Clark Teeple

Postdoctoral Fellow | Harvard Microrobotics Lab, Harvard University

cbteeple.com github.com/cbteeple @ cbteeple@gmail.com Based in Somerville, MA, USA

I am a roboticist with experience designing ”gentle” end effectors, and a passion for mechatronics and system integration. I am interested in applying my creative engineering mindset to solve exciting, real-world problems.

Education

Nov. 2021 PhD in Engineering Sciences (Robotics) – **Harvard University**, Cambridge, MA
- *Dissertation Title* - Design Principles for Improving Precision and Dexterity of Soft Robotic Hands
- NSF Graduate Research Fellow

May 2018 MS in Engineering Sciences (Robotics) – **Harvard University**, Cambridge, MA

May 2016 BSE in Mechanical Engineering – **University of Michigan**, Ann Arbor, MI
- 3.90 GPA, Summa Cum Laude

Skills

Mechanical Design	**Fusion 360**, Solidworks, OnShape, Eagle CAD (Electronics), Basic Machining, **3D Printing**, **Laser Cutting**, Design for Manufacturing
Programming	**Python** (including NumPy, SciPy, and Pandas), **C++** (embedded), MATLAB, **Linux**
Robotics Frameworks	**Robot Operating System (ROS)**, MoveIt!, PyBullet Physics, **UR5e Robot Arm**

Experience

2016–2021 | PhD Candidate

Harvard Microrobotics Lab – Harvard University, Cambridge, MA

Advisor : Prof. Robert Wood

- Lead the development of a dexterous soft robotic hand platform capable of in-hand manipulation, and developed relevant performance metrics to quantify in-hand manipulation.
- Investigated several factors in the design of soft robotic hands (*friction, compliance, finger arrangement, etc.*) leading to enhanced capabilities in both grasping and in-hand manipulation.
- Improved the precision grasping capabilities of soft grippers by developing finger designs that fully-utilize passive compliance.
- Studied the role of gripper compliance in manipulating fabrics and other thin, flexible objects.
- Developed Ctrl-P, a modular, high-bandwidth, smooth pressure control system for soft robots. This consists of a custom PCB, firmware, and ROS package, and is actively supporting my own research projects along with and several others.
- Developed calibration protocols for building and controlling physically-accurate soft robots in simulation as part of the development team for the SoMo (Soft Motion) Simulation Framework.
- Built an integrated light intensity measurement system for soft optical sensors consisting of a custom PCB, firmware, and MATLAB control interface.
- Supervised two Masters theses, and three undergraduate projects.

Mechanical Design | Simulation | Embedded Programming | System Integration | ROS | Python | C++

2015–2016 | Undergraduate Research Assisant

Vibration and Acoustics Laboratory : Microsystems – University of Michigan, Ann Arbor, MI

Advisor : Prof. Kenn Oldham

- Studied locomotion of small-scale legged robots with multiple sets of high-frequency elastic legs.
- Designed, built, and characterized several robot prototypes using 3D printing.
- Contributed to a design-invariant dynamic model of leg and body behavior.

Mechanical Design | 3D Printing | Dynamic Modeling

Summer 2015 | Engineering Intern

MIT Lincoln Laboratory – Lexington, MA

- Developed control systems and a user interface to automate the operation of a mobile mass spectrometry platform. This platform was used to improve training of canines for explosives detection.

System Integration | UI/UX Design | LabVIEW

Mentorship & Teaching

2021-2022 **Advisor/Supervisor** – Undergraduate Senior Thesis, *Harvard Microrobotics Lab*
2020-2021 **Advisor/Supervisor** – Two Undergraduate Research Projects, *Harvard Microrobotics Lab*
2019-2020 **Advisor/Supervisor** – Visiting Masters Student Thesis (EPFL), *Harvard Microrobotics Lab*
2018-2019 **Advisor/Supervisor** – Visiting Masters Student Thesis (ETH-Z), *Harvard Microrobotics Lab*
Fall 2018 **Teaching Fellow** – ES51 - Computer Aided Machine Design, *Harvard University*

Selected Publications

C.B. Teeple, J. Werfel, and R.J. Wood, "**Multi-Dimensional Compliance of Soft Grippers Enables Gentle Interaction with Thin, Flexible Objects**", *IEEE International Conference on Robotics and Automation (ICRA)*, 2022 (In-Review)

C.B. Teeple, B. Aktaş, M.C. Yuen, G.R. Kim, R.D. Howe, and R.J. Wood, "**Controlling Palm-Object Interactions via Friction for Enhanced In-Hand Manipulation**", *IEEE Robotics and Automation Letters*, 2022

C.B. Teeple, R.C. St. Louis, M.A. Graule, and R.J. Wood, "**The Role of Digit Arrangement in Soft Robotic In-Hand Manipulation**", *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2021

M.A. Graule, **C.B. Teeple**, T.P. McCarthy, G.R Kim, R.C. St. Louis, and R.J. Wood, "**SoMo : Fast and Accurate Simulations of Continuum Robots in Complex Environments**", *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2021

C.B. Teeple, G.R. Kim, M.A. Graule, and R.J. Wood, "**An Active Palm Enhances Dexterity of Soft Robotic In-Hand Manipulation**", *IEEE International Conference on Robotics and Automation (ICRA)*, 2021

C.B. Teeple, S. Abondance, and R.J. Wood, "**A Dexterous Soft Robotic Hand for Delicate In-Hand Manipulation**", *IEEE Robotics and Automation Letters*, 2020

C.B. Teeple, T.N. Koutros, M.A. Graule, and R.J. Wood, "**Multi-Segment Soft Robotic Fingers Enable Robust Precision Grasping**", *International Journal of Robotics Research*, 2020