Sam Foxman

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PROFILE

I am an senior undergrad in Computer Science at Caltech. I am interested in novel applications of computer science across all domains such as aerospace, communications, cybersecurity, and AI. Following my undergrad, I hope to become a PhD and pursue a career in academia.

EDUCATION

• **Caltech**　　　　　　　　　　　　　　　　　　　　　*September 2022 - June 2026*
B.S. in Computer Science　　　　　　　　　　　　　　　　Pasadena CA, USA

EXPERIENCE

• **Gharib Lab, Caltech [🌐]**　　　　　　　　　　　　　　*November 2023 - Present*
Undergraduate Researcher　　　　　　　　　　　　　　　Pasadena CA, USA
- Created GPU-accelerated image processing software to analyze fluid flow 1000x faster than any commercially available software, 2 papers & 2 patents
- Created software for low-latency vision language models

• **Information Processing Group, NASA Jet Propulsion Lab [🌐]**　　　*June 2023 - Present*
Undergraduate Researcher　　　　　　　　　　　　　　　Pasadena CA, USA
- Created a program to encode and decode laser signals as part of the Deep Space Optical Communications team which allows data to be downloaded 100x faster than radio
- Program receives signals from the NASA Psyche spacecraft and from astronauts on the Orion spaceship
  - NASA laser message beams video of a cat named Taters back to Earth, and it's a big deal - CNN
- Designed & created GPU-based optical communications receiver
  - Achieved world record for the highest link difficulty (bitrate $\cdot$ distance^2) of any real-time communication system (75 Mbps @ $2.25 \cdot 10^8$ km), outperforming previous FPGA-based systems

• **NASA Advanced Supercomputer Center [🌐]**　　　　　　　*June 2024 - Present*
Research Associate　　　　　　　　　　　　　　　　　Moffett Field CA, USA
- Created an AI chatbot and search engine app that cites millions of scientific and business documents
- Deploying the app across NASA, currently beta testing at Ames Supercomputing Division

• **Caltech Infrared Processing and Analysis Center [🌐]**　　　*February 2024 - June 2025*
Mission Operations and Ground Data Systems　　　　　　　　Pasadena CA, USA
- Wrote software for the Lunar Trailblazer spacecraft, launched February 2025
- Mission control for Lunar Trailblazer on launch day, monitoring spacecraft telemetry
  - Rapidly wrote software to decode anomalous telemetry the day after launch

• **NVIDIA [🌐]**　　　　　　　　　　　　　　　　　*June 2025 - September 2025*
Software Engineering Intern　　　　　　　　　　　　　　Santa Clara CA, USA
- Systems software for autonomous vehicles (Mercedes-Benz & Jaguar)
- Improved camera and radar processing verification

• **Nelson Lab, Caltech [🌐]**　　　　　　　　　　　　　*September 2024 - Present*
Undergraduate Researcher　　　　　　　　　　　　　　　Pasadena CA, USA
- Designed software system for high-throughput electron diffraction data processing

• **Feinberg Lab, Yale [🌐]**　　　　　　　　　　　　　　*May 2020 - June 2023*
High School Intern　　　　　　　　　　　　　　　　　New Haven CT, USA
- Created data analysis pipelines for the Fineberg Laboratory at Yale University for Bayesian analysis of the Social Valuation Task, neuroeconomic task to measure suicide ideation
- Presented findings in a short talk/poster at national Technology in Psychiatry (TIPS) conference

Leadership Experience

- **Teaching Assistant, Caltech** *September 2023 - June 2025*
  Head Teaching Assistant Pasadena CA, USA
  - CS 171: *Computer Graphics Laboratory* TA Fall 2024, Head TA Fall 2025, 2026
  - CS 179: *GPU Programming* TA Fall 2024, Head TA Spring 2025, 2026
    - ∗ Created assignment where students program a large language model from scratch in CUDA

- **Caltech Undergraduate Computer Science Club [⊕]** *September 2023 - Present*
  President Pasadena CA, USA
  - Managed a club budget of ≈ $24,000, organizing club events, and maintaining relations with external sponsors, including NVIDIA and Relativity Space, interested in giving and working with our club.
  - For instance, we worked on purchasing computer parts and getting sponsored GPUs from NVIDIA, built a computer cluster from these parts, and now actively operate it for club members.

- **Caltech Aerospace Club [⊕]** *September 2023 - Present*
  Co-chair Pasadena CA, USA
  - Won $150k NASA grant to study an inflatable Lunar dust shield. I lead the fluids team running computational fluid dynamics simulations. Presented at AIAA Ascend.

Publications

- *S. Bollt, **S. Foxman**, M. Gharib. "RapidPIV: Full Flow-Field kHz PIV for Real-Time Display and Control". Submitted to Measurement Science & Technology, 2025. Preprint https://www.arxiv.org/abs/2504.17987.*

- *L. Coffin, A.J. Torres, S. Wallen, P. Calub, K. Gauld, I. Kwaterski, **S. Foxman**, H. Ramsperger, E. Xu, ..., K. Carpenter, S.J. Chung. "PILLARS: Plume-Deployed Inflatable for Launch and Landing Abrasive Regolith Shielding". AIAA Aviation Forum and Ascend, July 2025. https://doi.org/10.2514/6.2025-4126*

- *B. Ehlmann, ..., **S. Foxman**, ..., and the Lunar Trailblazer Team. "Lunar Trailblazer Spacecraft Tracking and Mission Recovery Attempt: Characterization of Status and Behavior of a Non-Cooperative Object in Cis-Lunar Space " Manuscript submitted, August 2025*

- *D. Eremin, K. Jha, D. Delgadillo, H. Zhang, **S. Foxman**, S. Johnson, N. Vlahakis, D. Cascio, V. Lavallo, J. Rodriguez, H. Nelson. "Spatially-Aware Diffraction Mapping Enables Fully Autonomous MicroED". In review at Journal of the American Chemical Society (JACS), 2025. Preprint https://doi.org/10.26434/chemrxiv-2025-4p4c3*

- *B. Ehlmann, ..., **S. Foxman**, ..., and the Lunar Trailblazer Team. "The Lunar Trailblazer Mission: Science Motivation and Implementation of a Pioneering Small Satellite for Lunar Water and Lunar Geology in the NASA SIMPLEx program". Submitted to Journal of Geophysical Research, August 2025*

- ***S. Foxman**, D. Dalle. "NASA-GPT". Manuscript in preparation. September 2025*

- ***S. Foxman**, R. Rogalin. "GPU Receivers for Deep Space Optical Communications". Presenting at SPIE Photonics West, Free-Space Laser Communications XXXVIII, January 2026.*

Inventions

- *S. Bollt, **S. Foxman**, M. Gharib. "Portable Real-Time Optical Flow-Field Sensor". U.S. Patent Application No. 63/715,303. November 2024*

- ***S. Foxman**, R. Rogalin. "GPU-Based Optical Communications Modem". Software available under license from Caltech/NASA Jet Propulsion Laboratory. June 2025*

- ***S. Foxman**, S. Bollt, M. Gharib. "Systems and Methods for Optical Flow Using GPU Tensor Processing Cores". U.S. Patent Application No. 63/823,578. June 2025*

Skills

- **Programming Lanuages and Frameworks:** C++, Linux, Java, Python, Rust, CUDA, OpenGL, MATLAB, Jupyter, C, JavaScript, Full-Stack Development, Computer Networking, R, SQL, Bash
- **General:** Sysadmin, Cloud Servers, CAD, Embedded Systems, FPGA Software Programming, Robotics, 3D Printing, EEG Preprocessing Pipeline, HPC (High performance computing), Information Retrieval, AI, Wireless Communication