

# Connor M. McCann

SOFT ROBOTICS • MECHANISM DESIGN • NUMERICAL MODELING • ROBOTIC GRASPING

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📄 connor-mccann | 🐦 Connor\_M\_McCann

## EDUCATION

### Harvard University

Cambridge, MA

PH.D. IN MECHANICAL ENGINEERING

2023 (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

2021	<b>Certificate of Distinction in Teaching</b>	Harvard Derek Bok Center for Teaching & Learning
2018	<b>NSF Graduate Research Fellowship</b>	National Science Foundation
2018	<b>Donald Warren McCrosky Prize</b>	Yale School of Engineering & Applied Science
2017	<b>Belle &amp; Carl Morse Junior Scholarship</b>	Yale School of Engineering & Applied Science
2017	<b>Student Mechanism &amp; Robot Design Competition, 2nd Place</b>	ASME IDETC Conference
2017	<b>Student Design Showcase, 3rd Place</b>	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 optimization of wearable soft robots in the presence of complex human body interactions.

### 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, in-hand manipulation.
- Created a reconfigurable truss system for rapid assembly of lightweight, high-rigidity structures.

### 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.
- Gained experience fabricating various types of soft robotic sensing skins.

- Worked with engineering team to develop exoskeletons for medical and industrial applications.
- Designed and built an original cycle-testing apparatus for the company's *zeroG Arm* system to cycle that device through its full range of motion and simulate real world loading.

## PUBLICATIONS

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### Refereed Journal Articles

- [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

- [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 *IEEE International Conference on Biomedical Robotics & Biomechatronics (BioRob)*, **In Press**, 2022.
- [C3] **C. M. McCann** and A. M. Dollar, "Analysis and Dimensional Synthesis of a Robotic Hand Based on the Stewart-Gough Platform," in *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 *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 *ASME International Design Engineering and Technical Conferences (IDETC)*, 2016.

### Conference Posters & Abstracts

- [P4] **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," in *Gordon Research Conference & Seminar (GRC/GRS)*, 2022.
- [P3] D. Farrell, **C. M. McCann**, A. E. Forte, R. Sourki, C. J. Walsh, and K. Bertoldi, "Wearable Mechanical Textile Metamaterials," in *Bulletin of the American Physical Society (APS)*, 2022.
- [P2] A. M. West, H. Mandl, **C. M. McCann**, N. Gunawardena, A. Morris, and J. Siefert, Alyssa Zinter, "A Novel Sternotomy Saw Guide Incorporating Integrated Rigid Fixation," in *Design of Medical Devices (DMD) Conference*, 2017.
- [P1] 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," in *SPIE Medical Imaging*, vol. 9036, 2014.

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

## TEACHING EXPERIENCE

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### Harvard University

Cambridge, MA

#### TEACHING FELLOW (ES 242R)

Fall 2022

- Graduate course on nonlinear finite element method
- Developed new course material with instructor (Prof. Katia Bertoldi), including implementing nonlinear finite-element solver in Matlab

#### TEACHING FELLOW (ES 128/228)

Spring 2020 & Fall 2020

- Joint undergraduate/graduate course on finite-element method
- Developed Matlab programming assignments to implement linear FEM solver

## SERVICE ACTIVITIES

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### Peer Review

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

### 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 projects.

#### **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.

## STUDENT SUPERVISION

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<b>Lana Wagner</b>	Harvard University	(bachelor's student)
<b>Christian Mitsch</b>	ETH Zurich	(visiting master's student)
<b>Reza Sourki</b>	University of British Columbia	(visiting doctoral student)
<b>Joseph Sanchez</b>	Harvard University	(bachelor's student)
<b>Harrison Young</b>	Olin College	(visiting bachelor's student)