J. Markvicka**, Ravi Tutika, Michael D Bartlett, and Carmel Majidi. Soft electronic skin for multi-site damage detection and localization. *Advanced Functional Materials*, page 1900160, 2019
- [J12] Chengfeng Pan, **Eric J. Markvicka**, Mohammad H Malakooti, Jiajun Yan, Leiming Hu, Krzysztof Matyjaszewski, and Carmel Majidi. A liquid-metal–elastomer nanocomposite for stretchable dielectric materials. *Advanced Materials*, 31(23):1900663, 2019
- [J11] **Eric J. Markvicka**†, Michael D. Bartlett†, Xiaonan Huang, and Carmel Majidi. An autonomously electrically self-healing liquid metal–elastomer composite for robust soft-matter robotics and electronics. *Nature materials*, 17(7):618–624, 2018  
**Significant press coverage, top 1% (#23) of outputs from Nature Materials, top 0.5% of all outputs tracked (8/1/18)**
- [J10] Chengfeng Pan, Kitty Kumar, Jianzhao Li, **Eric J. Markvicka**, Peter R Herman, and Carmel Majidi. Visually imperceptible liquid-metal circuits for transparent, stretchable electronics with direct laser writing. *Advanced Materials*, 30(12):1706937, 2018
- [J9] Tong Lu, **Eric J. Markvicka**, Yichu Jin, and Carmel Majidi. Soft-matter printed circuit board with uv laser micropatterning. *ACS applied materials & interfaces*, 9(26):22055–22062, 2017
- [J8] **Eric J. Markvicka**†, Michael D Bartlett†, and Carmel Majidi. Rapid fabrication of soft, multilayered electronics for wearable biomonitoring. *Advanced Functional Materials*, 26(46):8496–8504, 2016 **[Front Cover ASME DSC Magazine]**
- [J7] Michael D Bartlett, Andrew Fassler, Navid Kazem, **Eric J. Markvicka**, Pratiti Mandal, and Carmel Majidi. Stretchable, high-k dielectric elastomers through liquid-metal inclusions. *Advanced Materials*, 28(19):3726–3731, 2016 **[Back Cover]**
- [J6] **Eric J. Markvicka**, Kearney Lackas, Tom Frederick, Joe Bartels, Shane Farritor, and Dmitry Oleynikov. Gross positioning system for in vivo surgical devices. *Journal of Medical Devices*, 7(3):030922, 2013
- [J5] Walter Bircher, **Eric J. Markvicka**, Jack Mondry, Tom Frederick, Joe Bartels, Shane Farritor, and Dmitry Oleynikov. Development of a low-cost inspection arm to map the available workspace within the abdominal cavity. *Journal of Medical Devices*, 7(3):030918, 2013
- [J4] Joseph Bartels, Thomas Frederick, **Eric J. Markvicka**, Kearney Lackas, Shane Farritor, and Dmitry Oleynikov. Accelerometer based absolute positioning for a miniature in-vivo surgical robot. *Journal of Medical Devices*, 7(3):030919, 2013
- [J3] Tom Frederick, **Eric J. Markvicka**, Joe Bartels, Kearney Lackas, Shane Farritor, and Dmitry Oleynikov. Haptic sensing for use in miniature in-vivo robotic grasping tasks. *Journal of Medical Devices*, 7(3):030914, 2013

- [J2] **Eric J. Markvicka**, Jack M Mondry, Shane M Farritor, and Dmitry Oleynikov. Novel pan-tilt stereoscopic camera with auto-focus for less robotic surgery. *Journal of Medical Devices*, 6(1):017514, 2012
- [J1] Nathan D Otten, Shane M Farritor, Amy C Lehman, Tyler D Wortman, Ryan L McCormick, **Eric J. Markvicka**, and Dmitry Oleynikov. Miniature in vivo cameras for use in single-incision robotic surgery-biomed 2011. *Biomedical sciences instrumentation*, 47:165–170, 2010

## CONFERENCES (PEER-REVIEWED) † denotes equal contribution

- [P13] **Eric J. Markvicka**†, Guanyun Wang†, Yi-Chin Lee, Gierad Laput, Carmel Majidi, and Lining Yao. Electrodermis: Fully untethered, stretchable, and highly-customizable electronic bandages. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, page 632. ACM, 2019 [**Front Cover HDIAC Journal**] **Won Dezeen Awards 2019 design longlist and Design Intelligence Award Honorable Mention.**
- [P12] **Eric J. Markvicka**†, Guanyun Wang†, Yi-Chin Lee, Gierad Laput, Carmel Majidi, and Lining Yao. Showcasing electrodermis. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems*, page VS17. ACM, 2019
- [P11] Michael D Bartlett, **Eric J. Markvicka**, Ravi Tutika, and Carmel Majidi. Soft-matter damage detection systems for electronics and structures. In *Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XIII*, volume 10971, page 1097112. International Society for Optics and Photonics, 2019
- [P10] Kitty Kumar, Chengfeng Pan, **Eric J. Markvicka**, Jianzhao Li, Peter R Herman, and Carmel Majidi. Direct laser writing of liquid metal grids for visually imperceptible stretchable electronics (conference presentation). In *Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XXIV*, volume 10905, page 1090516. International Society for Optics and Photonics, 2019
- [P9] **Eric J. Markvicka**, Steven Rich, Jiahe Liao, Hesham Zaini, and Carmel Majidi. Low-cost wearable human-computer interface with conductive fabric for steam education. *2018 IEEE Integrated STEM Education Conference*, pages 161–166, 2018
- [P8] **Eric J. Markvicka**, Ryan L McCormick, Tom P Frederick, Joe R Bartels, Shane M Farritor, and Dmitry Oleynikov. Multi-quadrant surgical robot for single incision laparoscopic colectomy. *Proceedings of the ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pages V06AT07A013–V06AT07A013, 2013
- [P7] **Eric J. Markvicka**, Kearney Lackas, Tom Frederick, Joe Bartels, Shane Farritor, and Dmitry Oleynikov. Gross positioning system for in vivo surgical devices. *Proceedings of the 2013 Design of Medical Devices Conference*, (Minneapolis, MN, April 2013)
- [P6] Walter Bircher, **Eric J. Markvicka**, Jack Mondry, Tom Frederick, Joe Bartels, Shane Farritor, and Dmitry Oleynikov. Development of a low-cost inspection arm to map the available workspace within the abdominal cavity. *Proceedings of the 2013 Design of Medical Devices Conference*, (Minneapolis, MN, April 2013)
- [P5] Joseph Bartels, Thomas Frederick, **Eric J. Markvicka**, Kearney Lackas, Shane Farritor, and Dmitry Oleynikov. Accelerometer based absolute positioning for a miniature in-vivo surgical robot. *Proceedings of the 2013 Design of Medical Devices Conference*, (Minneapolis, MN, April 2013)
- [P4] Tom Frederick, **Eric J. Markvicka**, Joe Bartels, Kearney Lackas, Shane Farritor, and Dmitry Oleynikov. Haptic sensing for use in miniature in-vivo robotic grasping tasks. *Proceedings of the 2013 Design of Medical Devices Conference*, (Minneapolis, MN, April 2013)
- [P3] **Eric J. Markvicka**, Jack M Mondry, Shane M Farritor, and Dmitry Oleynikov. Novel pan-tilt stereoscopic camera with auto-focus for less robotic surgery. *Proceedings of the 2012 Design of Medical Devices Conference*, (Minneapolis, MN, April 2012)

- [P2] Tyler D Wortman, Ryan L McCormick, **Eric J. Markvicka**, Tom P Frederick, Shane M Farritor, and Dmitry Oleynikov. Multi-functional surgical robot for laparo-endoscopic single-site colectomies. *Proceedings of ASME 2011 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pages 653–658, 2011
- [P1] Nathan D Otten, Shane M Farritor, Amy C Lehman, Tyler D Wortman, Ryan L McCormick, **Eric J. Markvicka**, and Dmitry Oleynikov. Miniature in vivo cameras for use in single-incision surgery. *Proceedings of the 48th Annual Rocky Mountain Bioengineering Symposium*, (Denver, CO, April 2011)

## CONFERENCES ABSTRACTS

- [C14] Chengfeng Pan, **Eric J. Markvicka**, Mohammad H Malakooti, Jiajun Yan, Leiming Hu, Krzysztof Matyjaszewski, and Carmel Majidi. A liquid metal elastomer nanocomposite for stretchable dielectric materials. *SES 2019 Annual Meeting*, (St. Louis, MO, 2019)
- [C13] Chengeng Pan, Kitty Kumar, Jianzhao Li, **Eric J. Markvicka**, Peter R. Herman, and Carmel Majidi. Visually imperceptible liquid-metal circuits for transparent, stretchable electronics with direct laser writing. *SES 2019 Annual Meeting*, (St. Louis, MO, 2019)
- [C12] **Eric J. Markvicka**, Michael D Bartlett, Xiaonan Huang, Ravi Tutika, and Carmel Majidi. Towards damage resilient soft-matter robotics and electronics. *MRS 2018 Fall Meeting*, (Boston, MA, 2018)
- [C11] **Eric J. Markvicka**, Michael D Bartlett, Ravi Tutika, and Carmel Majidi. Damage detection and localization in soft-matter systems. *ASME International Mechanical Engineering Congress and Exposition (IMECE)*, (Pittsburgh, PA, 2018)
- [C10] Chengeng Pan, Kitty Kumar, Jianzhao Li, **Eric J. Markvicka**, Peter R. Herman, and Carmel Majidi. Transparent, stretchable conductor with direct laser writing. *ASME International Mechanical Engineering Congress and Exposition (IMECE)*, (Pittsburgh, PA, 2018)
- [C9] Sara Abdollahi, **Eric J. Markvicka**, Carmel Majidi, and Adam W. Feinberg. 3d printed pulse oximetry wearable with soft electronics. *McGowan Institute 2018 Scientific Retreat*, (Pittsburgh, PA, 2018)
- [C8] **Eric J. Markvicka**, Michael D Bartlett, and Carmel Majidi. Autonomous, multi-site self-healing of damage in soft-matter electronics. *MRS 2018 Spring Meeting*, (Phoenix, AZ, 2018)
- [C7] Sara Abdollahi, **Eric J. Markvicka**, Carmel Majidi, and Adam W. Feinberg. Patient-specific 3d printed elastomeric wearable medical devices. *SFB 2018 Annual Meeting*, (Atlanta, GA, 2018)
- [C6] **Eric J. Markvicka**, Michael D Bartlett, and Carmel Majidi. High-cycle durability analysis of soft materials. *SES 2017 Annual Meeting*, (Boston, MA, 2017)
- [C5] Michael D Bartlett, Navid Kazem, Andy Fassler, **Eric J. Markvicka**, and Carmel Majidi. Liquid metal soft composites for multifunctional materials. *Adhesion Society*, (St. Petersburg, FL, 2017)
- [C4] Michael D Bartlett, **Eric J. Markvicka**, and Carmel Majidi. Soft, multi-functional materials created through rapid prototyping. *MRS 2015 Fall Meeting*, (Boston, MA, 2015)
- [C3] **Eric J. Markvicka**, Tom P Frederick, Kearney M Lackas, Shane M Farritor, and Dmitry Oleynikov. Miniature in vivo surgical robot for space applications. *2014 NASA Human Research Program Investigators' Workshop*, (Galveston, TX, 2014)
- [C2] Tyler D Wortman, Ryan L McCormick, **Eric J. Markvicka**, Shane M Farritor, and Dmitry Oleynikov. Multi-functional surgical robot for space applications. *International Academy of Astronautics 18th Humans in Space Symposium*, (Houston, TX, April 2011)
- [C1] Ryan L McCormick, Tyler D Wortman, **Eric J. Markvicka**, Tom P Frederick, Shane M Farritor, and Dmitry Oleynikov. Design and implementation of a six degree of freedom miniature in vivo surgical robot for use in long-term space flight. *2011 Nebraska Academy of Sciences Annual Meeting*, (Lincoln, NE, 2011)

## PATENTS ISSUED AND PENDING

- [X11] Carmel Majidi, Tong Lu, and **Eric Markvicka**. Method for fabrication of a soft-matter printed circuit board, July 11 2019. US Patent App. 16/243,475
- [X10] **Eric Markvicka**, Michael Bartlett, and Carmel Majidi. Autonomously self-healing soft-matter electronics and related systems and methods, October 10 2017. US Patent App
- [X9] **Eric Markvicka** and Carmel Majidi. Pressure sensing device with proximity detection and related systems and methods, September 6 2017. US Patent App
- [X8] Shane Farritor, Tyler Wortman, Kyle Strabala, Ryan McCormick, Amy Lehman, Dmitry Oleynikov, and **Eric Markvicka**. Robotic surgical devices, systems and related methods, January 24 2019. US Patent App. 16/123,619
- [X7] Michael Bartlett, **Eric Markvicka**, and Carmel Majidi. Soft, multilayered electronics for wearable devices and methods to produce the same, March 15 2017. US Patent App. 16/129,717
- [X6] Tom Frederick, **Eric Markvicka**, Shane Farritor, and Dmitry Oleynikov. Robotic device with compact joint design and related systems and methods, November 11 2015. US Patent App. 14/938,667
- [X5] Tom Frederick, Shane Farritor, Jack Mondry, **Eric Markvicka**, Dmitry Oleynikov, and Jacob Greenburg. Methods, systems and devices for surgical access and insertion, March 18 2015. US Patent App. 14/661,465
- [X4] Jack Mondry, Shane Farritor, **Eric Markvicka**, Thomas Frederick, and Joseph Bartels. Single site robotic device and related systems and methods, March 5 2019. US Patent 10,219,870
- [X3] Shane Farritor, Thomas Frederick, Joe Bartels, **Eric Markvicka**, and Jack Mondry. Methods, systems, and devices relating to robotic surgical devices, end effectors, and controllers, August 29 2017. US Patent 9,743,987
- [X2] Jack Mondry, Shane Farritor, **Eric Markvicka**, Thomas Frederick, and Joseph Bartels. Single site robotic device and related systems and methods, November 22 2016. US Patent 9,498,292
- [X1] **Eric Markvicka**, Tom Frederick, Jack Mondry, Joe Bartels, and Shane Farritor. Local control robotic surgical devices and related methods, April 21 2015. US Patent 9,010,214

## INVITED SEMINARS

Stretchable Electronic Bandages for Wearable Biomonitoring  
2019 Regenerative Medicine Symposium, Omaha, NE (May 2019)

## UNPUBLISHED WORKS

Eric J. Markvicka. Robust soft-matter robotic materials. Ph.D. Thesis, Carnegie Mellon University, 2018

Eric J. Markvicka. Design and development of a miniature in vivo surgical robot with distributed motor control for laparoscopic single-site surgery. M.S. Thesis, University of Nebraska-Lincoln, 2014

## HONORS AND AWARDS

- 2019 Design Intelligence Award (DIA) Honorable Mention Award (ElectroDermis)
- 2019 Dezeen Awards 2019 design longlist (ElectroDermis)
- 2018 TransTech Energy Conference Technical Assistance Award (Arieca LLC)
- 2017 Center for Machine Learning and Health Fellowship in Digital Health
- 2014 NASA Nebraska Space Grant Mini-Grant for student design competition
- 2013 NASA Nebraska Space Grant Graduate Fellowship
- 2012 *National Science Foundation Graduate Research Fellowship***
- 2012 5th Place: RASC-AL Exploration Robo Ops Competition
- 2012 NASA Nebraska Space Grant Graduate Fellowship
- 2012 Milton E. Mohr Graduate Fellowship
- 2012 1st Place: Graduate Robotics division at the ASME Student Mechanism & Robot Design Competition
- 2012 NASA Nebraska Space Grant Summer Fellowship
- 2011 NASA Nebraska Space Grant Fellowship
- 2010 NASA Nebraska Space Grant Mini-Grant for senior design project
- 2010 Undergraduate Creative Activities and Research Experiences, year 2 funding
- 2010 NASA Nebraska Space Grant Summer Fellowship
- 2010 NASA Nebraska Space Grant Fellowship
- 2010 Pi Tau Sigma Engineering Honors Fraternity
- 2009 Undergraduate Creative Activities and Research Experiences
- 2009 NASA Nebraska Space Grant Summer Fellowship
- 2009 NASA Nebraska Space Grant Fellowship
- 2008 NASA Nebraska Space Grant Summer Fellowship

## STEM OUTREACH

- NCIA Sovereign Native Youth STEM Leadership Academy, Lincoln, NE, June 2019
- Gelfand Outreach Saturday Series, Wearable Computers, Grades 7-9, Pittsburgh, PA, November 2018
- Summer Academy for Mathematics and Science (CMU), Grades 10-12, Pittsburgh, PA, July 2018
- Higher Achievement's STEM Demo Day at Jeron X. Grayson Center, Grades 7-9, Pittsburgh, PA, May 2018
- Gelfand Outreach Saturday Series, Wearable Computers, Grades 7-9, Pittsburgh, PA, November 2017
- Be an Engineer High School Outreach, Grades 9-12, Pittsburgh, PA, October 2017
- Gelfand Outreach Saturday Series, Wearable Computers, Grades 7-9, Pittsburgh, PA, March 2016
- SciTech Festival at the Carnegie Science Center, Pittsburgh, PA, November 2015
- SciTech Festival at the Carnegie Science Center, Pittsburgh, PA, November 2014
- Norris Middle School Career Day Panel, Firth, NE, March 2014
- Founding member of Innovation Studio on Innovation Campus, University of Nebraska-Lincoln, June 2013
- Vex Robotics mentor for Ravenna High School, Ravenna, NE, 2013
- Sunday with a Scientist at Morrill Hall, Lincoln, NE, January 2012
- First Lego League Robotics mentor for Goodrich Middle School, Lincoln, NE, September 2011
- Bright Lights Robotics Camp, University of Nebraska-Lincoln, June 2011
- Space Day at the Strategic Air and Space Museum, Ashland, NE, May 2011
- Space Grant Astronaut Camp, University of Nebraska-Lincoln, July 2010
- Space Day at the Strategic Air and Space Museum, Ashland, NE, March 2009

## PROFESSIONAL SERVICE

- 2018 Session Chair: Fracture and Damage: Nano- to Macro-Scale II Technical Session. ASME IMECE