

Miana Smith

Contact: miana@mit.edu

Website: <https://miana.pages.cba.mit.edu/home/>

education

Massachusetts Institute of Technology, Cambridge, MA
PhD Candidate at the Center for Bits and Atoms GPA 5.0/5.0 June 2023 — current
Advisor: Neil Gershenfeld
Researching self-assembling robotic systems for building architected materials.
SM in Media, Arts, and Sciences GPA 5.0/5.0 Sep 2021 — June 2023
Advisor: Neil Gershenfeld
Thesis: Recursive Robotic Assemblers
SB in Mechanical Engineering GPA 4.7/5.0 Sep 2017 — Feb 2021
Advisor: Maria Yang
Thesis: Functional Silk-Chitosan Composites, advisor: Neri Oxman

research experience

MIT Center for Bits and Atoms, Cambridge, MA September 2021 — current
Graduate Research Assistant

- Designed and build a self-assembling modular robotic system for assembling structural modular building blocks.
- Designed the robotic system (electronics, hardware, firmware, and motion planning) as well as the mechanical system (load bearing, mass-manufacturable).

MIT Media Lab – Mediated Matter, Cambridge, MA March 2019 — February 2021
Undergraduate Researcher

- Developed biohybrid fibers to create textiles that synthesize biological outputs.
- Prototyped mechanical devices to facilitate synthetic biology experiments, characterized material properties, did wet lab work (PCR, e. coli transformations, etc.), and designed experiments.

MIT Digital Design Fabrication Group, Cambridge, MA June 2018 – August 2018
Undergraduate Researcher

- Prototyped roofing that used piezoelectric materials to offset residential building energy consumption toward developing smart building façade modules.

UCLA Basic Plasma Science Facility, Los Angeles, CA June 2016 – August 2017
Lab Assistant

- Designed and built sensors and probes for various plasma physics experiments, primarily on the behavior of whistler waves under different modes of excitation.

selected publications

Hierarchical Discrete Lattice Assembly: An Approach for the Digital Fabrication of Scalable Macroscale Structures. Miana Smith, Paul Richard, Alex Htet Kyaw, and Neil Gershenfeld, *ACM Symposium on Computational Fabrication (SCF '25)*
<https://doi.org/10.1145/3745778.3766665>.

Voxel Invention Kit: Reconfigurable building blocks for interactive structural electromechanical systems. Miana Smith, Jack Forman, Amira Abdel-Rahman, Sophia Wang, and Neil Gershenfeld, *CHI Conference on Human Factors in Computing Systems (CHI '25)*, <https://doi.org/10.1145/3706598.3713948>.

Self-Reconfigurable Robots for Collaborative Discrete Lattice Assembly. Miana Smith, Amira Abdel-Rahman, and Neil Gershenfeld, *2024 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3624-3631, doi: 10.1109/ICRA57147.2024.10609866.

(thesis) **Recursive Robotic Assemblers.** Miana Smith, 2023, Master's Thesis, MIT.
<https://cba.mit.edu/docs/theses/23.06.smith.pdf>

Self-Replicating Hierarchical Robotic Swarms. Amira Abdel-Rahman, Christopher Cameron, Benjamin Jenett, *Miana Smith*, and Neil Gershenfeld, *Nature Communications Engineering*, 1 1-10 (2022). <https://doi.org/10.1038/s44172-022-00034-3>

(thesis) **Functional Silk-Chitosan Composites.** Miana Smith, 2021, Undergrad Thesis, MIT.

A Rapid Fabrication Methodology for Payload Modules, Piloted for the Observation of Queen Honey Bees in Microgravity. Smith, Rachel Soo Hoo, Kraemer, Felix, Bader, Christoph, *Smith, Miana*, Weber, Aaron, Simone-Finstrom, Michael, Wilson-Rich, Noah and Oxman, Neri. *Gravitational and Space Research*, vol.9, no.1, 2021, pp.104-114. <https://doi.org/10.2478/gsr-2021-0008>

Sequential Multimaterial Additive Manufacturing of Functionally Graded Biopolymer Composites. Nic A. Lee, Ramon E. Weber, Joseph H. Kennedy, Josh J. Van Zak, *Miana Smith*, Jorge Duro-Royo, and Neri Oxman. *3D Printing and Additive Manufacturing*. Oct 2020. 205-215. <http://doi.org/10.1089/3dp.2020.0171>

(pre-print) **Exogenous pigments shield microorganisms from spaceflight-induced changes.** S. Sharma, R.S.H Smith, N.A. Lee, S.L. Wilson, *M.M. Smith*, and N. Oxman. <https://doi.org/10.1101/2021.07.29.454367>

selected presentations

FAB23 Technology (R&D) Symposium Panel — Panelist, discussing distributed robotic assembly systems at FAB 2023 conference.

Assembler robots in construction — Invited talk at MIT 2023 Safety Hack

Simulation of a collaborative two-robot system for lattice assembly — Lightning talk and poster presentation at the ICRA 2022 Workshop on Collective Robotic Construction

Manufacturing Biohybrid Textiles through a Robust Fiber Based Cell-Free Expression System — Poster presentation at Materials Research Society Fall Meeting 2019

- Won best poster award

Functional Silk-Chitosan Composites — Presented at 2021 MIT MechE DeFlorez Competition

- Won first place in Best Undergraduate Science

Functional Silk-Chitosan Composites — Presented at 2021 Spring MIT ProjX Exposition

- Won P&G company sponsored award

Desktop Wet Spinning Platform for Producing Bio-Hybrid Fibers — Poster presentation at 2020 Fall MIT Mechanical Engineering Research Exhibition

- Won best undergraduate researcher award

Mode conversation and heating in a UCLA-high schools collaborative experiment — Poster presentation at APS Division of Plasma Physics Meeting 2016

teaching and mentorship

How to make (almost) anything, Fall 2021, 2022, 2023.
Teaching assistant

- Led recitations on electronics, EDA, textile processes, trainings on PCB milling, soldering, and programming, and workshops on inflatables.
- Course enrollment: 80-100 students, divided into ~20 person sections.

I have mentored 3 master's students: A. Kyaw (2024-current), P. Richard (2025), S. Leamon (2025), and 3 undergraduate students: S. Wang (2022-2024), T. Uviedo (2024), A. Dequin (2024-2025).