

Brady Bhalla

🌐 bradybhalla.github.io | 🐙 bradybhalla | 📄 bradybhalla

EDUCATION

California Institute of Technology | *Computer Science; 4.3 GPA; Class of 2026* Sep 2022 – Present

- **Selected Courses:** Compilers, Systems Programming, Software Design, Algorithms, Complexity Theory, Machine Learning, Large Language and Vision Models
- **Involvement:** Undergraduate Computer Science Club, Turtle Club, Avery House

EXPERIENCE

Software Engineering Intern | *Jane Street* Jun 2025 – Sep 2025

- Developed an authorization library on top of an internal RPC framework, simplifying the construction of authorization rules and enabling more secure services with less code.
- Redesigned a regulatory reporting application by extending its upload process from a single machine to a distributed service, removing the network bottleneck and enabling scalable, multi-machine uploads.

Teaching Assistant | *California Institute of Technology* Sep 2024 – Dec 2025

- Helped run the computing systems (CS 24) and graphics (CS 171) courses at Caltech.
- Held office hours to explain course concepts and provide debugging support to students.

Undergraduate Researcher | *SIGNAL Lab, Colorado State University* Jun 2024 – Aug 2025

- Contributed to the development of an AI system for tracking participants' shared beliefs during a collaborative problem-solving task by redesigning the codebase to be more modular, extendible, and reliable.
- Led the implementation and creation of tests for the new system design, resulting in a Python package that will serve as a foundation for future developments.

PROJECTS

Desmos Compiler | *Python, Pytest, Selenium*

- Developed a C-like language and a compiler which allows the language to run inside the Desmos graphing calculator.
- Translated the AST of the language into a lower level “Desmos assembly,” which is then converted into calculator expressions.
- Tested all project components using browser automation.

Double-DIP | *Python, PyTorch*

- Implemented the Deep Image Prior (DIP) network and Double-DIP framework, which use randomly initialized U-nets as image priors, enabling the unsupervised solving of inverse problems.
- Applied the framework to a wide variety of inverse problems including denoising, inpainting, and watermark removal.

Ray Tracer | *OCaml*

- Developed a ray tracer implementing both Whitted-style recursive tracing and stochastic random walk tracing for physically accurate global illumination.
- Built support for geometric primitives (spheres, planes, and triangles) and meshes imported from .obj files, enabling realistic rendering of textures, reflections, refractions, and customizable BSDFs.

SKILLS

- **Languages:** Python, OCaml, C, JavaScript, TypeScript, C++, Java, Lua, Coq
- **Tools:** Git, Vim, Tmux, \LaTeX , Docker, Slurm, Linux

PUBLICATIONS (* DENOTES EQUAL CONTRIBUTION)

- VanderHoeven, H., **Bhalla, B.**, Khebour, I., Youngren, A., Venkatesha, V., Bradford, M., Fitzgerald, J., Mabrey, C., Tu, J., Zhu, Y., Lai, K., Jung, C., Pustejovsky, J., Krishnaswamy, N., “TRACE: Real-Time Multimodal Common Ground Tracking in Situated Collaborative Dialogues,” *Nations of the Americas Chapter of the Association for Computational Linguistics (NAACL): System Demonstrations*, 2025.
- **Bhalla, B.***, Huang, Z.*, Serghine, E.*, Zhang, B., Wu, Z., Bouman, K., “Text-Guided Image Restoration via a Unified Plug-and-Play Diffusion Framework,” *CVPR Computational Cameras and Displays Workshop*, 2025.

AWARDS

- Henry Ford II Scholar Award for best academic record (2025)
- Caltech Summer Undergraduate Research Fellowship (2023, 2024)