# Samuel Stevens

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## RESEARCH VISION

My research focuses on AI for acclerating data-driven scientific discovery; specifically, I focus on developing and leveraging large pretrained models for novel discovery from learned structures. Highlights: BioCLIP (BioCLIP 2) and sparse autoencoders for vision.

## EDUCATION

**Ohio State University** August 2021 - Present
Ph.D. in Computer Science & Engineering *Columbus, OH*
Advisor: Professor Yu Su

**Ohio State University** (3.93 GPA) August 2017 - May 2021
Honors B.S. in Computer Science & Engineering, *Summa Cum Laude* *Columbus, OH*
Honors Research Distinction in Computer Science & Engineering
German Minor

## SELECTED PUBLICATIONS & PREPRINTS

**Towards Open-Ended Visual Scientific Discovery with Sparse Autoencoders**
**Samuel Stevens**, Jacob Beattie, Tanya Berger-Wolf and Yu Su
*arXiv Preprint*, 2025

· Applies sparse autoencoders (SAEs) to morphological trait discovery.

**Interpretable and Testable Vision Features via Sparse Autoencoders**
**Samuel Stevens**, Wei-Lun Chao, Tanya Berger-Wolf and Yu Su
*arXiv Preprint*, 2025

· Applies sparse autoencoders (SAEs) to vision models.

**BioCLIP 2: Emergent Properties from Scaling Hierarchical Contrastive Learning**
Jianyang Gu, **Samuel Stevens**, Elizabeth G Campolongo, Matthew J Thompson, Net Zhang, Jiaman Wu, Andrei Kopanev, Zheda Mai, Alexander E. White, James Balhoff, Wasila Dahdul, Daniel Rubenstein, Hilmar Lapp, Tanya Berger-Wolf, Wei-Lun Chao, Yu Su
*NeurIPS*, 2025 **(Spotlight)**

· Scales BioCLIP to 214M images and discovers emergent propoerties in learned representations.

**BioCLIP: A Vision Foundation Model for the Tree of Life**
**Samuel Stevens**, Jiaman Wu, Matthew J Thompson, Elizabeth G Campolongo, Chan Hee Song, David Edward Carlyn, Li Dong, Wasila M Dahdul, Charles Stewart, Tanya Berger-Wolf, Wei-Lun Chao and Yu Su
*CVPR*, 2024 **(Best Student Paper)**

· Trains and evaluates a CLIP model on 10M image-text pairs for use in ecology and biology.

**Salsa Fresca: Angular Embeddings and Pre-Training for ML Attacks on Learning With Errors**
**Samuel Stevens**, Emily Wenger, Cathy Yuanchen Li, Niklas Nolte, Eshika Saxena, Francois Charton, and Kristin Lauter
*TMLR*, 2025

· Improves ML attack cost on Learning With Errors by 250× through modeling improvements.

**Memorization for Good: Encryption with Autoregressive Language Models**
**Samuel Stevens** and Yu Su
*arXiv Preprint*, 2023
· Proposes a novel symmetric encryption algorithm based on language model memorization.

**An Investigation of Language Model Interpretability via Sentence Editing**
**Samuel Stevens** and Yu Su
*EMNLP BlackboxNLP Workshop: Analyzing and Interpreting Neural Networks for NLP*, 2021
· Finds that BERT's attention weights correlate well with human rationales.

## RESEARCH EXPERIENCE

**Zoom** May 2024 - August 2024
*AI Research Scientist Intern* *Remote*

· Designed and implemented abstractions for programming language model more reliably.

**Meta** May 2023 - August 2023
*Research Scientist Intern, supervised by Kristin Lauter and Francois Charton* *Seattle, WA*

· Implemented and validated simpler architecture for the ongoing SALSA project.
· Continued part-time from August 2023 to December 2023.

**Self-Attention Interpretability in Sequence Classification** October 2019 - April 2021
*Undegraduate Honors Research Thesis* *Columbus, OH*

· Fine-tuned pre-trained language models on existing sequence classification task.
· Analyzed trends in the attention maps of BERT-based models to quantify differences in interpretability.
· Identified literature gap (no large-scale quantitative measurement of BERT's interpretability on sequence level classification) and designed experiments leading to a baseline result.

## ENGINEERING EXPERIENCE

**SpaceX (Starlink)** May 2021 - August 2021
*Hardware Test Associate Engineer* *Seattle, WA*

· Improved test code leading to $66K expected annual savings and 25% increase in first-pass yield.
· Developed data visualization for micropositioner actuator repeatability during testing.
· Developed thermal camera testing prototype, reducing test time from 30+ minutes to 30 seconds.

**Microsoft** May 2020 - August 2020
*Software Engineering Intern* *Seattle, WA (Remote)*

· Developed new Power BI feature to improve customers' ability to diagnose data-refresh problems.
· Ramped up quickly in a 100 million-line C++ codebase to begin delivering value immediately.

**TicketBay** January 2018 - August 2020
*Lead Developer* *Columbus, OH*

· Developed a mobile app for students to buy and sell football tickets.

· Facilitated the transfer of $165K worth of tickets between more than 7K customers.
· Led system architecture decisions in order to balance ease of development and system performance.

**GE Aviation** May 2018 - August 2018
*Digital Technology Intern* *Cincinnati, OH*

· Built an end-to-end testing solution to automate QA testing of customer-facing web application.
· Integrated test solution with existing CI/CD pipeline, leading to improved product quality with no additional developer work.

**The Ohio State University** May 2018 - November 2019
*Lead Developer* *Columbus, OH*

· Developed a webapp to distribute rich media content to support a professor's research.
· Managed 2 student developers in multiple time zones with agile methodology.

**GE Aviation** May 2017 - August 2017
*INTERalliance Intern* *Cincinnati, OH*

· In-sourced customer-facing search, targeting $300K in savings and 40K customers.
· Led MongoDB integration, giving customers access to previously unsearchable documents.

## AWARDS

**1st Alexa Prize Taskbot Challenge: 3rd Place** 2021-2022
*"The challenge is focused on developing agents that assist customers in completing tasks requiring multiple steps and decisions. It's the first conversational AI challenge to incorporate multimodal (voice and vision) customer experiences."*

· Developed internal dashboard to support bug-fixes in near-real time.
· Designed and implemented automated test suite using fuzzy matching to support dynamic chatbot responses and improve deployment speed and quality.

**Hack OHI/O: Awarded 3rd Place** 2021
*"A 48 hour hackathon that attracts over 800 participants annually for a full weekend of coding, building, learning, networking, and innovation"*

· Developed an optimal trick-or-treating route planner using OpenStreetMap data and quadtrees to maximize predicted candy per mile walked.

**Hack OHI/O: Awarded Best UI/UX and People's Choice** 2020

· Developed a web-based, voice-powered, natural language code editor to convert natural, spoken language into Python code in real time.
· Fine-tuned pretrained transformer models and developed a custom parser to convert natural language to structured code.

**Hack OHI/O: Awarded Best Hack** 2019

· Developed an accessibility-focused text extraction app for visually impaired users.
· Used Tesseract OCR to extract text from images to provide content in a variety of accessible formats.

**Brain Health Hack: Awarded Best Project at Large** 2018

*"Teams of future scientists, clinicians, engineers and coders compete to create tools that enable better care, more powerful research, or ruther empower patients to live independent and productive lives"*

- Developed a Android and iOS Parkinson's Disease tracking app to improve effectiveness of medication.
- Used device accelerometers to measure a user's tremors to improve effectiveness of medication.

**Hack OHI/O: Awarded Best Software Hack** 2017

- Developed an iOS social media trend aggregator in 24 hours to aggregate trending topics on Twitter and Instagram.

## ADDITIONAL INFO

OSU Club Powerlifting August 2021 - May 2024

OSU Club Water Polo August 2017 - May 2024

- Club Risk Manager August 2020 - May 2021

Study abroad in Dresden, Germany June 2019 - August 2019

- Awarded Huntington International Fellowship