

# ANTHONY JOSEPH (A.J.) VETTURINI

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## Education

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<b>Carnegie Mellon University</b> <i>Ph.D. Candidate, Mechanical Engineering</i>	<b>Aug. 2022 – Present</b> <i>Pittsburgh, PA</i>
<b>Case Western Reserve University</b> <i>B.S.E Aerospace and Mechanical Engineering</i>	<b>Aug. 2015 – May 2019</b> <i>Cleveland, OH</i>

## Research Interests

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

## Ph.D. Research

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<b>Computational design methods for DNA origami metamaterials</b> <i>Ph.D. Candidate</i>	<b>Aug 2022 – Present</b> <i>Pittsburgh, PA</i>
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- Advised by Professor Rebecca E. Taylor and Jonathan Cagan in the Department of Mechanical Engineering at Carnegie Mellon University.

## Peer Reviewed Journal Publications

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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

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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

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

## Teaching Experience

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### Carnegie Mellon University

*Teaching Assistant - 2D Mechanics*

**August 2024 – December 2024**

*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**

*Pittsburgh, PA*

*Teaching Assistant - Product Design*

- 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**

*Middleburg Heights, OH*

*Certified PTC Instructor*

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

### Development of Engineering Standards Course

**January 2018 – April 2018**

*Cleveland, OH*

*Teaching Assistant*

- 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

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### PDSVISION US

**June 2019 – August 2022**

*Middleburg Heights, OH*

*Mechanical Engineer*

- 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

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### Computational Fire Dynamics Laboratory

**Summer 2017 – Winter 2018**

*Cleveland, OH*

*Research Assistant*

- 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

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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

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**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