

# Ellis L. Brown, II

☎ 314.761.1662 • ✉ [ellisbrown@cmu.edu](mailto:ellisbrown@cmu.edu) • 🌐 [ellisbrown.github.io](https://ellisbrown.github.io)  
in [ellislbrownii](#) • 🎓 [google scholar](#) • 🐙 [ellisbrown](#)

## Interests

My research interests lie at the intersection of deep learning, computer vision, and robotics—particularly in the areas of *representation learning*, *self-supervised learning*, and *open-ended/continual learning*. I am currently exploring novel training paradigms that leverage the entire Internet to learn richer representations.

## Education

<b>Carnegie Mellon University</b> <i>M.S. Thesis, Computer Science; Advised by Professors <a href="#">Deepak Pathak</a> and <a href="#">Alexei Efros</a></i>	<b>Pittsburgh, PA</b> <i>May 2023</i>
<b>Stanford University</b> <i>Non-Degree Graduate Student, Computer Science</i>	<b>Palo Alto, CA</b> <i>Jun. 2020</i>
<b>Columbia University</b> <i>Non-Degree Graduate Student, Computer Science</i>	<b>New York, NY</b> <i>May 2019</i>
<b>Vanderbilt University</b> <i>B.S., Computer Science; B.A., Mathematics; Advised by Professor <a href="#">Maithilee Kunda</a></i>	<b>Nashville, TN</b> <i>May 2017</i>

## Publications

- 2023 A. Li\*, **E. Brown\***, A. Efros, D. Pathak. *Internet Explorer: Targeted Representation Learning on the Open Web*. *ICML 2023* (under review)
- 2022 A. Li\*, **E. Brown\***, A. Efros, D. Pathak. *Internet Curiosity: Directed Unsupervised Learning on Uncurated Internet Data*. *ECCV 2022, Workshop on "Self Supervised Learning: What is Next?"* Tel Aviv, Isr.
- 2018 **E. Brown**, S. Park, N. Warford, A. Seiffert, K. Kawamura, J. Lappin, and M. Kunda. An Architecture for Spatiotemporal Template-Based Search. *Advances in Cognitive Systems, Volume 6*, 101-118.
- 2018 **E. Brown**, S. Park, N. Warford, A. Seiffert, K. Kawamura, J. Lappin, and M. Kunda. SpatioTemporal Template-based Search: An Architecture for Spatiotemporal Template-Based Search. *Sixth Annual Conference on Advances in Cognitive Systems*, Stanford, CA. (Oral)

\*equal contribution

## Awards and Honors

- GEM Ph.D. Fellowship, The National GEM Consortium & Adobe Research *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*

## Experience

### Robotics Institute, Carnegie Mellon University

*Graduate Student Researcher*, Advised by Professors [Deepak Pathak](#) and [Alexei Efros](#) *2022–Pres.*

- Researching self-supervised learning, curiosity-driven exploration, and generalization on the open-Internet.
- 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 a Markov decision process; designed and wrote 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.

## 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.

[amdegrout/ssd.pytorch](#) ★ 4.7k 👤 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.

## 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.

## Talks

- 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), *American Indian Science and Engineering Society 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), *American Indian Science and Engineering Society National Conference 2017*, Denver, CO. [[slides](#), [link](#)]

## Graduate Coursework

**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*

2019–2021

- Mentored an undergraduate AISES student studying CS through the 2020–2021 Full Circle Mentorship Program.
- Reviewed scholarships for the 2020 AISES Undergraduate Scholarship.
- Judged posters for Undergraduate Student Research Competition at the 2019 National Conference.

### 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.

### Kappa Sigma Fraternity (Kappa Chapter)

*Social Chairman*

2014–2016

- Managed \$90k annual budget; planned & executed dozens of large-scale events; served on Executive Council.

### 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.