

## Kushagra Varma

Ph.D. Candidate, Assoc. AIA, LEED AP, WELL AP, ENV SP, CAPM

School of Architecture (SOA), Carnegie Mellon University

kvarma2@andrew.cmu.edu | +1 617.949.1025 | <https://www.linkedin.com/in/kush-varma/>

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### Education

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- 02/2021 - 05/2024 **Carnegie Mellon University**, Pittsburgh, Pennsylvania  
Doctor of Philosophy in Architecture Engineering Construction Management (AECM)  
GPA 4.06/4.33  
*Thesis Title* A 4D Interactive Carbon Emissions Dashboard: A Visualization and Assessment Tool for Urban Building Environmental Impact.  
*Thesis Advisors* Dr. Erica C. Hameen, Vivian Loftness, Kristen Kurland, Dr. Peter Scupelli, Dr. Ellyn Lester
- 08/2015 - 12/2016 **Stevens Institute of Technology**, Hoboken, New Jersey  
Master of Science in Construction Management  
GPA 3.93/4.00
- 07/2009 - 04/2014 **National Institute of Technology (MANIT)**, Bhopal, India  
Bachelor of Architecture  
GPA 8.56/10.00

### Skills

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- Project Management* MS Project, Primavera P6, MS Office, Bluebeam, @Risk, Precision Tree  
*Building Design* Autodesk – AutoCAD, Revit, Navisworks, Design Builder, and IES-VE  
*Energy Analytics* Energy Plus, Climate Consultant, NREL SAM, Homer Grid Pro, ReOpt, Atrius, and WebCTRL.  
*Data Analytics* Python 3, ArcGIS Pro, SPSS, and Tableau (Prep, Desktop, Public)  
*Graphic Design* Adobe Creative Suite - Photoshop, Illustrator, InDesign

### Achievements and Awards

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- 2023 Environmental Defense Fund (EDF) Climate Corp Fellowship at the City of Orlando.  
2023 Finalist in Carnegie Mellon University's 3-minute doctoral thesis (3MT) challenge.  
2022 Emerging Scholar Award 2022, Common Ground Research Network, Urbana Campaign, IL.  
2022 First Place – Scott Institute for Energy Innovation, Research Poster Competition 2022.  
2019 Faculty Appreciation Award, Stevens Institute of Technology.  
2019 & 20 Appreciation letter from the vice-provost for excellent teaching ratings, Stevens Institute of Technology.

### Credentials and Certifications

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- 2021 Fundamentals of Engineering (FE), National Council of Examiners for Engineering and Surveying  
2021 CITI Training in Responsible Conduct of Research for Engineers  
2021 CITI Training in Social and Behavioral Responsible Conduct of Research  
2021 WELL AP, International WELL Building Institute (IWBI)  
2020 Certified associate in project management (CAPM®), Project Management Institute (PMI)  
2019 Envision Sustainability Professional (ENV SP), Institute for Sustainable Infrastructure (ISI)  
2017 LEED AP BD+C, US Green Building Council  
2016 Construction Manager-in-Training (CMIT), Construction Management Association of America  
2016 & 17 OSHA 30, OSHA 10 Construction Industry Certificates

### Professional Affiliations

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- 2021 American Society of Civil Engineers, Student Member  
2018 American Institute of Architects, Associate Member  
2018 Council of Architecture, India, Registered Architect  
2016 Construction Management Associate of America, Student Member  
2012 National Information Center for Earthquake Engineering (NICEE), Lifetime Member

## Academic Appointments

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- 07/2022 – present* **Instructor and Thesis Advisor**, Carnegie Mellon University, Pittsburgh, PA
- Oversee and actively participate in the formulation of innovative research concepts for graduate theses in the Master of Science in Building Performance and Diagnostics and Master of Science in Sustainable Design programs.
  - Lead over 10 graduate thesis projects.
- 02/2021 – 07/2022* **Teaching and Research Assistant**, Carnegie Mellon University, Pittsburgh, PA
- Geographic Information Systems, with Prof. Kristen Kurland
  - Indoor Environmental Quality, With Prof. Erica C. Hameen
- 01/2018 – 12/2020* **Lecturer**, Stevens Institute of Technology, Hoboken, NJ
- Directed five construction engineering and management courses within the Civil, Environmental, and Ocean Engineering (CEOE) department. (See course ratings below)
- 05/2017 – 12/2020* **Academic Advisor**, Stevens Institute of Technology, Hoboken, NJ
- Advised over 100 graduate students in the Construction Engineering and Management program.
- 2019 – 2020* **Instructor**, Civil Engineering Summer Boot Camp, Pre-College Program, Stevens Institute of Technology
- Taught Introduction to Civil Engineering course to high school students
  - Taught Introduction to Engineering Drawing and Building Information Modeling course.

## Courses ratings, in the Construction Engineering and Management Program at Stevens Institute of Technology

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Term	Courses	Enrollment	Course rating	Instructor rating
<i>F 20</i>	CM 502* Construction Engineering II	14	3.8/4.0	4.0/4.0
	CM 592* Adv Project Controls in Built Env	25	3.71/4.0	3.86/4.0
	CM 592W* Adv Project Controls in Built Env	5	3.33/4.0	3.67/4.0
	CM 542 Quality Mgt & Const Performance	10	3.67/4.0	4.0/4.0
<i>SU 20</i>	CM 561W Green Construction	8	3.5/4.0	3.5/4.0
<i>SP 20</i>	CM 502* Construction Engineering II	18	2.88/4.0	3.0/4.0
	CM 560 Sustainable Design (BIM course)	30	3.5/4.0	3.64/4.0
	CM 592* Adv Project Controls in Built Env	28	3.8/4.0	3.9/4.0
<i>FA 19</i>	CM 502A* Construction Engineering II	26	3.94/4.0	3.89/4.0
	CM 502B* Construction Engineering II	23	3.4/4.0	3.6/4.0
	CM 592* Adv Project Controls in Built Env	23	3.76/4.0	3.82/4.0
<i>SU 19</i>	CM 561W Green Construction	15	3.75/4.0	3.75/4.0
<i>SP 19</i>	CM 502* Construction Engineering II	36	3.75/4.0	3.67/4.0
	CM 560 Sustainable Design (BIM course)	15	3.9/4.0	3.9/4.0

	CM 561 Green Construction	12	3.8/4.0	3.8/4.0
<i>FA 18</i>	CM 502* Construction Engineering II	29	3.48/4.0	3.61/4.0
	CM 592A* Adv Project Controls in Built Env	26	3.45/4.0	3.6/4.0
	CM 592B* Adv Project Controls in Built Env	28	3.71/4.0	3.57/4.0
<i>SU 18</i>	CM 561 Green Construction	14	3.67/4.0	3.67/4.0
<i>SP 18</i>	CM 502* Construction Engineering II (co- lectured)	35	NA	NA
	CM 560 Sustainable Design (co-lectured)	16	NA	NA

\* Core (or required or foundation) courses 12 units other course carried 9 units. 'W' stands for web-based course.

### Service Appointments

*2021 – Present* **Admissions Committee Member** for M.S. in Architecture-Engineering-Construction Management Program, School of Architecture and Civil and Environmental Engineering Department, CMU

*2021* **Faculty Advisor**, Construction Management Students Organization (CMSO), Stevens Institute of Technology

### Industry Appointments

*05/2023 – 08/2023* **Environmental Defense Fund Climate Corps Fellow**, City of Orlando, Florida

- Partnered with municipal authorities to evaluate and monitor environmental performance through the utilization of the Atrius data management platform.
- Led the analysis of energy and water consumption in the municipal building portfolio, employing Atrius, ChargeUp, and WebCTRL data analytics platforms.
- Directed the analysis of photovoltaic and community solar capacity to monitor advancements toward the City's 2030 decarbonization objectives.

*05/2022 – 08/2022* **Senior Intern** in Built Ecology Consulting, WSP USA, Chicago, Illinois

- Formulated innovative strategies and frameworks for large corporate clients to achieve decarbonization goals.
- Developed two Excel-based calculators for assessing scope 1, 2, and 3 carbon emissions in separate projects.
- Produced comprehensive sustainability and decarbonization guidance documents for use in pursuits and projects.

*02/2017 -05/2017* **Assistant Project Manager**, Copper Hill Development Inc., New York City, New York.

- Oversaw corporate clientele in Manhattan, offering design and construction counsel.
- Conducted and facilitated project meetings, ensuring adherence to project schedules and estimates.
- Acted as a liaison between diverse stakeholders, including owners, designers, and contractors.

*06/2016 – 08/2016* **Field Engineering Intern**, China Construction America Civil Inc, Jersey City, New Jersey

- Directed field operations by overseeing both union and non-union labor and equipment.
- Generated quantity take-offs, Request for Quotations (RFQs), and Purchase Orders (POs).
- Compiled daily field reports, environmental control checklists, and 2-week look-ahead schedules.

- 07/2014 – 07/2015 **Architectural Engineer**, Samsung Heavy Industries India, Noida, Uttar Pradesh, India
- Generated architectural layouts, material take-offs, purchase order specifications, and quantity take-offs for two Floating Production Storage and Offloading (FPSO) vessels.
  - Executed tasks in accordance with the ISO 9001, 14001, and 18000 family of standards.
- 12/2013 – 04/2014 **Architect Intern**, HCP Design Planning and Management Pvt. Ltd., Ahmedabad, India
- Created architectural layouts for a multi-super specialty hospital in Ahmedabad.
  - Developed GIS-based planning maps, building layouts, and urban planning policy guidelines.

### Other Appointments

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- 2021 – Present **Reviewer**, Elsevier's Building and Environment Journal
- 2022 **Conference session chair**, 12<sup>th</sup> International Conference on the Constructed Environment.
- 2020 **Sustainability expert and final competition judge**, Jersey City High School STEAM Challenge, Appointed by the New York Academy of Sciences (NYAS)
- 2019 **Conference planning committee member and session chair**, 2019 AMPS Conference 2019, Stevens Institute of Technology

### Sponsored Research

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- 2022 **Investigator:** Steinbrenner Institute Doctoral Fellowship for Environmentally Focused Research  
Principal Investigator: Erica C. Hameen  
**Project:** Kushagra Varma's doctoral research project: *A 4D Interactive Carbon Emissions Dashboard: A Visualization and Assessment Tool for Urban Building Environmental Impact.*  
**Award type:** Competitively awarded doctoral research fellowship.  
**Total Support:** USD 40,000
- 2021 **Investigator:** P.J. Dick Incorporated AECM Doctoral Fellowship  
Principal Investigator: Erica C. Hameen  
**Project:** Kushagra Varma's doctoral research project: *A 4D Interactive Carbon Emissions Dashboard: A Visualization and Assessment Tool for Urban Building Environmental Impact.*  
**Award type:** Competitively awarded doctoral research fellowship.  
**Total Support:** USD 250,000 +

### Journal Publication

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- 2014 Varma K., Chaurasia M., Shukal P., Ahmed T. (2014, February). *Green Building Architecture: A Literature Review on Designing Techniques.* International Journal of Scientific Research Publication, Volume 4 (Issue 2). ISSN 2250-3153

### Manuscripts (in progress)

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- 2023 Feasibility of benchmarking embodied carbon in building structures and envelop at urban scale: A systematic review of embodied carbon in buildings research published between 2011 and 2022. (Target journal: *Elsevier, Building and Environment*)
- Towards 4D visualization of urban building environmental performance: A systematic review of predictive methods. (Target journal: *Elsevier, Energy and Buildings*)
- Analysis of web-based tools used for visualizing the building performance data collected through benchmarking ordinances: An analysis of 48 US cities and states. (Target journal: *Elsevier, Computer Environment, and Urban Systems*)
- Predictive modeling of building-related emissions using Pittsburgh's energy benchmarking data: A comparative analysis of different forecasting methods. (Target journal: *Elsevier, Building and Environment*)

## Invited Presentations

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- 2022 Varma, Kushagra (July 2022), *Modern Planning, scheduling, and management tools & techniques to reduce time, cost, resource wastage in construction industry*. National Faculty Development Program 2022, Council of Architecture India.

## Conference Presentations

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- 2023 Varma K., Cochran E. (2023, September). *Towards 4D Visualization of Urban Building Environmental Performance: Analysis of Energy and Water Use Performance of Municipal Buildings in Pittsburgh*. ASHRAE Building Performance Analysis Conference 2023. Austin Texas.
- 2021 Varma K., Cochran E., Ken Oporum B. (2021, April). *Effects and Impacts of Sustainability Initiatives on the Environmental Performance of Residential Buildings in the Borough of Manhattan: A comparative Study and a Model for the Future*. Eleventh International Conference on the Constructed Environment. (Online): University of Calgary, Canada. [https://cgscholar.com/cg\\_event/events/V21/proposal/55659](https://cgscholar.com/cg_event/events/V21/proposal/55659)

## Graduate Theses Advised

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### Master of Engineering in Construction Engineering and Management, Stevens Institute of Technology

- 2019 Mihalik Jarred, (May 2019) *Building on the Past: Identifying the Historical Trends that Shaped New York City Unions*. Committee: Ellyn A Lester (Chair), **Kushagra Varma** (reader)

### Master of Science in Sustainable Design, Carnegie Mellon University

- 2022 - 23 Manali, Lisa, (May 2023) *Pixels to Pavement: Analyzing City Sidewalks Using Deep Learning and Vision-Based Frameworks for Data-Driven Solutions in Urban Planning*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisors: Claudio T. Silva, Zekum (Suzy) Li

Meffert N., Clarice, (May 2023) *Architectural Psychology of Stress: Analyzing the Impact of Material, Formal, and Aesthetic Features on Stress Reactions Using Biophilic Patterns*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisor: David Creswell.

Nagaraj, Sanjana, (May 2023) *The Blue-Green Sponge Toolkit: Mitigating Flash Floods in Bengaluru*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisors: Zekum (Suzy) Li

Lamne, Sayali, (May 2023) *Building as a Battery: Communal Solutions for Urban Energy Systems*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisors: Vivian Loftness

Khatwani, Nikita, & Dabas, Sachin (May 2023) *Is your Apartment Sustainable? Analytical Toolset to Evaluate the Health of Apartments and Increase Sustainable Building Practices in Rental Markets*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisors: Vivian Loftness

Zhou, Xin (May 2023) *Designing the Invisible: Adaptive Design for Experiencing Qualitative Daylight Analysis Using Virtual Reality*, Committee: Dana Cupkova (Chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral

Zhourui, Li (May 2023) *Reinforcement Learning Model of Irregular Shading Control for Optimal Daylight and Glare Analysis*, Committee: Dana Cupkova (chair), Azadeh Sawyer, **Kushagra Varma**, Sinan Goral, Co-advisor: Josh Bard

Bandewar, Ninad (May 2023) *Examining the Collective Impact of Greenhouse Gas Emissions on Retrofits of Single-Family Homes*, Committee: Dana Cupkova (Chair), **Kushagra Varma** (co-advisor), Azadeh Sawyer, Sinan Goral

**Master of Science in Building Performance and Diagnostics, Carnegie Mellon University**

2023 - 24 Guo, Bingtong (expected May 2024) *A Graphic Library to Compare and Identify the Most Suitable Data-Driven Benchmarking Model Based on Building Types and Climate Zones in the US*, Committee: Vivian Loftness (Chair), **Kushagra Varma**, Tian Li

Lasariia, Laura (expected May 2024) *Deluge, drought and sustainable connectivity of buildings to the habitat of the most vulnerable areas within two different climatic zones*, Committee: Vivian Loftness (Chair), **Kushagra Varma**, Suzy Li, Zhan Shi

Shahidi, Negin (expected May 2024) *The Impact of High-Performance Office Design on Sick Building Symptoms*, Committee: Vivian Loftness (Chair), **Kushagra Varma**

Zhang, Xinyue (expected May 2024) *IAQ-sensor-Based Control of HVAC System for Office Buildings*, Committee: Vivian Loftness (Chair), **Kushagra Varma**, Wei Liang, Erica Cochran Hameen

Ma, Yihan (expected May 2024) *Machine Learning-Enhanced Fault Detection and Diagnosis for HVAC Maintenance Prioritization for Improved Indoor Air Quality in Office Buildings*, Committee: Vivian Loftness (Chair), **Kushagra Varma**, Jinzhao Tian