

ANTHONY JOSEPH (A.J.) VETTURINI

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Education

Carnegie Mellon University

Ph.D. Candidate, Mechanical Engineering

Aug. 2022 – Present

Pittsburgh, PA

Case Western Reserve University

B.S.E Aerospace and Mechanical Engineering

Aug. 2015 – May 2019

Cleveland, OH

Research Interests

- DNA Nanostructures
- Self-assembly
- Generative Design
- Inverse Design
- Metamaterials
- Molecular Dynamics

Ph.D. Research

Computational design methods for DNA origami metamaterials

Aug 2022 – Present

Ph.D. Candidate

Pittsburgh, PA

- Advised by Professor Rebecca E. Taylor and Jonathan Cagan in the Department of Mechanical Engineering at Carnegie Mellon University.

Peer Reviewed Journal Publications

1. **Vetturini, A. J.**, Cagan, J., and Taylor, R. E., Generative Design-Enabled Exploration of Wireframe DNA Origami Nanostructures. *Nucleic Acids Research* 53, no. 2 (2025): gkae1268.
<https://doi.org/10.1093/nar/gkae1268>.
2. **Vetturini, A. J.**, Cui, W., Liao, YT. et al. “Flame Spread Over Ultra-Thin Solids: Effect of Area Density and Concurrent-Opposed Spread Reversal Phenomenon.” *Fire Technology* 56, no. 1 (2020): 91–111.
<https://doi.org/10.1007/s10694-019-00878-w>.

Selected as a top paper of the year and printed within the Editors' Choice of *Fire Technology*

Conference Presentations

1. **Vetturini, Anthony J.**, Cagan, Jonathan, and Taylor, Rebecca E. “Automated design of DNA nanostructures through cycle construction.” International Design Engineering Technical Conferences, Design Automation Conference, 27 August 2025, Los Angeles, CA. Conference Presentation.
2. **Vetturini, Anthony J.**, Cagan, Jonathan, and Taylor, Rebecca E. “Design exploration of wireframe DNA origami through multiobjective optimization-driven generative design.” DNA30, 16 September 2024, Johns Hopkins University, Baltimore, MD. Conference Presentation.
3. **Vetturini, Anthony J.**, Cagan, Jonathan, and Taylor, Rebecca E. “A Grammar-Enabled Generative Design Framework for Design Exploration of Deoxyribonucleic Acid (DNA) Nanostructures.” International Design Engineering Technical Conferences, Design Automation Conference, 27 August 2024, JW Marriott, Washington, DC. Conference Presentation.
4. **Vetturini, Anthony J.**, and Liao, Ya-Ting. “Effects of Area Density on Thin Fuel Flammability.” 34th Annual Meeting of the American Society for Gravitational and Space Research, 1 November 2018, Bethesda North Marriott Hotel and Conference Center, Bethesda, MD. Conference Presentation.

Invited Talks

1. “Applying Coarse-Grain Molecular Dynamics via oxDNA for DNA origami”, 1 October 2025, Carnegie Mellon University, Pittsburgh, PA.

Teaching Experience

Carnegie Mellon University

August 2024 – December 2024

Teaching Assistant - 2D Mechanics

Pittsburgh, PA

- Prepared materials and delivered recitation sections for a ~150-student undergraduate course.
- Oversaw teams of 3 from conceptualization to physical demonstrations of 4-bar linkages for class design challenge.

Carnegie Mellon University

August 2023 – December 2023

Teaching Assistant - Product Design

Pittsburgh, PA

- Guided ~40 final-year student design teams from project ideation to a working prototype in their capstone engineering course by providing expertise in manufacturing, CAD, and testing.
- Prepared lectures on materials and manufacturing processes selection using Ashby charts.

PDSVISION US

June 2019 – August 2022

Certified PTC Instructor

Middleburg Heights, OH

- Certified instructor on Creo Parametric, Creo Simulate, and Windchill Manufacturing Process Management.

Development of Engineering Standards Course

January 2018 – April 2018

Teaching Assistant

Cleveland, OH

- Prepared presentations to be used in an engineering standards pilot course. Topics included: Why Standards Exist, US Domestic versus International organizations, Regulatory Bodies, Materials and Manufacturing Standards.
- Worked in conjunction with Underwriters Laboratories (UL).

Industry Experience

PDSVISION US

June 2019 – August 2022

Mechanical Engineer

Middleburg Heights, OH

- Customized and implemented mechanical design software into companies of varying sizes (local to global corporations).
- Consulted on FEA and CFD design projects to support client product design requirements.
- Implemented manufacturing process management workflows that enable complex engineering change notice pipelines.

Undergraduate Research

Computational Fire Dynamics Laboratory

Summer 2017 – Winter 2018

Research Assistant

Cleveland, OH

- Studied effects of area density on flame spread using the Zero-G Drop Tower located at NASA Glenn Research Center at Lewis Field.
- Uncovered a relationship between fuel thinness and the flames structure being concurrent or opposed to air flow direction.
- Prepared ultra-thin fuel samples, observed drop tests, and composed original MATLAB code using computer vision to track flame position and shape during drop experiment.

Honors & Awards

Department of Defense National Defense Science and Engineering Graduate Fellowship

2024 – 2027

Jochum-Moll Foundation Scholarship

2018 – 2019

Case Alumni Association Scholarship

2017 – 2019

All-Academic UAA Winter Team

2016

Technical Skills

Programming Languages: Python, R

Frameworks: Pandas, NumPy, SciPy, JAX, tidyverse

CAD: Creo Parametric, SolidWorks, OnShape

Cloud: AWS EC2, S3

FEA: Creo Simulate, ANSYS Mechanical

CFD: Simerics MP, ANSYS Fluent, OnShape SimScale

PLM: Windchill 11.0 – 12.0