

# David Shustin

UNDERGRADUATE AT PRINCETON UNIVERSITY

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## Education

### Princeton University

BACHELOR OF ENGINEERING AND SCIENCE IN COMPUTER SCIENCE, GPA: 3.93/4.0

Princeton, NJ

Sep 2020 - May 2024

**Awards:** Shapiro Prize (x2), Manfred Pyka Memorial Prize for Physics

#### Relevant Coursework (\* denotes graduate coursework)

Phase Transitions and the Renormalization Group*	Analysis III: Integration Theory and Hilbert Spaces	Classical Mechanics (A+)
Machine Learning for Structural Biology*	Introduction to Quantum Theory	Principles of Quantum Mechanics
Advanced Algorithm Design*	Algebra I	Introduction to Quantum Computing
Data Structures & Graph Algorithms*	Computer Architecture	Introduction to Programming Systems (A+)
Neural Rendering*	Probability and Stochastic Systems	Advanced Linear Algebra (A+)
Deep Learning Theory*	Information Signals (A+)	Advanced Mechanics (A+)
Thermal Physics	Distributed Systems	

### Millburn High School

HIGH HONORS

Millburn, NJ

Sep 2016 - June 2020

## Publications and Pre-prints

\* denotes equal contribution.

[1] Michael Tang\* and **David Shustin\***. Renderers are Good Zero-Shot Representation Learners: Exploring Diffusion Latents for Metric Learning. *arXiv preprint*, 2023. <https://arxiv.org/abs/2306.10721>

## Research

### Automated Feature Discovery in Protein Structure Models

November 2023 - Present

Active research on automatically discovering and cataloguing features in protein folding models. Advised by Professor Ellen Zhong in the Princeton Molecular Machine Learning lab.

### Neural Spline Fields for Burst Image Fusion and Layer Separation

March 2023 - December 2023

Completed research project on using neural images and splines with learned control points for layer separation and obstruction removal in a long-burst image capture setting. Advised by Professor Felix Heide in the Princeton Computational Imaging lab. Joint work with Ilya Chugunov. Preprint link available on .

- Completed development of a proof-of-concept inverse model that demonstrated feasibility of layer separation using neural images.
- Processed all baselines and co-wrote manuscript. Submitted for review.
- Co-wrote manuscript and submitted for review.

### Contrastive Methods for Dimensionality Reduction

November 2023 - December 2023

Pursuing short research project investigating theoretical guarantees in contrastive representation learning for dimensionality reduction. Advised by Professor Huacheng Yu in his Advanced Algorithms graduate course. Joint work with Yongwei Che.

### Zero-Shot Representation Learning in 3D Diffusion Models

March 2023 - May 2023

Completed short research project investigating the use of diffusion latent variables from OpenAI's Shap-E model for view-independent visual object retrieval. Demonstrated use of neural rendering-based latents as a representation for downstream tasks. Advised by Professor Felix Heide in his Neural Rendering graduate research seminar. Joint work with Michael Tang.

## Industry Experience

### Skydio

AUTONOMY ENGINEERING INTERN

San Mateo, CA

June 2023 - Aug 2023

- Built scalable developer tools for computer-vision-powered autonomous quadcopters.
- Implemented per-commit integrated unit testing with robotics simulations using C++, Python, Bazel, and Kubernetes.

## **Nuro**

AUTONOMY SYSTEMS INTERN

- Improved vehicle safety & perceptive response to on-road hazards using Python and C++.

*Mountain View, CA*

*June 2022 - Aug 2022*

## **NJ Governor's School of Engineering & Technology**

RESIDENTIAL TEACHING ASSISTANT

- Managed logistical and technical tasks at a summer program for STEM-curious high schoolers.
- Mentored and advised project groups on academic and occupational choices.

*New Brunswick, NJ*

*July 2021 - Aug 2021*

# Teaching and Community

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## **Princeton Racing Electric** [[website](#)]

SYSTEMS LEAD AND CHIEF ENGINEER

- Led a systems engineering team to integrate electrical systems with mechanical components, manage onboard computing elements, and ensure driver safety in an electric Formula race car.
- Served as one of four chief engineers, managing top-level systems design of the vehicle.
- Raised funds by corresponding with former team members and maintained a robust alumni network.

*Princeton, NJ*

*Sep. 2020 - Jan. 2023*

## **International Food Co-op**

TREASURER

- Revived a food co-operative after prior collapse during the COVID-19 pandemic.
- Responsible for all finances and budgeting of co-operative funds.
- Organize all kitchen-related matters.

*Princeton, NJ*

*Sep. 2022 - Present*

## **Advanced Multivariable Calculus and Linear Algebra**

UNDERGRADUATE COURSE ASSISTANT

- Organized problem sessions for advanced introductory mathematics courses.

*Princeton, NJ*

*Sep. 2021 - May 2022*

## **Hatch Tutors**

TUTOR

- Developed curriculum for personal pro-bono tutoring in calculus.

*Princeton, NJ*

*Jul. 2021 - Aug. 2021*