

# Nolan Browning **Lizmi**

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## EDUCATION

**Cornell University, College of Arts & Sciences**

August 2023–May 2027

**Degrees:** Bachelor of Arts in Computer Science, Bachelor of Arts in Astronomy

Ithaca, NY

**GPA:** 4.023 / 4.3

**Relevant Coursework:** Computational Imaging, Computer Graphics, Graduate Computer Graphics & Vision Seminar, Machine Learning, Compilers, Multiwavelength Astronomical Techniques, Planetary Surface Processes, Planetary Physics, Modeling and Machine Learning in Astronomy, Systems Programming, Quantum Computing, Galaxies & Cosmology, Engineering Mathematics Sequence, Introductory Physics Sequence, Analysis of Algorithms, Functional Programming, Discrete Structures, Object-Oriented Programming, Interactive Computer Graphics (Spring 2027)

## RELEVANT EXPERIENCE

**Cornell Computational Imaging Lab**

January 2026–Present

Undergraduate Research Assistant under Kristina Monakhova

Ithaca, NY

- Applying differentiable rendering techniques to refractive optical systems, allowing calibration of lens misalignments.
- **Summer 2026:** Employed as a full-time student researcher in the Cornell Bowers Undergraduate Research Experience (BURE) program for ten weeks; presented my work at a concluding program-wide symposium.
- Utilizing Python's ecosystem of numerical and astronomical packages, including PyTorch, for efficient computation.
- Conducting thorough literature reviews of papers in signal processing, optics, physically-based rendering, and astronomy.
- Meeting with collaborators across fields, including Lisa Kaltenegger of the Cornell astronomy department.

**IEEE International Conference on Computational Photography (ICCP) 2026**

July 2026

Summer School Fellow and Main Conference Attendee

Princeton, NJ

- Was selected as one of only twenty-five fully-funded "fellows" for the second annual ICCP Summer School.
- Attended two days of collaborative, hands-on courses focused on modern imaging hardware and software.
- Constructed a working Michelson interferometer and an adaptive optics setup, and used Cryo-EM software and SPADs.
- Attended the presentations, poster sessions, and meals of the main conference following the Summer School.

**Cornell ALPS (Algorithms for Large-Scale Parallel Systems) Lab**

February–December 2025

Undergraduate Research Assistant under Giulia Guidi

Ithaca, NY

- Accelerated genomic analysis algorithms using sparse linear algebra and concurrency techniques in heterogeneous memory.
- **Summer 2025:** Employed full-time in the BURE program.
- Developed in CUDA C++, collected data using Bash and Python, and utilized external libraries for CPU/GPU acceleration.
- Utilized software such as Slurm on NERSC's Perlmutter supercomputer to develop, execute, and benchmark computations.

**CS 3410 (Computer Systems Organization & Programming)**

August–December 2025

Undergraduate Teaching Assistant

Ithaca, NY

- Reworked previously problematic assignments, developed assignment handout materials, and graded student submissions.
- Co-led weekly in-person Lab sections where students were led through difficult concepts from lecture.
- Held weekly in-person office hours to assist students with conceptual understanding and assignment completion.

**ASTRO 6580 (Planetary Surface Processes Field Trip)**

March 30–April 3, 2026

Field Trip Participant

Death Valley and Mojave Desert, CA & NV

- Applied planetary science concepts in understanding the formation processes of myriad geologic features in the area.
- Used GIS software to make predictions about landforms before the trip, and then tested these predictions in the field.
- Kept a comprehensive field notebook detailing local geologic formations and their theorized origins.
- Presented relevant concepts to the class in the field, and authored a synthesizing report at the conclusion of the trip.

## PERSONAL & COURSE PROJECTS

### CS 4120/4121 (Compilers) Project

January–May 2026

Compiler for the  $\rho$  (Rho) and  $\eta$  (Eta) programming languages

Ithaca, NY

- Engineered an optimizing compiler for  $\eta$ , a statically-typed imperative language, and later the object-oriented extension  $\rho$ .
- Communicated clearly and frequently with two teammates about goals, work division, and implementation.
- Carefully constructed Java code for all stages of compilation, including code optimization, in a containerized environment.
- Co-authored several comprehensive engineering reports detailing technical specifications and issues encountered.

### CS 4620 (Computer Graphics) Final Project

December 2025

Tim, Destroyer of Worlds

Ithaca, NY

- Developed an interactive 3D “planet destruction” demo in less than a week, coordinating within a small group of students.
- Extended a course-provided TypeScript library for 3D rendering, itself based on Three.js, to develop our demo.
- Implemented and utilized graphics techniques including marching cubes, procedural generation, and signed distance fields.

### ASTRO 6577 (Planetary Surface Processes) Final Project

May 2026

Enceladus Ice Jet Particle Simulator

Ithaca, NY

- Worked with a partner to create a 3D particle simulation of the icy jets in the South Polar Terrain of Saturn’s moon Enceladus.
- Consulted existing literature to derive physically-accurate particle emission geometry and parameters for ~100 individual jets.
- Engineered an efficient, multithreaded particle simulation program in MATLAB using geometric matrix operations.
- Presented in-class progress updates, drawing conclusions from 3D visualizations of relevant quantities for ejected particles.

### CS 4621 (Computer Graphics Practicum) Project

August–December 2025

“4Dungeon”

Ithaca, NY

- Created a video game with four spatial dimensions in the Unity game engine, collaborating in a self-led team of five students.
- Developed the underlying infrastructure and set of primitives for four-dimensional rendering in a three-dimensional engine.
- Presented project milestone progress to course instructors and peers throughout the semester.

### CS 3110 (Functional Programming) Final Project

October–December 2024

“PSBop” ([link to GitHub repository](#))

Ithaca, NY

- Engineered a study-tracking web app in OCaml in a team of three CS 3110 students under self-direction.
- Utilized SQLite bindings in OCaml to create a persistent database system in the back-end.
- Communicated clearly and frequently with teammates in-person and via Slack about project goals and development.
- Wrote and edited reports detailing collaborative progress and our technical obstacles and advances.

### Video Game Project with the Cornell Development in Games Association

July–August 2024

“Completely Hammered” ([link to itch.io page](#))

Remote

- Developed a full video game over the course of five weeks, coordinating with a team of around twelve Cornell students.
- Became closely familiar with GitHub and Unity as I assembled game objects and programmed game components in C#.
- Created and released a substantial update for the game with two other team members following the initial release.

### Personal Todo List Manager Project

May 2026–Present

“todo” ([link to GitHub repository](#))

Ithaca, NY

- Independently authoring an interactive command-line “todo list” management system using the Rust language.
- Progressively adding useful features to a simple baseline, refactoring using modular software engineering techniques.
- Using Rust’s powerful type system to create highly general functions and data structures, enabling large-scale code reuse.

## TECHNICAL SKILLS

**Programming Languages:** C/C++, Rust, Java, Bash, OCaml, Python, Julia, C#, TypeScript, RISC-V Assembly, MATLAB, Nushell

**Mathematics:** Multivariable calculus, differential equations, linear algebra, signal processing, optimization, statistics, probability

**Physics:** Mechanics, special relativity, electromagnetism, waves and oscillations, quantum physics, orbital mechanics

**Development & Creative Software:** Git, Slurm, GNU/Linux, Docker/Podman, Visual Studio Code, MATLAB, Jupyter, Unity, Godot, QGIS, Helix, LaTeX, Nix, NixOS, uv, Pixi, Anaconda, Cargo, Obsidian, Aseprite, Krita, Inkscape, p5.js

**Software Libraries:** Numpy, PyTorch, Scipy, Astropy, DeepLens, CUDA, cuSPARSE, OpenMP, MPI, Three.js

**Spoken Languages:** English (native), español (low intermediate), Gayogohonqʷnéha:ʔ (novice)