

Markus P. Nemitz

ASSISTANT PROFESSOR · DEPARTMENT OF MECHANICAL ENGINEERING

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Education

The University of Edinburgh

PH.D. IN ROBOTICS

• Thesis advisor: Prof. Adam A. Stokes

Edinburgh, UK

2014 - 2018

The University of Edinburgh

M.SC. IN ELECTRONICS

• Thesis advisor: Prof. Adam A. Stokes

Edinburgh, UK

2013 - 2014

Bochum University of Applied Sciences

B.ENG. IN ELECTRICAL ENGINEERING

• Thesis advisor: Prof. Edmund Coersmeier

Bochum, GER

2009 - 2012

Professional Experience

2020 - Present **Director of Nemitz Robotics Group**, WPI and Tufts University

2024 - Present **Assistant Professor**, Department of Mechanical Engineering, Tufts University

2020 - 2024 **Assistant Professor**, Department of Robotics Engineering, WPI

2018 - 2020 **Postdoctoral Fellowship**, George Whitesides, Harvard University

2015 - 2018 **Research Scholar**, Department of Electrical Engineering and Computer Science, University of Michigan

Publications

JOURNAL

19. Mimicking Lightning-induced Electrochemistry on the Early Earth

H.J. Jiang, T. Underwood, J.G. Bell, J. Lei, J.C. Gonzales, L. Emge, L.G. Tadese, M.K. Abd El-Rahman, D.M. Wilmoth, L.C. Brazaca, G. Ni, L. Belding, S. Dey, A.A. Ashkarran, A. Nagarkar, M.P. Nemitz, B.J. Cafferty, D.S. Sayres, S. Ranjan, D.R. Crocker, J.G. Anderson, D.D. Sasselov, G.M. Whitesides
Proceedings of the National Academy of Sciences, 2024, **accepted**

18. Programmable soft valves for digital and analog control

C.J. Decker, H.J. Jiang, M.P. Nemitz, S.E. Root, A. Rajappan, J.T. Alvarez, J. Tracz, L. Wille, D.J. Preston, G.M. Whitesides
Proceedings of the National Academy of Sciences, 2205922119, 2022

17. A Buckling-Sheet Ring Oscillator for Electronics-Free Multimodal Locomotion

W.K. Lee, D.J. Preston, M.P. Nemitz, A. Nagarkar, A.K. McKeith, B. Gorissen, N. Vasios, V. Sanchez, K. Bertoldi, L. Mahadevan, G.M. Whitesides
Science Robotics, 7(63), 2022

16. Tube-Balloon Logic for the Exploration of Fluidic Control Elements

J.A. Tracz,* L. Wille,* D. Pathiraja, S.V. Kendre, R. Pfisterer, E. Turett, C.K. Abrahamsson, S.E. Root, W. Lee, D.J. Preston, H.J. Jiang, G.M. Whitesides, M.P. Nemitz
IEEE Robotics and Automation Letters, 2022

15. The Soft Compiler: A Web-Based Tool for the Design of Modular Pneumatic Circuits for Soft Robots

S.V. Kendre,* L. Whiteside,* T.Y. Fan, J.A. Tracz, G.T. Teran, T.C. Underwood, M.E. Sayed, H.J. Jiang, A.A. Stokes, D.J.

Preston, G.M. Whitesides, M.P. Nemitz
IEEE Robotics and Automation Letters, 2022

14. **Modular Robots for Enabling Operations in Unstructured Extreme Environments**
M.E. Sayed, J.O. Roberts, K. Donaldson, S.T. Mahon, F. Iqbal, B. Li, S.F. Aixela, G. Mastorakis, E.T. Jonasson, M.P. Nemitz, S. Bernardini, A.A Stokes
Advanced Intelligent Systems, 2022
13. **Gripping, Catching, and Conveying With a Soft, Toroidal Hydrostat**
S.E. Root, D.J. Preston, G.O. Feifke, H. Wallace, R.M. Alcoran, M.P. Nemitz, J.A. Tracz, G.M. Whitesides
Cell Reports Physical Science, 2021
12. **Elastic instability enabled locomotion**
A. Nagarkar, W. Lee, D.J. Preston, M.P. Nemitz, N. Deng, G.M. Whitesides, L. Mahadevan
Proceedings of the National Academy of Sciences, 2013801118, 2021
11. **Soft Robots for Ocean Exploration and Offshore Operations: A Perspective**
S. Aracri, F. Giorgio-Serchi, G. Suaria, M.E. Sayed, M.P. Nemitz, A.A Stokes
Soft Robotics, 2021
10. **A Soft Ring Oscillator**
D.J. Preston, H.J. Jiang, V. Sanchez, P. Rothmund, J. Rawson, M.P. Nemitz, W.-K. Lee, Z. Suo, C.J. Walsh, G.M. Whitesides
Science Robotics, 4(31), 2019
9. **Digital Logic for Soft Devices**
D.J. Preston, P. Rothmund, H.J. Jiang, M.P. Nemitz, J. Rawson, Z. Suo, G.M. Whitesides
Proceedings of the National Academy of Sciences, 1820672116, 2019
8. **Linbots: Soft Modular Robots Utilizing Voice Coils**
R.M. McKenzie, M.E. Sayed, M.P. Nemitz, B.W. Flynn, A.A. Stokes
Soft Robotics, 6(2), 195-94
7. **Soft Radio-Frequency Identification Sensors: Wireless Long-Range Strain Sensors Using Radio-Frequency Identification**
L. Teng, K. Pan, M.P. Nemitz, R. Song, A.A. Stokes
Soft Robotics, 6(1), 82-94
6. **The Limpet: A ROS-Enabled Multi-Sensing Platform for the ORCA Hub**
M.E. Sayed, M.P. Nemitz, S. Aracri, A.C. McConnell, R.M. McKenzie, A.A. Stokes
Sensors, 18(10), 3487
5. **Capability by Stacking: The Current Design Heuristic for Soft Robots**
S.T. Mahon, J.O. Roberts, M.E. Sayed, D.H. Chun, S. Aracri, R.M. McKenzie, M.P. Nemitz, A.A. Stokes
MDPI Biomimetics, 3(3), 16
4. **HoverBots: Precise Locomotion Using Robots That Are Designed for Manufacturability**
M.P. Nemitz, M.E. Sayed, J. Mamish, G. Ferrer, L. Teng, R.M. McKenzie, A.O. Hero, E. Olson, A.A. Stokes
Frontiers in Robotics and AI, 4, 55
3. **SOPHIA: Soft Orthotic Physiotherapy Hand Interactive Aid**
A.C. McConnell, M. Vallejo, R.C. Moioli, F.L. Brasil, N. Secciani, M.P. Nemitz, C.P. Riquart, D.W. Corne, P.A. Vargas, A.A. Stokes
Frontiers in Mechanical Engineering, 3, 3

2. **Controlling and Simulating Soft Robotic Systems: Insights from a Thermodynamic Perspective**

D. Ross, [M.P. Nemitz](#), A.A. Stokes

Soft Robotics, 3(4), 170-176

1. **Using Voice Coils to Actuate Modular Soft Robots: Wormbot, an Example**

[M.P. Nemitz](#), P. Mihaylov, T.W. Barraclough, D. Ross, A.A. Stokes

Soft Robotics, 3(4), 198-204

CONFERENCE

9. **Vision-based FDM Printing for Fabricating Airtight Soft Actuators**

Y. Wu, Z. Dai, H. Liu, L. Wang, [M.P. Nemitz](#)

IEEE Soft Robotics Conference, San Diego, CA, 2024

8. **Programmable Switching of Fluids via Pre-twisting**

Y. Wu, [M.P. Nemitz](#)

IEEE Soft Robotics Conference, San Diego, CA, 2024

7. **FDM Printing: a Fabrication Method for Fluidic Soft Circuits?**

S. Kendre,* L. Wang,* E. Wilke, N. Pacheco, L. Fichera, [M.P. Nemitz](#)

*IEEE Soft Robotics Conference, San Diego, CA, 2024, PDF, **Best paper award** in “Manufacturing Reproducibility”*

6. **Soft Fluidic Closed-Loop Controller for Untethered Underwater Gliders**

K. Bonofiglio,* L. Whiteside,* M. Angeles, M. Haahr, B. Simpson, J. Palmer, Y. Wu, [M.P. Nemitz](#)

IEEE Soft Robotics Conference, Singapore, 2023

5. **Printable Flexible Robots for Remote Learning**

S.V. Kendre, G.T. Teran, L. Whiteside, T. Looney, R. Wheelock, S. Ghai, [M.P. Nemitz](#)

ASME Northeast 2022 Conference

4. **Air-Releasable Soft Robots for Explosive Ordnance Disposal**

T.C. Looney, R.I. Wheelock, N.M. Savard, G.T. Teran, A.G. Milligan, M. Scalise, D.P. Perno, G.C. Lewin, C. Pincioli, C.D. Onal, [M.P. Nemitz](#)

IEEE Soft Robotics Conference, Edinburgh, 2022

3. **An all soft, electro-pneumatic controller for soft robots**

M. Garrad, I. Feeney, A.T. Conn, J. Rossiter, [M.P. Nemitz](#), H. Hauser

IEEE Soft Robotics Conference, New Haven, 2021

2. **Soft Non-Volatile Memory for Non-Electronic Information Storage in Soft Robots**

[M.P. Nemitz](#), C.K. Abrahamsson, L. Wille, D.J. Preston, A.A. Stokes, G.M. Whitesides

IEEE Soft Robotics Conference, New Haven, 2020

1. **HoverBots: Embracing and Detecting Collisions Using Robots Designed for Manufacturability**

[M.P. Nemitz](#), E. Olson, A.A. Stokes

International Conference on Robotics and Automation, workshop paper, Australia, May 21-26, 2018

Grants

PI

2023-24	Robotic Landmine Detection Using Quantum Sensing U.S. National Science Foundation - ROSE-HUB	\$ 35,000
2023-28	3D Printable Fluidic Robots with Electronic Interfaces U.S. National Science Foundation CAREER	\$ 599,815
2022-24	An Automized refuel system for hydrogen-powered UAVs U.S. Army and NEOEx Systems Inc.	\$ 907,480
2021	Demining Robot for the Movie Afghan Dreamers Movie Director Bill Guttentag	\$ 1,500

Co-PI

2024-26	3D-Printed Floating Photocatalyst Structures to Combat Harmful Algal Blooms U.S. Environmental Protection Agency	\$ 74,920
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Presentations

INVITED TALKS

Spring 2025	TBA, UMD Maryland Robotics Center, College Park, MD.
Fall 2024	TBA, Materials Research Society, Boston, MA.
Fall 2023	Transforming Ordinary Materials To Extraordinary via 3D Printing, Department of Computer Science at Dartmouth College, Hanover, NH.
Spring 2022	Printable Robots Integrated in a Robot Ecosystem For Measuring Oceanic Margins of Ice Sheets, Materials Research Society, Honolulu, HI.
Spring 2022	Design and Fabrication of Fluidically-Driven Soft Robots for Remote Education, International Conference in Soft Robotics, Edinburgh, UK.
Fall 2021	How do I start a career in robotics?, Panel discussion, Bristol, UK.
Spring 2021	Using Material Instabilities for the Control of Soft Robots, Bristol Robotics Laboratory, Bristol, UK.
Fall 2020	Introduction to Robotics Engineering Education, Technical Highschool, Geldern, GER.

Teaching Experience

Spring 2024	RBE 495, Capstone Project Experience, <i>Worcester</i>
Fall 2023	RBE 2002, Unified Robotics II: Perception and Control, <i>Worcester</i>
Fall 2023	RBE 595, Printable Robotics, <i>Worcester</i>
Spring 2023	RBE 530, Soft Robotics, <i>Worcester</i>
Fall 2022	RBE 533, Smart Materials, <i>Worcester</i>
Fall 2021	RBE 595, Printable Robotics, <i>Worcester</i>
Spring 2021	RBE 2002, Unified Robotics II: Perception and Control, <i>Worcester</i>
Fall 2020	RBE 2002, Unified Robotics II: Perception and Control, <i>Worcester</i>