

Avani Anne

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EDUCATION

Harvey Mudd College — *Claremont, CA*

Bachelor of Science Joint Computer Science and Physics | Completed: May 2025

Honors & Awards: Graduated with High Distinction | Departmental Honors in three departments: Computer Science, Physics, and Humanities, Social Sciences, & the Arts | Physics Department Community Award

PUBLICATIONS & PRESENTATIONS

Peer-Reviewed Publication

Chaffee, H., et al. (2024). *Hexagonal vortices enable faster colloidal crystal grain coarsening*, *Physical Review E* (Vol. 110, No. 1). American Physical Society. doi: <https://doi.org/10.1103/PhysRevE.110.014608>

Conference Presentations

Anne, A., et al. "Cooperative motion and granule rotation during rapid grain shrinking in colloidal crystals." Talk presented at *APS March Meeting 2024*. Abstract: Z34.00008.

RESEARCH EXPERIENCE

FICUS Lab, Harvey Mudd College — *Research Intern*

Sept 2023 – Aug 2025

Mentored by Professor Sarah Kavassalis

- Processed and analyzed high-dimensional air quality datasets using techniques like filtering & interpolation
- Applied and evaluated explainable AI technique known as layerwise relevance propagation on long short-term memory models, analyzing results across seeds, diurnal and seasonal cycles, and in comparison with random forest baselines; utilized Python libraries like Pandas, TensorFlow, and SHAP
- Contributed to peer review and refinement of a poster presented at the *AGU Fall Meeting 2023*: "Exploring the Explainability Power of AI in Identifying Causal Factors of Air Pollution: An Ozone in Los Angeles Case Study"

Gerbode Soft Matter Physics Lab, Harvey Mudd College — *Research Intern*

Jan 2022 – Mar 2024

Mentored by Professor Sharon Gerbode

- Developed scripts to understand cooperative motion (particles follow each other as they move) and vorticity during granule dissolution; observed relationship between such mechanisms and rate of dissolution in crystals
- Created ramp cells and utilized techniques like optical blasting to manipulate and track grain boundaries
- Presented findings on cooperative motion and granule rotation during rapid grain shrinking in colloidal crystals at the *APS March Meeting 2024*; work published in *Physical Review E*

PROFESSIONAL EXPERIENCE

Aurora Energy Research — *Analyst*

Sept 2025 – Present

- Synthesizing and processing datasets for generator interconnection queues and developing analytical tools to evaluate locational energy market trends across the West Coast

ExploraVist — *Machine Learning Team Member*

June 2025 – Present

- Created ML pipeline in Python with multilabel binarizers to enhance user safety for AI-powered wearable glasses
- Designed a verification framework to evaluate LLM text reading; developed benchmarking techniques

LS Power — *Team Lead & Clinic Intern*

Aug 2024 – May 2025

- Led a cross-functional team of 6 to develop predictive analytics solutions to identify problematic wells for a landfill-to-renewable-natural-gas plant, collaborating with customers, advisors, and industry experts
- Processed and structured sensor datasets with 10+ parameters for 100+ sensors over several years
- Built Python pipelines to analyze sensor data that utilized Pandas for data filtration, Scikit-learn for machine learning model implementation (XGBoost, K-nearest neighbor, etc.), and statistical process control for trend analysis, which improved detection of problematic sensors up to a week in advance

SpaceX — *Software Engineering Intern*

May 2024 – Aug 2024

- Improved efficiency of coupled loads analysis through reimplementation and enhancement of MATLAB code in C++; created units tests (pytest) to ensure accuracy of results

- Developed and integrated multiple classes in C++ to model physical forces (like thrust, and positional force); enhanced the accuracy of modal solvers
- Collaborated in a multi-developer production environment using Linux/Git, maintaining production-ready code

PROJECT EXPERIENCE

Continuous Models in Dynamical Systems

April 2025 – May 2025

- Developed neural network models in Julia for continuous dynamical systems like the simple harmonic oscillator and non-linear pendulum, leveraging Runge-Kutta and Euler integrators (modeled after Krishnapriyan et. al 2023)

Coupled ODE in Tropospheric System

April 2024 – May 2024

- Developed and implemented Python code to analyze dynamics (period doubling, chaos, bifurcation) of coupled differential equations in a tropospheric system for various initial conditions

Restricted Three-Body Problem — *Pair Programming Project*

Dec 2023 – Dec 2023

- Formulated the system's Lagrangian equations and implemented a numerical solver in Python

TEACHING & LEADERSHIP EXPERIENCE

Academic Excellence for Physics — *Tutor*

Aug 2023 – May 2025

- Mentored underclassman in Special Relativity, Electromagnetic Theory & Optics (E&M), and Mechanics, providing guidance on problem-solving and concept mastery; nominated for position by department

Computer Science Department — *Tutor & Grader*

Jan 2025 – May 2025

- Tutored and graded for Algorithms course, covering topics such as dynamic programming and NP-completeness

The Muddraker (Newspaper) — *Co-Editor-In-Chief & Senior Advisor*

Aug 2022 – May 2025

- Led weekly editorial team meetings, organized subteams, recruited members, and managed publication schedule
- Delegated and contributed to writing, editing, and design tasks to a team of 15+ students

OTHER EXPERIENCE

- Task Force for Clinic & Corporate Partnerships | Women in Physics Mentor | Diversity Director, Associated Students of Harvey Mudd College | Dorm Mentor, Office of Residential Life | VEX Robotics and FRC Robotics | Girl Scouts (lifetime member; Gold Award)

SKILLS

- Languages: Python, C++, C, MATLAB, and Julia
- Tools: Git, Linux/Unix, Jupyter, TensorFlow, Scikit-learn, Pandas, OpenAI API integrations,
- Concepts: Machine Learning, Model Evaluation & Validation, Data Analysis, Data Visualization, Unit Testing