

**Markus P. Nemitz, Ph.D.**

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**EDUCATION**

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- 2018 Ph.D. in Electrical Engineering**, The University of Edinburgh, United Kingdom  
Thesis: HoverBot: A manufacturable swarm robot that has multi-functional sensing capabilities and uses collisions for two-dimensional mapping  
Faculty Advisor: Adam Stokes
- 2014 M.Sc. in Electronics**, The University of Edinburgh, United Kingdom  
Thesis: Implementation of a communication system of a static distributed sensor network for force change measurements in granular media  
Faculty Advisor: Adam Stokes
- 2012 B.Eng. in Electrical Engineering**, Bochum University for Applied Sciences, Germany  
Thesis: Selection and implementation of approximated and interpolated polynomials in a bus system based on a non-linear measuring system characteristics curve  
Faculty Advisor: Edmund Coersmeier
- 2012 Electronics Technician in Automation Technology**, German Chambers of Commerce and Industry, Germany  
Thesis: Installation and configuration of a thermocouple temperature measurement system at the annealing furnace of the dip coating line  
Advisor: Harald Henkemeyer

**RESEARCH EXPERIENCE**

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- 2018- Postdoctoral Fellow**, Chemistry and Chemical Biology, Harvard University  
**2020** Fields: Soft robotics, non-electronic computation  
Faculty Mentor: George Whitesides
- 2015- Research Scholar**, Computer Science and Engineering, University of Michigan  
**2018** Fields: Swarm robotics  
Faculty Mentors: Edwin Olson
- 2010- Undergraduate Researcher**, Process Technology, ThyssenKrupp Steel, Germany  
**2011** Project: Autonomous identification of material positions on flat steel using laser surface authentication  
Mentor: Harald Henkemeyer

**SELECTED AWARDS AND HONORS**

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1. Industrial Undergraduate Scholarship. ThyssenKrupp Steel, Germany (2009)
2. Doctoral Studies Scholarship. Scottish Research Council, United Kingdom (2014)
3. Best Poster Award. Center for Doctoral Training in Intelligent Sensing and Measurement Annual Conference, United Kingdom (2015)
4. Research Scholarship. University of Michigan, United States (2015)
5. Best Oral Presentation Award. Center for Doctoral Training in Intelligent Sensing and Measurement Annual Conference, United Kingdom (2016)
6. International Internship Grant. Center for Doctoral Training in Intelligent Sensing and Measurement, United Kingdom (2017)
7. Postdoctoral Award for Professional Development. Harvard University, United States (2019)

**PUBLICATIONS**

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**Patents**

1. **M.P. Nemitz** and A.A. Stokes, “A Locomotion Platform and Multiagent System,” 2016.
2. C. K. Abrahamsson, A. Nagarkar, M.J. Fink, D.J. Preston, J. Bozenko, S. Ge, **M.P. Nemitz** and G.M. Whitesides, “Density-based Analysis of Powdered Mixtures of Illicit Drugs, Adulterants, and Dilutants,” 2019.
3. **M.P. Nemitz**, D. Pathiraja, C.K. Abrahamsson, and G.M. Whitesides, “Non-Electronic Control for Soft Robots Using Tubes and Balloons,” 2019

**The University of Edinburgh, University of Michigan—PhD in Electrical Engineering**

1. **M.P. Nemitz**, P. Mihaylov, T.W. Barraclough, D. Ross, and A.A. Stokes, “Using Voice Coils to Actuate Modular Soft Robots: Wormbot, an Example,” *Soft Robotics* 3(4): 198-204, 2016.
2. D. Ross, **M.P. Nemitz**, and A.A. Stokes, “Controlling and Simulating Soft Robotic Systems: Insights from a Thermodynamic Perspective,” *Soft Robotics* 3(4): 170-176, 2016.
3. A.C. McConnell, M. Vallejo, R. Moioli, F. Brasil, N. Secciani, **M.P. Nemitz**, C.P. Riquart, D.W. Corne, P.A. Vargas, and A.A. Stokes. “SOPHIA: Soft Orthotic Physiotherapy Hand Interactive Aid,” *Frontiers in Mechanical Engineering*, 2017.
4. **M.P. Nemitz**, M.E. Sayed, J. Mamish, G. Ferrer, L. Teng, R.M. McKenzie, A.O. Hero, E. Olson, and A.A. Stokes, “HoverBots: Precise Locomotion Using Robots That Are Designed for Manufacturability,” *Frontiers in Robotics and Artificial Intelligence*, 2017.
5. L. Teng, T. Wei, K. Jeronion, **M.P. Nemitz**, G. Lyu, and A.A. Stokes, “Integrating Soft Sensor Systems Using Conductive Thread,” *Journal of Micromechanics and Microengineering*, 2017.
6. S.T. Mahon, J. Roberts, M.E. Sayed, D.H. Chun, S. Aracri, R.M. McKenzie, **M.P. Nemitz**, and A.A. Stokes, “Capability by Stacking: The Current Design Heuristic for Soft Robots,” *Biomimetics*. (2018).
7. M.E. Sayed, **M.P. Nemitz**, S. Aracri, A.C. McConnell, R.M. McKenzie, and A.A. Stokes, “The Limpet: A ROS-Enabled Multi-Sensing Platform for the ORCA Hub,” *MDPI Sensors*, 2018.
8. L. Teng, K. Pan, **M.P. Nemitz**, R. Song, Z. Hu, and A.A. Stokes. “Soft Radio-Frequency Identification Sensors: Wireless Long-Range Strain Sensors Using Radio-Frequency Identification,” *Soft Robotics* 6(1): 82-94, 2018.

9. R.M. McKenzie, M.E. Sayed, **M.P. Nemitz**, B.W. Flynn, and A.A. Stokes, “Linbots: Soft, Modular Robots Utilising Voice Coils,” *Soft Robotics* 6(2): 195-205, 2018
10. **M.P. Nemitz**, R. Marcotte, M.E. Sayed, G. Ferrer, A.O. Hero, E. Olson, and A.A. Stokes, “Multi-Functional Sensing for Swarm Robots Using Time Sequence Classification: HoverBot, an Example,” *Frontiers in Robotics and Artificial Intelligence*, 2018.
11. **M.P. Nemitz**, E. Olson, and A.A. Stokes, ”HoverBots: Embracing and Detecting Collisions Using Robots Designed for Manufacturability,” International Conference on Robotics and Automation (ICRA), *Swarms: From Biology to Robotics and Back*, 2018. (conference)

#### Harvard University—Postdoctoral Fellow

12. D.J. Preston, P. Rothemund, H.J. Jiang\*, **M.P. Nemitz\***, J. Rawson, Z. Suo, and G.M. Whitesides, ”Digital Logic for Soft Devices,” *Proceedings of the National Academy of Sciences (PNAS)* 116(16): 7750-7759, 2019.
13. D.J. Preston, H.J. Jiang, P. Rothemund, J. Rawson, **M.P. Nemitz**, W. Lee, Z. Suo, and G.M. Whitesides, “A Soft Ring Oscillator,” *Science Robotics* 4(31), 2019.
14. **M.P. Nemitz**, C.K. Abrahamsson, L. Wille, A.A. Stokes, D.J. Preston, and G.M. Whitesides, “Soft Non-Volatile Memory for Non-Electronic Information Storage in Soft Robots,” *IEEE Soft Robotics Conference 2020*
15. S. Aracri, F.G. Serchi, **M.P. Nemitz**, M.E. Sayed, G. Suaria, and A.A. Stokes, “Using Soft Robots for Monitoring Oceans and Coasts: A Review,” *Soft Robotics*. *Under review*

#### PRESENTATIONS

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##### Talks and Lectures

1. Going abroad during your PhD, *The University of Edinburgh – School of Engineering*, United Kingdom (2016)
2. An Opportunity: Studying Electronics at the University of Edinburgh, *The University of Edinburgh – School of Engineering*, United Kingdom (2016)
3. Distributed Sensing with Swarm Robots, *The University of Glasgow – School of Physics and Astronomy*, United Kingdom (2016)
4. HoverBots: Embracing and Detecting Collisions Using Robots Designed for Manufacturability, *International Conference on Robotics and Automation*, Brisbane, Australia (2018)
5. Pathfinder: The Impact of the Centre for Doctoral Training on My Career, *Conference on Photonic Integration and Advanced Data Storage*, The University of Strathclyde, United Kingdom (2018)
6. Detecting and Embracing Collisions for Mapping Environments, Invited Talk, *Harvard Microrobotics Laboratory – Rob Wood*, Harvard University (2019)
7. Designing Low-Cost, Manufacturable Robot Systems, Seminar Talk, *Whitesides Research Group*, Harvard University (2019)
8. Embedding Digital Soft Logic into Underwater Robots, *IEEE RobotSoft 2019*, Seoul, South Korea (2019)
9. Using Low-Cost, Autonomous Robot Systems for Education and Fundamental and Applied Robotics Research, Invited Symposium Speaker, *U.S. Naval Research Laboratory*, Washington D.C. (2019)

**Posters**

1. Smart Contact Lens for Non-Invasive Continuous Glucose Monitoring, *Scottish Microelectronics Centre*, Edinburgh, United Kingdom (2015)
2. Spatially Distributed Multimodal Sensor Networks, *Soft Robotics Conference*, Livorno, Italy (2015)
3. Collective Perception in Multi Agent Systems, *Annual Conference of the Doctoral Training Program in Intelligent Sensing and Measurement*, Glasgow, United Kingdom (2015)
4. Distributed Sensing with Swarm Robots, *Graduate Student Conference of the University of Edinburgh*, Edinburgh, United Kingdom (2017)
5. HoverBots: Embracing and Detecting Collisions Using Robots Designed for Manufacturability, *International Conference on Robotics and Automation*, Brisbane, Australia (2018)
6. Non-Electronic Control of Soft Robots Using Tubes and Balloons, *Gordon Conference on Smart Materials, Fabrication and Biohybrid Systems for Robotics*, California, United States (2020)

**INDUSTRY EXPERIENCE**

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Electronics Technician, ThyssenKrupp Steel, Cold Rolling Mill, Duisburg, Germany (2012)

Electrical Engineer, ThyssenKrupp Steel, Cold Rolling Mill, Duisburg, Germany (2013)

**LEADERSHIP ROLES**

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Educational Outreach, Hands on 3D Printing, West Linton Primary School, United Kingdom (2015)

Conference Organizer, Robotics Science and Systems, University of Michigan, USA (2016)

President, Engineering Graduate Society, The University of Edinburgh, United Kingdom (2016)

Workshop Organizer, Aquatic Soft Robotics, IEEE RoboSoft 2019, Seoul, Korea (2019)

Soft Robotics Journal Club Organizer (~15 participants), Harvard University, USA (2019)

**SELECTED MEDIA COVERAGE**

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**Digital Logic for Soft Devices**

- “World’s first fully functioning rubber computer developed,” Digital Journal, April 8<sup>th</sup>, 2019. [Link](#).
- “Soft Circuits to Control Soft Robots,” IEEE Spectrum, April 2<sup>nd</sup>, 2019. [Link](#).
- “Computer hardware softens up,” Physics World, March 30<sup>th</sup>, 2019. [Link](#).
- “A rubber computer eliminates the last hard components from soft robots,” Tech Xplore, March 25<sup>th</sup>, 2019. [Link](#).
- “Video shows a New Rubber Computer That May Hold the Key to Invisible Robots,” Inverse, March 25<sup>th</sup>, 2019. [Link](#).

**A Soft Ring Oscillator**

- “Soft robots for all,” Science Daily, July 9<sup>th</sup>, 2019. [Link](#).
- “The first soft ring oscillator lets soft robots roll, undulate, sort, meter liquids, and swallow,” Tech Xplore, July 26<sup>th</sup>, 2019. [Link](#).