

# Ellis L. Brown, II

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## Interests

My research interests lie at the intersection of deep learning, computer vision, and robotics—particularly in the areas of *(multimodal) representation learning*, *self-supervised learning*, *open-endedness*, and *AI agents*.

## Education

### New York University

*Ph.D., Computer Science; Advised by Professors [Saining Xie](#) and [Rob Fergus](#)*

New York, NY

Sept. 2023–Pres.

### Carnegie Mellon University

*M.S. Thesis, Computer Science; Advised by Professors [Deepak Pathak](#) and [Alexei Efros](#)*

Pittsburgh, PA

May 2023

### Stanford University

*Non-Degree Graduate Student, Computer Science*

Palo Alto, CA

June 2020

### Columbia University

*Non-Degree Graduate Student, Computer Science*

New York, NY

May 2019

### Vanderbilt University

*B.S., Computer Science; B.A., Mathematics; Advised by Professor [Maithilee Kunda](#)*

Nashville, TN

May 2017

## Publications and Preprints

- 2024 Shengbang Tong\*, **Ellis Brown\***, Penghao Wu\*, Sanghyun Woo, Manoj Middepogu, Sai Charitha Akula, Jihan Yang, Shusheng Yang, Adithya Iyer, Xichen Pan, Austin Wang, Rob Fergus, Yann LeCun, Saining Xie *Cambrian-1: A Fully Open, Vision-Centric Exploration of Multimodal LLMs*. Preprint. <https://cambrian-mlm.github.io/>
- 2024 Jihan Yang, Runyu Ding, **Ellis Brown**, Xiaojuan Qi, Saining Xie. *V-IRL: Grounding Virtual Intelligence in Real Life*. ECCV 2024, Milan, Italy. <https://virl-platform.github.io/>
- 2023 Alexander C. Li, Mihir Prabhudesai, Shivam Duggal, **Ellis Brown**, Deepak Pathak. *Your Diffusion Model is Secretly a Zero-Shot Classifier*. ICCV 2023, Paris, France. <https://diffusion-classifier.github.io/>
- 2023 Alexander C. Li\*, **Ellis Brown\***, Alexei Efros, Deepak Pathak. *Internet Explorer: Targeted Representation Learning on the Open Web*. ICML 2023, Honolulu, USA. <https://internet-explorer-ssl.github.io/>  
Also presented at ECCV 2022, Workshop on “Self Supervised Learning: What is Next?” Tel Aviv, Israel.
- 2018 **Ellis Brown**, Soobeen Park, Noel Warford, Adriane Seiffert, Kazuhiko Kawamura, Joseph Lappin, and Maithilee Kunda. An Architecture for Spatiotemporal Template-Based Search. *Advances in Cognitive Systems, Volume 6*, 101–118.

\*equal contribution

## Experience

### Allen Institute for Artificial Intelligence (AI2)

*Research Intern, Mentored by [Ross Girshick](#)*

2024

- Working on compressive visual memory for long sequences of high-resolution observations in Embodied AI and Video.

### Robotics Institute, Carnegie Mellon University

*Graduate Student Researcher, Advised by Professors [Deepak Pathak](#) and [Alexei Efros](#)*

2022–2023

- Lead contributor to securing a \$30m cross-institutional DARPA [Machine Common Sense](#) grant for CMU, UC Berkeley, MIT, and UMich—team “MESS” (Model-building, Exploratory, Social-learning Systems).

### BlackRock AI Labs

Advised by Professors [Mykel Kochenderfer](#), [Stephen Boyd](#), and [Trevor Hastie](#).

Founding team member and culture carrier. Launched bi-weekly reading group. Launched external [website](#).

*Research Engineer* | Palo Alto, CA

2020–2021

- Formulated the securities lending process as an MDP; built a multi-agent lending market simulator for the learning and evaluation of policies; showed that learned policies outperform the rule-based policy used by the lending desk.
- Open-sourced two Julia packages for separable optimization problems. Presented at JuliaCon 2021. [[blog](#), [talk](#)]

*Machine Learning Engineer* | New York, NY

2018–2019

- Proposed a model of portfolio “operational risk,” decomposable into interpretable factors. Built a Spark ETL pipeline that extracts 3k+ features from systems across the firm and outputs daily predictions for every managed portfolio.
- Designed a system to automatically parse compliance rules from legal documents; previously performed by 30 FTEs.

## BlackRock

*Software Engineer* | New York, NY

2017

- Built an ETL pipeline to ingest daily mutual fund reference data using Apache Storm.

*Software Engineering Intern* | New York, NY

2016

- Won intern hackathon with NLP system to extract contract terms from legal documents during new client onboarding.

## Department of Computer Science, Vanderbilt University

*Undergraduate Student Researcher*, Advised by Professor [Maithilee Kunda](#)

2016–2018

- Developed a computational cognitive architecture of human attention during spatiotemporal visual search.
- Contributed to the development of the [Toybox Dataset](#) for small sample learning and hand-object interaction.

## Teaching

**Department of Computer Science**

Vanderbilt University

*Teaching Assistant*, CS 2201: Program Design & Data Structures

Fall 2015

- Held weekly office hours for class of 200+ students. Graded weekly programming assignments and exams.

## Open-Source

[JuliaFirstOrder](#)/ { [PiecewiseQuadratics.jl](#), [SeparableOptimization.jl](#) }

2021

- Co-authored Julia packages for solving the problem of minimizing a sum of piecewise-quadratic functions subject to affine equality constraints via a derivative of the Alternating Direction Method of Multipliers (ADMM). Formed the [JuliaFirstOrder](#) organization.

[amdegroot/ssd.pytorch](#)

★ 5k 📄 1.7k

2017

- Co-authored the canonical PyTorch implementation of the [Single Shot MultiBox Detector](#), a real-time object detection framework using a single network, 3 months after PyTorch’s alpha release.

[ellisbrown/BNN-Uncertainty](#)

2019

Keras implementation of a Bayesian Neural Network with dropout

- Examine the effect of weight prior & network architecture on uncertainty estimates.

[ellisbrown/name2gender](#)

2017

Used classical and deep learning based approaches to infer gender from character sequences in multinational first names.

Wrote a [blog post](#) that was published by *Towards Data Science*.

[amdegroot/deepgenres.torch](#)

2017

Music genre classification from audio snippets using a ConvNet, built in Torch/Lua.

## Awards and Honors

• DoD NDSEG Fellowship

2024–2027

• Dean’s Doctoral Fellowship, NYU GSAS

2023–2028

• *Scholar*, Lighting the Pathways to Faculty Careers for Natives in STEM, AISES

2021–Pres.

• Intel Growing the Legacy Graduate Scholarship

2021; 2022

• *Scholar*, Computer Science Research Mentorship Program, Google Research

2021

• 3<sup>rd</sup> Place, Graduate Student Research Competition, AISES National Conference

2019

• Osage Nation Higher Education Scholarship

2013–2017; 2021–Pres.

• (2x) *Academic All-American*, USA Water Polo

2012, 2013

## Talks

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- 2021 Linearly Constrained Separable Optimization (oral), *JuliaCon 2021 JuMP-dev track*. [[talk](#)]
- 2019 Modeling Uncertainty in Bayesian Neural Networks with Dropout: the effect of weight prior and network architecture selection (poster), *AISES National Conference 2019*, Madison, WI. [[poster](#)]
- 2018 SpatioTemporal Template-based Search: An Architecture for Spatiotemporal Template-Based Search (oral), *Sixth Annual Conference on Advances in Cognitive Systems*, Stanford, CA. [[slides](#)]
- 2017 Computational Cognitive Systems to Model Information Saliency (oral), *AISES National Conference 2017*, Denver, CO. [[slides](#), [link](#)]

## Graduate Coursework

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**CMU:** Deep RL for Robotics, Visual Learning & Recognition, Deep RL & Control, Advanced Intro ML, Philosophical Foundations of Machine Intelligence, Math Fundamentals for Robotics, Distributed Systems, Intro to Computer Systems  
**Stanford:** Engineering Design Optimization **Columbia:** Mathematics of Deep Learning

## Reports

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- 2022 Alvin Shek, **Ellis Brown**, Nilay Pande, David Noursi. Self-Supervised Representation Learning via Curiosity-Driven Exploration. Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. [[report](#)]
- 2021 **Ellis Brown**, Aaron M. Roth. Scaling Interpretable Reinforcement Learning via Decision Trees to Minecraft. Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. [[report](#)]
- 2020 **Ellis Brown**. Securities Lending Policy Optimization. Computer Science Department, Stanford University, Palo Alto, CA. [[report](#), [video](#)]
- 2019 **Ellis Brown\***, Melanie Manko\*, Ethan Matlin\*. Modeling Uncertainty in Bayesian Neural Networks with Dropout. Department of Electrical Engineering and Computer Science, Columbia University, New York, NY. [[report](#), [slides](#)]

\*equal contribution

## Extracurricular Activities

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### American Indian Science & Engineering Society (AISES)

*Volunteer*

2019–Pres.

- Mentor an undergraduate AISES students studying CS through the Full Circle Mentorship Program.
- Scholarship reviewer for Undergraduate AISES Scholarships.
- Judge posters for Undergraduate Student Research Competition at National Conferences.

### Code/Interactive

*Mentor*

2018

- Advised and tutored (weekly) an underprivileged high schooler interested in CS; helped prepare college applications.

### Vanderbilt Admissions

*Tour Guide*

2014–2016

- Led weekly campus tours to groups of 10-50+ prospective students and families.

### Water Polo

*Captain & President*, Vanderbilt Club Team (2014 SEC Champions)

2014–2016

- Coordinated and led a team of 20+ players through a 10 week season with 2+ travel tournaments.

*Trainee*, USA Olympic Development Program

2010–2013

- Trained in the United States National Team Pipeline program. Competed in Junior Olympics.