

Natasha K. Hirt

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MIT | Department of Architecture
Building Technology Program
77 Massachusetts Avenue
Cambridge, MA 02139

Developing agentic systems that reason over complex decision spaces. Leveraging these, and computational methods more generally, to reduce the carbon and material intensity of the built environment.

Education

Massachusetts Institute of Technology
★ *Doctoral candidate in Building Technology*
Advisor: Dr. Caitlin T. Mueller

Cambridge, MA

Massachusetts Institute of Technology
★ *M.S. Building Technology*
★ *M.S. Computational Science & Engineering*
Advisor: Dr. Caitlin T. Mueller

Cambridge, MA
June 2025

Thesis: Structural analysis at scale: an evaluation of embodied carbon in complex floor layouts

Massachusetts Institute of Technology
★ *M.Eng. Civil & Environmental Engineering (Structural Mechanics & Design)*
Advisor: Dr. Caitlin T. Mueller

Cambridge, MA
June 2023

Thesis: Generative structural design: an algorithmic approach to synthesizing and optimizing steel lateral systems

Massachusetts Institute of Technology
★ *B.S. Architecture*
★ *B.S. Urban Studies and Planning*
Advisors: Dr. John Ochsendorf, Dr. Eric R. Huntley

Cambridge, MA
June 2023
Phi Beta Kappa

Thesis: Urban scale structural modelling as a tool for reducing embodied carbon in planning, policymaking, and design

Professional Experience

Cassius Capital
Quantitative researcher intern

New York, NY
Summer 2026

- ★ Built Cursor- and Claude Code-integrated multi-agent research infrastructure over MCP servers for coordinating research agents, approximately doubling the team's effective research capacity.
- ★ Developed persistent agentic memory for recording decisions while coding and a zettelkasten for research organization, unified with the codebase through a shared reasoning layer.
- ★ Designed a domain-specific language for specifying investment strategies and an accompanying backtesting framework for systematic evaluation.

Skidmore, Owings & Merrill (SOM)
Computational engineer intern
Supervisors: Neil Katz, Jonathan Rabagliati

New York, NY
Summer 2023

- ★ Developed algorithms to design and optimise the largest PV array in New York (New York Climate Exchange on Governor's Island).

MIT D-Lab, We Yone Learning Centre

Architect and structural engineer

Masiaka, Sierra Leone

Winter 2021

Supervisors: Dr. Leslie Norford (MIT D-Lab), Dr. John Ochsendorf (MIT Civil Engineering)

- ★ Worked with MIT Development Lab (D-Lab) as primary architect and structural designer for three-building community center and school complex in Sierra Leone. Built using local labour and climate-adaptive techniques, construction was completed in 2023. Partnership with nonprofit organization US-Africa Children's Fund.

SpeakEasy Social Inc.

Cofounder, product design lead

Cambridge, MA

2020–2022

- ★ Co-founded a tech startup that sought to improve antiquated labour union management and communication systems.
- ★ Spearheaded UI/UX work; led product design and brand implementation; oversaw translation to final alpha product; guided development of mid-term expansion plans and pilot.

NOBULL

Business strategist intern

Boston, MA

Winter 2020–2021

- ★ Developed sustainability strategies for the footwear and apparel value chain.
- ★ Collaborated with footwear designers on product line roadmaps and supported e-commerce UI/UX website improvements.

Research Experience |

MIT Ideation Lab

Undergraduate researcher

Cambridge, MA

Summer 2021

Advisor: Dr. Maria Yang

- ★ Conducted literature review and feasibility study for in-situ lunar manufacturing using molten glass extrusion methods. Evaluated potential for 3D-printing structures from lunar regolith using novel techniques developed at the MIT Media Lab.

MIT Media Lab, Mediated Matter

Undergraduate researcher

Cambridge, MA

Summer 2019

Advisor: Dr. Neri Oxman

- ★ Parametrically modelled, manufactured, and documented biocomposite structures to demonstrate the effect of material composition on a structure's response to varying environmental effects.

Teaching Experience |

4.440: Introduction to Structural Design

Spring 2025

Dr. John Ochsendorf, MIT

- ★ Led weekly lab sections for undergraduates focusing on structural analysis fundamentals and design principles.

4.450: Computational Structural Design and Optimization

Fall 2024

Dr. Caitlin Mueller, MIT

- ★ Instructed students in computational tools including Grasshopper, Karamba3D, and custom optimization algorithms.

- ★ Provided technical support and guidance for final projects exploring novel solutions to architectural and structural problems.

4.453: Creative Machine Learning for Design

Spring 2023

Dr. Caitlin Mueller, MIT

- ★ Assisted students with implementation of machine learning algorithms in PyTorch.

Academic Honors |

- ★ Leventhal Center for Advanced Urbanism (LCAU) Fellowship 2025–2026
- ★ Phi Beta Kappa 2023
- ★ Henry Wentworth Gardner [1894] Prize for an Architecture Senior 2023
In recognition of academic excellence and achievement in design

Service |

Graduate

- ★ MIT Graduate Student Council Academics, Research, and Careers Committee Co-Chair 2025–2026
- ★ MIT Graduate Student Council Nominations Board 2025–2026
- ★ Class of 2022 MIT Pi (π) Reunion Planning Committee 2024–2025
- ★ MIT Graduate Student Council Representative for Architecture 2024–2025
- ★ Presidential Advisory Cabinet of MIT President Sally Kornbluth Graduate Representative 2024–2025
- ★ Research Fellow, MIT Schwarzman College of Computing 2023–2024
Common Ground; contributed to conceptualization of MIT computer science curriculum

Undergraduate

- ★ MIT Corporation Joint Advisory Committee on Institute-Wide Affairs 2022–2023
Undergraduate Representative
- ★ Schwarzman College of Computing Undergraduate Advisory Board 2022–2023
- ★ MIT Values Committee 2021–2022
Undergraduate Representative
- ★ Presidential Advisory Cabinet of MIT President Rafael Reif 2021–2022
Undergraduate Representative
- ★ MIT Ring Committee 2020–2023
Artist for MIT 2022, 2023 class rings (full ring), and 2024 (bezel).
First student to serve on multiple years' committees.
- ★ MIT Undergraduate Association Communications Committee Chair 2020–2021
Led team of 10 to improve UA communications infrastructure and student engagement
- ★ MIT Undergraduate Association COVID-19 Emergency Response Team 2020
Chair of engagement, responsible for surveys and reports, negotiations with administration

Publications |

Journal Papers

- [1] **Hirt, N. K.**, & Mueller, C. T. (2025). Efficiency through topology: A computational method for quantifying embodied carbon in complex beam layouts. *Accepted*.

Conference Papers

- [1] **Hirt, N. K.**, Broyles, B. M., & Mueller, C. T. (2026). Structured intelligence: Implementing agentic AI for transparent, deterministic structural engineering reasoning systems. IASS Annual Symposium 2026. *Under review*
- [2] Feickert, K., **Hirt, N. K.**, Chan, K., & Mueller, C. T. (2025). Quantifying the embodied carbon of select massing typologies in architectural design. IASS Annual Symposium 2025.
- [3] Lee, K. J., **Hirt, N. K.**, & Mueller, C. T. (2024). Geometry, strength, and efficiency: Tracing the standardization of North American structural steel, 1885-present. 8th International Congress on Construction History, Zurich.

Presentations & Panels |

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| ★ MIT Values Statement Community Conversation
Panelist | February 2023 |
| ★ Schwarzman College of Computing Parent Leadership Circle Panel on
the Common Ground and Social and Ethical Responsibilities of Computing at MIT
Panelist | October 2023 |

Supplementary |

Athletics

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| ★ MIT Division 1 Team Captain, Lightweight Women's Crew
CRCA Scholar-Athlete & IRA All-Academic Team Award | 2022–2023 |
| ★ Division 1 IRA National Champion, Lightweight Women's 4+ | 2022 |
| ★ Winner, Head of the Charles Regatta, Lightweight Women's 4+ | 2021 |
| ★ Hong Kong Division 3 High School National Champion, 1500m Track Race | 2017 |

Rhetoric

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| ★ Grand Finalist, Interpretive Reading, World Individuals Public Speaking and Debate Competition | 2017 |
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Languages

- ★ Native: English, German (Hochdeutsch)
- ★ Conversational: Han Chinese (繁体)