Natasha K. Hirt

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

The practical reduction of embodied carbon and material intensity of the built environment vis-à-vis novel comptuational analysis and optimization techniques. Emphasis is placed on manufacturability, usability, and generality of methods.

Education

Massachusetts Institute of Technology Cambridge, MA
⋆ *Doctoral student in Building Technology*
Advisor: Dr. Caitlin T. Mueller

Massachusetts Institute of Technology Cambridge, MA
⋆ *M.S. Building Technology* **June 2025**
⋆ *M.S. Computational Science & Engineering*
Advisor: Dr. Caitlin T. Mueller
Thesis: Structural analysis at scale: an evaluation of embodied carbon in complex floor layouts

Massachusetts Institute of Technology Cambridge, MA
⋆ *M.Eng. Civil & Environmental Engineering (Structural Mechanics & Design)* **June 2023**
Advisor: Dr. Caitlin T. Mueller
Thesis: Generative structural design: an algorithmic approach to synthesizing and optimizing steel lateral systems

Massachusetts Institute of Technology Cambridge, MA
⋆ *B.S. Architecture* **June 2023**
⋆ *B.S. Urban Studies and Planning* *Phi Beta Kappa*
Advisors: Dr. John Ochsendorf, Dr. Eric R. Huntley
Thesis: Urban scale structural modelling as a tool for reducing embodied carbon in planning, policymaking, and design

Research Experience

MIT Ideation Lab Cambridge, MA
Undergraduate researcher 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 Cambridge, MA
Undergraduate researcher 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.

Professional Experience

Skidmore, Owings & Merrill (SOM) New York, NY
Computational design intern Summer 2023
Supervisors: Neil Katz, Jonathan Rabagliati

⋆ Designed algorithms for the layout and optimal orientation of the largest solar panel array in New York City. Array designed for installation on the New York Climate Exchange on Governor's Island.

MIT D-Lab, We Yone Learning Centre Masiaka, Sierra Leone
Architect and structural engineer 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. Cambridge, MA
Cofounder, product design lead 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 Boston, MA
Intern Winter 2020

⋆ Developed sustainability strategies to be implemented across the entire footwear and apparel value chain.

⋆ Collaborated with footwear designers to strategize and structure product line roadmap in the domain of e-commerce UI/UX improvements.

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 2024–2025
Graduate Representative

⋆ 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). Discretized slab topology: Computational tools for quantifying embodied carbon in complex beam layouts. *Under review.*

Conference Papers

[1] 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.

[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. *Under review.*

Presentations & Panels

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

Supplementary

Athletics

- ⋆ MIT Division 1 Team Captain, Lightweight Women's Crew — 2022–2023
  CRCA Scholar-Athlete & IRA All-Academic Team Award
- ⋆ 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

- ⋆ Grand Finalist, Interpretive Reading, World Individuals Public Speaking and Debate Competition — 2017

Languages

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