

Connor M. McCann

ROBOTICS • SOFT ROBOTICS • MECHANISM DESIGN • MEDICAL DEVICES

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EDUCATION

Harvard University

Cambridge, MA

PH.D. IN MECHANICAL ENGINEERING

2018-2024 (anticipated)

- Research Advisor: Prof. Conor Walsh
- NSF Graduate Research Fellow

Yale University

New Haven, CT

B.S. IN MECHANICAL ENGINEERING (ABET ACCREDITED, *cum laude*)

2014-2018

- GPA: 3.87/4.00
- Research Advisor: Prof. Aaron M. Dollar

HONORS & AWARDS

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|------|---|------------------|
| 2018 | Donald Warren McCrosky Prize , Yale School of Engineering and Applied Science | New Haven, CT |
| 2018 | NSF Graduate Research Fellowship , National Science Foundation | Washington, D.C. |
| 2017 | Belle and Carl Morse Junior Scholarship , Yale School of Engineering and Applied Science | New Haven, CT |
| 2017 | Student Mechanism and Robot Design Competition, 2nd Place , ASME IDETC Conference | Cleveland, OH |
| 2017 | Student Design Showcase, 3rd Place , Design of Medical Devices Conference | Minneapolis, MN |

RESEARCH EXPERIENCE

Harvard University, Biodesign Lab

Cambridge, MA

STUDENT RESEARCHER (ADVISER: PROF. CONOR WALSH)

2018 – present

- Developing novel modeling/design optimization strategies for multi-actuator soft robotic systems.

Yale University, GRAB Lab

New Haven, CT

STUDENT RESEARCHER (ADVISER: PROF. AARON DOLLAR)

2015 – 2018

- Developed a novel Stewart platform-based robotic hand for dexterous 6-DOF, in-hand manipulation. [C2][C3]
- Created a reconfigurable truss system for rapid assembly of lightweight, high-rigidity structures. [J1], [C1]

Massachusetts Institute of Technology, Robot Locomotion Group

Cambridge, MA

RESEARCH INTERN (ADVISER: PROF. RUSS TEDRAKE)

Summer 2014

- Developed a computer model of a robotic bird for motion planning and simulation.

Harvard Medical School, Surgical Navigation and Robotics Lab

Boston, MA

RESEARCH INTERN (ADVISER: PROF. NOBUHIKO HATA)

Summer 2013

- Created a device to measure biopsy needle insertion depth during robotic, MRI-guided surgeries. [A1]
- Performed preclinical study in the hospital's Advanced Multimodality Image Guided Operating Room (AMIGO).

Tufts University, Department of Biomedical Engineering

Medford, MA

RESEARCH INTERN (ADVISER: PROF. QIAOBING XU)

Summer 2012

- Helped develop of a 3D perfusion bioreactor for drug delivery screening of lipidoid-based cancer therapies.

INDUSTRY EXPERIENCE

Toyota Research Institute

Cambridge, MA

RESEARCH INTERN (ADVISER: MIT PROF. RUSS TEDRAKE)

Summer 2017

- Developed novel soft robotic tactile sensors for in-home robotic manipulation tasks.
- Gained experience fabricating various types of soft robotic sensing skins.

Ekso Bionics

Richmond, CA

MECHANICAL ENGINEERING INTERN

Summer 2016

- 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

Refereed Journal Articles

- [J1] Z. Xu, **C. M. McCann**, and A. M. Dollar. "Reconfigurable Modular Chain: a Reversible Material for Folding 3D Lattice Structures." *ASME Journal of Mechanisms and Robotics (JMR)*, 2017; 9(2).

Refereed Conference Papers

- [C3] **C. M. McCann** and A. M. Dollar. "Analysis and dimensional synthesis of a robotic hand based on the Stewart-Gough platform" *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, 2018.
- [C2] **C. M. McCann** and A. M. Dollar. "Design of a Stewart Platform-Inspired Dexterous Hand for 6-DOF Within-Hand Manipulation" *IEEE/RSJ 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." *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, 2016.

Conference Abstracts and Posters

- [A2] A. West, H. Mandl, **C. M. McCann**, N. Gunawardena, A. Morris, A. Siefert, J. Zinter. "A Novel Sternotomy Saw Guide Incorporating Integrated Rigid Fixation." *Design of Medical Devices Conference*, 2017.
- [A1] K. Palmer, D. Alelyunas, **C. M. McCann**, K. Yoshimitsu, T. Kato, S. Song, N. Hata. "Development and evaluation of optical needle depth sensor for percutaneous diagnosis and therapies." *SPIE Medical Imaging 2014: Image-Guided Procedures, Robotic Interventions, and Modeling*, 2014.

OTHER PROJECTS

Rough-Terrain Forest Vehicle

New Haven, CT

YALE MECHANICAL ENGINEERING SENIOR CAPSTONE COURSE PROJECT (MENG 489)

Spring 2018

- Designed and optimized a rough terrain vehicle to carry small forestry equipment for logging and research applications in the Yale School of Forestry.
- Constructed a 30% scale, fully functional prototype and tested in actual forest environments.

Variable-Stiffness Soft-Robotic Precision Grasper

New Haven, CT

YALE ADVANCED ROBOTIC MECHANISMS COURSE PROJECT (ENAS 778)

Fall 2016

- Developed a novel, variable-stiffness, soft-robotic grasper for this graduate level course.
- Design incorporated two pneumatically actuated, compliant fingers that rely on agonist/antagonist air chambers to vary their stiffness.

Novel Sternotomy Saw Guide Incorporating Integrated Rigid Fixation

New Haven, CT

YALE MEDICAL DEVICE DESIGN AND INNOVATION COURSE PROJECT (MENG 404)

Fall 2016

- Worked in a team to develop a novel saw guide to reduce complications in sternotomy procedures.
- By constraining the motion of the saw blade, our device ensures an accurate midline incision to facilitate improved healing.

Yale University Undergraduate Intelligent Vehicles Team

New Haven, CT

MECHANICAL DESIGN TEAM LEAD

2014 – 2016

- Led mechanical design and construction efforts for development of an autonomous sailboat.

Tactile Screen for Blind Individuals

Concord, MA

INDEPENDENT ENGINEERING PROJECT

Spring 2014

- Independently developed an original proof-of-concept prototype for a tactile screen interface that allows a blind individual to feel computer-generated graphical information and braille writing in 3D.

TEACHING EXPERIENCE

Yale SPLASH

New Haven, CT

STUDENT INSTRUCTOR

2016 – 2018

- Teach stand-alone lectures to high school students on robotic mechanism design and kinematics with live robotic demos.

TECHNICAL SKILLS

CAD	Solidworks, Finite-Element Analysis, PDM, CAMWorks, Topology Optimization
SOFTWARE	Matlab, C, Python, R, Arduino, Processing, LaTeX
FABRICATION	3D printing, laser cutting, milling, lathing, CNC milling, soft-robotic fabrication

YALE COURSEWORK

Freshman Year

Multivariable Calculus	A-	Mechanical Design	A
Comprehensive General Chemistry	A-	Ordinary & Partial Differential Equations	A
Fundamentals of Physics	A-	Computing for Engineers & Scientists	A
Physics Lab	B+	Fundamentals of Physics	A-
Livy's Rome	B+	Physics Lab	A
Introduction to Linguistics (summer)	A	Writing Seminar (summer)	A-

Sophomore Year

Strength & Deformation	A	Linear Algebra	A
Computer-Aided Engineering	A	Introduction to Computer Engineering	A
Independent Research	A	History of the English Language	A
Introduction to Material Science	A-	Material Science Lab	A-
Thermodynamics	B	Data Structures & Programming Techniques	(Cr) *

Junior Year

Advanced Robotic Mechanisms **	A	Fluid & Thermal Energy Science	A
Medical Device Design	A	Mechatronics Lab	A
Fluid Mechanics	A	Dynamics	A
Introduction to Electronics	A	Fluid Mechanics & Thermodynamics Lab	A

Senior Year

Independent Research	A	Independent Research	A
Language and Computation	A	Design Process & Implementation	A
Introduction to Architecture	A	Neural Networks & Language	(Cr) *
Communication, Computation, & Control	(Cr) *	Intensive Introductory Statistics	(Cr) *

* Courses marked "(Cr)" were taken under Yale's Credit/D/F grading option

** Indicates graduate-level course taken in Yale's School of Engineering and Applied Science