

# ANTHONY JOSEPH (A.J.) VETTURINI II

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## Education

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### Carnegie Mellon University

*Ph.D. Candidate, Mechanical Engineering*

**Aug. 2022 – Present**

*Pittsburgh, PA*

### Case Western Reserve University

*B.S.E Aerospace and Mechanical Engineering, Cum Laude*

**Aug. 2015 – May 2019**

*Cleveland, OH*

## Research Interests

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- DNA Nanostructures
- Self-assembly
- Generative Design
- Optimization
- Baseball & Football Analytics

## Ph.D. Research

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### A generative design framework for DNA origami nanostructures

**Aug 2022 – Present**

*Ph.D. Candidate*

*Pittsburgh, PA*

- Member of Microsystems and MechanoBiology Lab (MMBL) and the Integrated Design Innovation Group (IDIG) in the Department of Mechanical Engineering at Carnegie Mellon University.
- Researching innovative design strategies for the self-assembly of DNA nanostructures
- Using generative design methodologies to systematically generate DNA nanostructures

## Technical Skills

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**Programming Languages:** Python, MATLAB, R

**Frameworks:** Pandas, NumPy, SciPy, PyTorch, tidyverse, nffastR

**CAD:** Creo Parametric, SolidWorks, OnShape

**FEA:** Creo Simulate, ANSYS Mechanical

**CFD:** Simerics MP, ANSYS Fluent, OnShape SimScale

**PLM:** Windchill 11.0 – 12.0

**Hardware:** Mill, Lathe, 3D Printing

## Projects and Software

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### **kodak: a react application for data visualization**

- Visualization application developed to give a UI to plot design with a default towards academic publications.
- Uses React, Vite, and plotly.js to populate design where a Python application has been developed to assist in creation of .plots files
- [Project Page](#) [GitHub Repo](#)

### **mango: a generative design framework for wireframe DNA origami**

- Python package implementing grammars and optimization algorithms for the generative design of wireframe DNA origami
- Uses grammar-based generative design (i.e., Shape Annealing) to guide the generated design to a user-defined objective using designer-specific constraints
- [GitHub Repo](#)

### **BALK: Predictive baseball model for predetermined "edge" games**

- Personal project with colleagues where we have developed a supervised machine learning model to predict baseball game outcomes
- Assisted in development of random forest algorithm to predict a game winner using sabermetrics
- Developed Python-based web scraper using BeautifulSoup to pull daily lineups and produce required data for algorithm input
- 2020 Season resulted in a model accuracy of 55.6% and a projected yielded return of 27 units compared to DraftKings odds

## Peer Reviewed Journal Publications

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1. **Vetturini, A.**, Cui, W., Liao, YT. et al. Flame Spread Over Ultra-thin Solids: Effect of Area Density and Concurrent-Opposed Spread Reversal Phenomenon. *Fire Technol* 56, 91–111 (2020).  
<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**, 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.

## Teaching Experience

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### Carnegie Mellon University

August 2023 – December 2023

*Teaching Assistant - Product Design*

*Pittsburgh, PA*

- Guided ~40 senior-level 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.

### PDSVISION US

June 2019 – August 2022

*Certified Creo 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*

- Researched and prepared presentations to be used in an engineering standards pilot course
- Worked in conjunction with Underwriters Laboratories (UL)

## Industry Experience

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### PDSVISION US

June 2019 – August 2022

*Mechanical Engineer*

*Middleburg Heights, OH*

- Consulted on and implemented mechanical design software into companies of varying sizes (local to global corporations)
- Creo Parametric Professional Certification
- Specialized in running both FEA and CFD simulations in consulting projects requiring the ability to learn various concepts quickly to provide valid results
- Use educational background to perform engineering evaluations of customer models to offer design alternatives for customer requirements

## Undergraduate Research

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### 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
- Prepared samples, observed tests, and composed original MATLAB code leveraging computer vision to track flame position and shape during and 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

## Professional Society Membership

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American Society for Gravitational and Space Research (ASGSR)

2018 – 2020