Žiga Kovačič

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Education

Cornell University Ithaca, NY

B.A. in Computer Science and Mathematics | **GPA: 4.13/4.0** Aug 2022 - May 2025

- **Relevant Grad Courses:** (Grad) Physically Based Animations (A+), (Grad) Program Synthesis (A+) (Grad) 3D Computer Vision (A+), (Grad) Computation for Content Creation (A), (Grad) Computational Imaging (A)
  Relevant Undergrad Courses: Graphics (A+), Machine Learning (A+), Algorithms (A+), Honors Real Analysis II (A+), Numerical Analysis (A), Reinforcement learning (A), Intro to Probability (A+), Honors Discrete structures (A+), Linear algebra (A+), Digital Logic and Computer Organizations (A+), Honors OOP and Data Structures (A)
- **In progress: Independent Project:** High Performance Physical Simulation, Systems for Large Scale Machine Learning

Research Experience

Recursion and Learning Lab | Advisor: Kevin Ellis Ithaca, NY

Undergraduate Researcher Mar 2025 - Present

- **Program synthesis for physical simulation:**
  Exploring the use of coding agents in writing physical simulation code.
- **Refactoring Codebases through Library Design:**
  Library learning on repository-level codebases and hard programming domains. *In submission at NeurIPS.*

Cornell Graphics Lab | Advisor: Abe Davis Ithaca, NY

Undergraduate Researcher May 2023 - Mar 2025

- **Image Space Modal Warping and Re-simulation:**
  Implemented techniques from [ISMB, 2016] in JavaScript and Python. Extended modal analysis simulation with modal warping and extracted modal basis from 4D pointclouds.
- **Pocket Timelapse, [SIGGRAPH 2025] :**
  Developed a framework for creating time lapses from sparse hand-captured data using 2D Gaussian splatting with change-aware sampling. Enabled user control over time and seasonal variation in synthesized time lapses.

Teaching Experience

Cornell University, Teaching Assistant

- **CS 4787:** (**Head TA**) Large Scale Machine Learning Fall 2025
- **CS 4782:** (**Head TA**) Introduction to Deep Learning | Made an assignment autograder for 200+ students. Spring 2025
- **CS 4620:** Introduction to Computer Graphics Fall 2024
- **CS 4780:** Introduction to Machine Learning. | Award: Course Staff Exceptional Service Award Spring 2024
- **CS 2110:** Object Oriented Programming and Data Structures, Spring 2023

Projects

SliceSplatting - Obstruction Removal from 3D reconstructions October 2024 - Feb 2025

- Modified Gaussian Splatting to remove obstructions blocking the view of objects of interest in a 3D scene reconstruction.

Differentiable Rendering with Dual Pixels Oct 2024 - Dec 2024

- Improved 3D reconstruction in differentiable rendering with unknown environment map by introducing a dual pixel image formation model.

MelodyMesh | Grad course final project April 2023 - May 2023

- Built a 3D music visualizer that deforms a mesh based on dominant frequencies in a sound recording.
- Used a graphics library Three.js to render deformations of 3D objects loaded from .obj mesh files in real-time on a website.
- Used signal processing theory and FFT algorithm to obtain the dominant frequency bins of a sound in real-time and map them to deformations of the mesh using spherical harmonics and Legendre polynomials.

Path Tracer in Ocaml April 2025

- Built a path tracer from scratch and implemented refractions and reflections, distributive ray tracing, BVH speedup structure, volumetric rendering, emissive objects, and parallelized over blocks of pixels.

Caustics and Water surface simulation | Graphics final project Top Submission December 2023

- Implemented Multi-pass rendering, screen space refractions, shadow mapping, height fields, environmental mapping, and time-varying environmental map.

Technical Skills

Languages: Python, JavaScript, Java, C/C++, LaTeX, Markdown, Typst
Libraries: PyTorch,Taichi, Numpy, WebGL, Three.js, rawpy, JavaFX