

Connor M. McCann

MECHANISM DESIGN • SOFT ROBOTICS • WEARABLE ROBOTICS
ROBOTIC GRASPING • NUMERICAL MODELING

HARVARD UNIVERSITY, MECHANICAL ENGINEERING | 29 OXFORD STREET, CAMBRIDGE, MA 02138
☎ (339) 223-5178 | ✉ cmccann@g.harvard.edu | 🏠 www.connor-mccann.com

EDUCATION

Harvard University

Cambridge, MA

PH.D. IN MECHANICAL ENGINEERING

2025 (expected)

- Research Advisors: Profs. Conor J. Walsh & Katia Bertoldi
- NSF Graduate Research Fellow

M.S. IN MECHANICAL ENGINEERING

2021

Yale University

New Haven, CT

B.S. IN MECHANICAL ENGINEERING

2018

- Research Advisor: Prof. Aaron M. Dollar

HONORS & AWARDS

2023	Certificate of Distinction in Teaching	Harvard Derek Bok Center for Teaching & Learning
2021	Certificate of Distinction in Teaching	Harvard Derek Bok Center for Teaching & Learning
2018	NSF Graduate Research Fellowship	National Science Foundation
2018	Donald Warren McCrosky Prize	Yale School of Engineering & Applied Science
2017	Belle & Carl Morse Junior Scholarship	Yale School of Engineering & Applied Science
2017	Student Mechanism & Robot Design Competition, 2nd Place	ASME IDETC Conference
2017	Student Design Showcase, 3rd Place	Design of Medical Devices Conference

RESEARCH EXPERIENCE

Harvard University: Biodesign Lab & Bertoldi Group

Cambridge, MA

STUDENT RESEARCHER (ADVISORS: PROFS. CONOR J. WALSH & KATIA BERTOLDI)

2018 – present

- Developing techniques for the characterization, modeling, and design of wearable textile soft robots in the presence of complex human-body interactions
- Studying hybrid-stiffness mechanical metamaterials inspired by stingray pectoral fin skeletons

Yale University: GRAB Lab

New Haven, CT

STUDENT RESEARCHER (ADVISOR: PROF. AARON M. DOLLAR)

2015 – 2018

- Developed a Stewart-Gough platform-based robotic hand for dexterous 6-DOF, within-hand manipulation
- Created robotically assembled reconfigurable truss metamaterials for spaceflight applications

Massachusetts Institute of Technology: Robot Locomotion Group

Cambridge, MA

RESEARCH INTERN (ADVISOR: PROF. RUSS L. TEDRAKE)

2014

- Developed a computational model of a robotic bird for motion planning

Harvard Medical School: Surgical Navigation & Robotics Lab

Boston, MA

RESEARCH INTERN (ADVISOR: PROF. NOBUHIKO HATA)

2013

- Created a device to measure biopsy needle insertion depth during robotic, MRI-guided surgeries

INDUSTRY EXPERIENCE

Toyota Research Institute

Cambridge, MA

RESEARCH INTERN (ADVISOR: MIT PROF. RUSS L. TEDRAKE)

2017

- Developed soft robotic tactile sensors for in-home robotic manipulation tasks, comparing different soft sensing modalities

Ekso Bionics

Richmond, CA

MECHANICAL ENGINEERING INTERN

2016

- Worked with engineering team to develop exoskeletons for medical and industrial applications
- Designed and built a cycle-testing apparatus for the company's *zeroG Arm* system to evaluate lifespan

PUBLICATIONS & TALKS

(* Indicates these authors contributed equally to this work.)

Refereed Journal Articles

- [J8] J. Arnold*, P. Pathak*, Y. Jin, D. Pont-Esteban, **C. M. McCann**, C. Lehmacher, J. P. Bonadonna, T. Lewko, K. M. Burke, S. Cavanagh, L. Blaney, K. Rische, T. Cole, S. Paganoni, D. Lin, and C. J. Walsh, "Personalized ML-based wearable robot control improves impaired arm function," (*submitted*), 2024.
- [J7] **C. M. McCann***, J. Arnold*, C. Lehmacher, K. Bertoldi, and C. J. Walsh, "On-body textile hysteresis estimation for personalized physical human-robot interaction," *International Journal of Robotics Research (IJRR)* (*in review*), 2024.
- [J6] Y. M. Zhou, C. J. Hohimer, H. T. Young, **C. M. McCann**, D. Pont-Esteban, U. S. Civici, Y. Jin, P. Murphy, D. Wagner, T. Cole, N. Phipps, H. Cho, F. Bertacchi, I. Pignataro, T. Proietti, and C. J. Walsh, "A portable inflatable soft wearable robot to assist the shoulder during industrial work," *Science Robotics*, vol. 9, no. 91, 2024.
- [J5] **C. M. McCann**, C. J. Hohimer, C. T. O'Neill, H. T. Young, K. Bertoldi, and C. J. Walsh, "In-Situ Measurement of Multi-Axis Torques Applied by Wearable Soft Robots for Shoulder Assistance," *IEEE Transactions on Medical Robotics and Bionics (T-MRB)*, vol. 5, no. 2, 2023.
- [J4] E. Gallardo Hevia, **C. M. McCann**, M. Bell, N. Hyun, C. Majidi, K. Bertoldi, and R. J. Wood, "High-Gain Microfluidic Amplifiers: The Bridge between Microfluidic Controllers and Fluidic Soft Actuators," *Advanced Intelligent Systems (AIS)*, no. 2200122, 2022.
- [J3] C. T. O'Neill, **C. M. McCann**, C. J. Hohimer, K. Bertoldi, and C. J. Walsh, "Unfolding Textile-Based Pneumatic Actuators for Wearable Applications," *Soft Robotics (SoRo)*, vol. 9, no. 1, 2021.
- [J2] **C. M. McCann***, V. V. Patel*, and A. M. Dollar, "The Stewart Hand: A Highly Dexterous, Six-Degrees-of-Freedom Manipulator Based on the Stewart-Gough Platform," *IEEE Robotics and Automation Magazine (RAM)*, vol. 28, no. 2, 2021.
- [J1] Z. Xu, **C. M. McCann**, and A. M. Dollar, "Reconfigurable Modular Chain: A Reversible Material for Folding Three-Dimensional Lattice Structures," *ASME Journal of Mechanisms and Robotics (JMR)*, vol. 9, no. 2, 2017.

Refereed Conference Papers

- [C5] A. Seewald, M. Chancán, **C. M. McCann**, S. Noh, O. Fallahi, H. Castillo, I. Abraham, and A. Dollar, "RB5 Low-Cost Explorer: Implementing Autonomous Long-Term Exploration on Low-Cost Robotic Hardware," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, 2024.
- [C4] Y. Jin*, Y. M. Zhou*, **C. M. McCann**, T. Proietti, C. H. Rycroft, and C. J. Walsh, "A Data-based Approach to Simultaneously Align Local and Global Frames between an Inertial Measurement Unit (IMU) and an Optical Motion Capture System," in *Proceedings of the IEEE International Conference on Biomedical Robotics & Biomechanics (BioRob)*, 2022.
- [C3] **C. M. McCann** and A. M. Dollar, "Analysis and Dimensional Synthesis of a Robotic Hand Based on the Stewart-Gough Platform," in *Proceedings of the ASME International Design Engineering and Technical Conferences (IDETC)*, 2018.
- [C2] **C. M. McCann** and A. M. Dollar, "Design of a Stewart Platform-Inspired Dexterous Hand for 6-DOF Within-Hand Manipulation," in *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2017.
- [C1] Z. Xu, **C. M. McCann**, and A. M. Dollar, "Design of a Reconfigurable Modular Chain for Folding 3D Lattice Structures," in *Proceedings of the ASME International Design Engineering and Technical Conferences (IDETC)*, 2016.

Chapters in Edited Volumes

- [B1] **C. M. McCann**, K. Swaminathan, and C. J. Walsh, “Soft Wearable Robots,” in *Wearable Exoskeleton Systems, 2nd Edn.*, S. Bai, C. S. Virk, and T. G. Sugar, Eds. London, U.K.: IET Publishing, (*in review*) 2025.

Patents and Applications

- [P1] C. J. Walsh, J. M. Arnold, C. Lehmacher, and **C. M. McCann**, “System and Method for Controlling a Wearable Robotic Device,” U.S. Provisional Patent Application 63/581,575, Sep. 8, 2023.

Invited Talks

- [I1] **C. M. McCann**, “Textile soft robots for the upper extremity: actuation, materials, and evaluation,” at *Georgia Institute of Technology ExoSkin Symposium*, 2024.

Contributed Talks and Posters

- [T14] **C. M. McCann**, J. Arnold, C. Lehmacher, K. Bertoldi, and C. J. Walsh, “Hysteresis as a Feature, not a Bug—Exploiting Textile Hysteresis for Wearable Soft Robots,” at *American Physical Society (APS) March Meeting*, 2024.
- [T13] **C. M. McCann**, J. Arnold, C. Lehmacher, K. Bertoldi, and C. J. Walsh, “Hysteresis Modeling for Woven Textile Soft Actuators,” at *Northeast Robotics Colloquium (NERC)*, 2023.
- [T12] **C. M. McCann**, J. Arnold, C. Lehmacher, K. Bertoldi, and C. J. Walsh, “Hysteresis Modeling for Woven Textile Soft Actuators,” at *Society of Engineering Sciences (SES)*, 2023.
- [T11] D. Farrell, **C. M. McCann**, A. Delpy, A. E. Forte, R. Sourki, C. J. Walsh, and K. Bertoldi, “Textile metamaterials for Wearable Robotics,” at *Society of Engineering Sciences (SES)*, 2023.
- [T10] D. Farrell, **C. M. McCann**, A. E. Forte, R. Sourki, C. J. Walsh, and K. Bertoldi, “Force Manipulation Across a Textile Metamaterial,” at *American Physical Society (APS) March Meeting*, 2023.
- [T9] C. Bösch, G. Bordiga, **C. M. McCann**, E. Medina, M. Yuen, Y. Jin, O. Araromi, A. Fichtner, and K. Bertoldi, “Autonomous Control of a Mobile Robot using a Mechanical Metamaterial “Brain”,” at *American Physical Society (APS) March Meeting*, 2023.
- [T8] **C. M. McCann**, C. J. Hohimer, C. T. O’Neill, H. T. Young, K. Bertoldi, and C. J. Walsh, “In-Situ Measurement of Multi-Axis Torques Applied by Wearable Soft Robots for Shoulder Assistance,” at *Northeast Robotics Colloquium (NERC)*, 2022.
- [T7] Y. M. Zhou, C. J. Hohimer, H. T. Young, **C. M. McCann**, H. Cho, Y. Jin, P. Banzet, P. Murphy, D. Wagner, T. Cole, T. Proietti, and C. J. Walsh, “A Portable Inflatable Soft Wearable Robot for Supporting the Shoulder during Industrial Overhead Tasks,” at *Northeast Robotics Colloquium (NERC)*, 2022.
- [T6] Y. Jin, Y. M. Zhou, **C. M. McCann**, T. Proietti, C. H. Rycroft, and C. J. Walsh, “Visualizing IMU Drift During Shoulder Kinematics Tracking,” at *Northeast Robotics Colloquium (NERC)*, 2022.
- [T5] **C. M. McCann**, C. J. Hohimer, C. T. O’Neill, H. T. Young, K. Bertoldi, and C. J. Walsh, “In-Situ Measurement of Multi-Axis Torques Applied by Wearable Soft Robots for Shoulder Assistance,” at *Gordon Research Conference & Seminar (GRC/GRS)*, 2022.
- [T4] **C. M. McCann**, C. J. Hohimer, C. T. O’Neill, H. T. Young, K. Bertoldi, and C. J. Walsh, “In-Situ Measurement of Multi-Axis Torques Applied by Wearable Soft Robots for Shoulder Assistance,” at *Workshop on Determining Appropriate Metrics and Test Methods for Soft Actuators in Robotic Systems at IEEE International Conference on Robotics and Automation (ICRA)*, 2022.
- [T3] D. Farrell, **C. M. McCann**, A. E. Forte, R. Sourki, C. Walsh, and K. Bertoldi, “Wearable Mechanical Textile Metamaterials,” at *American Physical Society (APS) March Meeting*, 2022.
- [T2] A. M. West, H. Mandl, **C. M. McCann**, N. Gunawardena, A. Morris, A. Siefert, and J. Zinter, “A Novel Sternotomy Saw Guide Incorporating Integrated Rigid Fixation,” at *Design of Medical Devices (DMD) Conference*, 2017.
- [T1] K. Palmer, D. Alelyunas, **C. M. McCann**, K. Yoshimitsu, T. Kato, S.-E. Song, and N. Hata, “Development and evaluation of optical needle depth sensor for percutaneous diagnosis and therapies,” at *SPIE Medical Imaging*, vol. 9036, 2014.

TEACHING EXPERIENCE

Harvard University

Cambridge, MA

TEACHING FELLOW (ES 242R – SOLID MECHANICS ADVANCED SEMINAR)

Fall 2022

- Graduate course on nonlinear finite element methods for elasticity
- This was as an entirely new course that I developed with Prof. Katia Bertoldi

TEACHING FELLOW (ES 128/228 – COMPUTATIONAL SOLID & STRUCTURAL MECHANICS)

Spring 2020 & Fall 2020

- Joint undergraduate/graduate course on finite-element methods for elasticity
- Re-envisioned Matlab programming assignments to improve pedagogical clarity and streamline overall course operation

STUDENT MENTORSHIP

Jonathan Chinana	Navajo Technical University	(visiting postbaccalaureate scholar)
Lana Wagner	Harvard University	(bachelor's student)
Annie Doris	Harvard University	(bachelor's student)
Christian Mitsch	ETH Zurich	(visiting master's student)
Dr. Reza Sourki	University of British Columbia	(visiting doctoral student)
Joseph Sanchez	Harvard University	(bachelor's student)
Harrison Young	Olin College	(visiting bachelor's student)

SERVICE ACTIVITIES

Peer Review

- Nature
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Robotics and Automation Magazine (RA-M)
- IEEE International Conference on Robotics and Automation (ICRA)
- Mechatronics
- Applied Physics Reviews (APR)
- Extreme Mechanics Letters (EML)
- Soft Robotics (SoRo)

Community Outreach

EXPLO Program

Wellesley, MA

GUEST LECTURER

2022

- Invited to present my research from Harvard University to high school students during a summer course on origami robotics
- Taught two lectures and served as a guest panelist for the students' final project evaluation

SPLASH Program

New Haven, CT

STUDENT INSTRUCTOR

2016 – 2018

- Taught stand-alone lectures to high school students on robotic mechanism design and kinematics, including live robotic demos from my research at Yale University