Samuel Stevens

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Research Vision

My research accelerates scientific discovery by composing interpretability methods with foundation models, especially for biology and ecology. I emphasize system/model codesign: algorithms built to exploit real hardware at scale. Highlights include 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

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

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

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 and Yu Su *NeurIPS*, 2025 **(Spotlight)**

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)**

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

Memorization for Good: Encryption with Autoregressive Language Models
Samuel Stevens and Yu Su *arXiv Preprint*, 2023

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

Research Experience

Zoom May 2024 – August 2024
AI Research Scientist Intern *Remote*
- Designed and implemented abstractions for programming language models more reliably.

Meta May 2023 – August 2023
Research Scientist Intern *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
Undergraduate 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 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 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.

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 and Honors

CVPR Best Student Paper 2024
- BioCLIP: A Vision Foundation Model for the Tree of Life

1st Alexa Prize Taskbot Challenge: 3rd Place 2022
- 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.

All Publications

2025

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

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 and Yu Su *NeurIPS*, 2025 **(Spotlight)**

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

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

BioBench: A Blueprint to Move Beyond ImageNet for Scientific ML Benchmarks
Samuel Stevens *NeurIPS Imageomics Workshop*, 2025

Mind the (Data) Gap: Evaluating Vision Systems in Small Data Applications
Samuel Stevens, S M Rayeed and Jenna Kline *NeurIPS Imageomics Workshop*, 2025

2024

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)**

MMMU: A Massive Multi-Discipline Multimodal Understanding and Reasoning Benchmark for Expert AGI
Xiang Yue, Yuansheng Ni, Kai Zhang, Tianyu Zheng, Ruoqi Liu, Ge Zhang, **Samuel Stevens**, Dongfu Jiang, Weiming Ren, Yuxuan Sun, Cong Wei, Botao Yu, Ruibin Yuan, Renliang Sun, Ming Yin, Boyuan Zheng, Zhenzhu Yang, Yibo Liu, Wenhao Huang, Huan Sun, Yu Su and Wenhu Chen *CVPR*, 2024 **(Best Paper Finalist)**

A Simple Interpretable Transformer for Fine-Grained Image Classification and Analysis
Dipanjyoti Paul, Arpita Chowdhury, Xinqi Xiong, Feng-Ju Chang, David Carlyn, **Samuel Stevens**, Kaiya Provost, Anuj Karpatne, Bryan Carstens, Daniel Rubenstein, Charles Stewart, Tanya Berger-Wolf, Yu Su and Wei-Lun Chao *ICLR*, 2024

The Cool and the Cruel: Separating Hard Parts of LWE Secrets
Niklas Nolte, Mohamed Malhou, Emily Wenger, **Samuel Stevens**, Cathy Li, François Charton and Kristin Lauter *AFRICACRYPT*, 2024

KABR: In-Situ Dataset for Kenyan Animal Behavior Recognition from Drone Videos
Maksim Kholiavchenko, Jenna Kline, Michelle Ramirez, **Samuel Stevens**, Alec Sheets, Reshma Babu, Namrata Banerji, Elizabeth Campolongo, Matthew Thompson, Nina Van Tiel, Jackson Miliko, Eduardo Bessa, Isla Duporge, Tanya Berger-Wolf, Daniel Rubenstein and Charles Stewart *WACV*, 2024

Optimizing Image Capture for Computer Vision-Powered Taxonomic Identification
Alyson East, Elizabeth G. Campolongo, Luke Meyers, **Samuel Stevens**, Hilmar Lapp, Yasin Bakis, Henry Bart, Wasila Dahdul, Anuj Karpatne, Tanya Berger-Wolf and John Bradley *Methods in Ecology and Evolution*, 2024

A Framework for Autonomic Computing for In Situ Imageomics
Jenna Kline, Christopher Stewart, Tanya Berger-Wolf, **Samuel Stevens** and Charles Stewart *IEEE ACSOS*, 2024

2023

Mind2Web: Towards a Generalist Agent for the Web
Xiang Deng, Yu Gu, Boyuan Zheng, Shijie Chen, **Samuel Stevens**, Boshi Wang, Huan Sun and Yu Su *NeurIPS*, 2023 **(Spotlight)**

Memorization for Good: Encryption with Autoregressive Language Models
Samuel Stevens and Yu Su *arXiv Preprint*, 2023

Roll Up Your Sleeves: Working with a Collaborative and Engaging Task-Oriented Dialogue System
Lingbo Mo, Shijie Chen, Ziru Chen, Xiang Deng, Ashley Lewis, Sunit Singh, **Samuel Stevens**, Chang-You Tai, Zhen Wang, Xiang Yue, Tianshu Zhang, Yu Su and Huan Sun *SIGDIAL*, 2023

SalsaBot: Towards a Robust and Generalizable Embodied Agent
Chan Hee Song, Jiaman Wu, Ju-Seung Byeon, Zexin Xu, Vardaan Pahuja, Goonmeet Bajaj, **Samuel Stevens**, Ziru Chen and Yu Su *CVPR Embodied AI Workshop*, 2023

2022

arXivEdits: Understanding the Human Revision Process in Scientific Writing
Chao Jiang, Wei Xu and **Samuel Stevens** *EMNLP*, 2022

Bootstrapping a User-Centered Task-Oriented Dialogue System
Shijie Chen, Ziru Chen, Xiang Deng, Ashley Lewis, Lingbo Mo, **Samuel Stevens**, Zhen Wang, Xiang Yue, Tianshu Zhang, Yu Su and Huan Sun *Alexa Prize TaskBot Challenge Proceedings*, 2022

2021

An Investigation of Language Model Interpretability via Sentence Editing
Samuel Stevens and Yu Su *EMNLP BlackboxNLP Workshop*, 2021