

EDUCATION

Cornell University, College of Arts and Sciences
B.A. in Computer Science and Math, GPA: 4.075

Ithaca, NY
Expected, May 2024

PUBLICATIONS AND PREPRINTS

** denotes equal contribution and † denotes mentorship*

Boundary Path Sampling

Feb 2023 - Jan 2024

Zichen Wang, Xi Deng, Steve Marschner[†]

- Submitting to SIGGRAPH 2024
- I proposed a faster differentiable rendering algorithm with SDF. Based on the path integral formulation, we introduce the novel concept of the visible path space and discover that the boundary path space coincides the boundary of the visible path space. This allows us to define metrics over the path space and approximate the integral of boundary paths with nearby paths.

Accurate Differential Operators of Neural Fields

May 2023

Aditya Chetan, Guandao Yang, **Zichen Wang**, Steve Marschner[†], Bharath Hariharan[†]

- Submitted to NeurIPS 2023
- We proposed a differential operator for hybrid SDF networks to reduce high-frequency noise and obtain smooth normals and higher-order derivatives. This can be done by fitting a tangent plane to the nearby sampled points.
- I coded experiments on rendering, simulation, and PDE solver. I also wrote the paragraphs on rendering.

Revisiting a 2-Approximation for the k -MST Problem in Graphs

Jan 2022 - Aug 2022

Emmett Breen*, Renee Mirka*, **Zichen Wang***, and David P. Williamson**

- Proceedings of SIAM Symposium on Simplicity in Algorithms (SOSA) 2023
- I gave a 20-minute presentation at the conference
- We revisited Garg's primal-dual algorithm for the k -MST problem and supplemented with rigorous proofs
- I introduced the novel concept of *kernels* to better study the structure of the spanning tree

Four-Periodic Infinite Staircase for Four-Dimensional Polydisk

Jun 2022 - Jul 2022

C. Farley*, T. Holm*, N. Magill*, J. Schroder*, **Z. Wang***, M. Weiler*, and E. Zabelina*

- Accepted by Joint Math Meeting 2023 and is our work in Cornell Summer Undergraduate Research Program (SPUR)
- We studied symplectic four-manifold ellipsoid embedding and computed a new family of infinite staircases
- I developed Python codes that quickly compute almost toric fibration and embedded contact homology

EXPERIENCES

CS4999 Independent Research with Steve Marschner

Sep 2022 - present

- We read through Veach's thesis and literature reviewed on more recent papers in differentiable rendering. Meanwhile, I coded my own renderer from scratch in C++ and explored numerous models on novel view synthesis and inverse rendering. These experiences crystalized into my notes on rendering, differentiable rendering, and inverse rendering.

SimSDF: Physics-Based Simulation with Signed Distance Field

May 2023

- This project explored using SDF in rigid body simulations. We proposed to take the maximum of SDFs to different objects and run gradient descent to obtain the contact region. Compared with mesh representations, our approach gives more accurate normals and adhere closer to the ground truth.

Cornell University Artificial Intelligence (CUAI)

Sep 2022 - present

- CUAI is an undergraduate research group on machine learning. The group has numerous publications at top ML conferences.

MATH 4901 Supervised Reading with Liam Mazurowski

Jan 2022 - May 2022

- Read Do Carmo's *Differential Geometry of Curves and Surface* and *Riemannian Geometry* and studied minimal surfaces

TEACHING

- Teaching Assistant, CS4620 Introduction to Computer Graphics
- Teaching Assistant, CS4820 Introduction to Analysis of Algorithms

Fall 2023
Summer 2022

AWARDS

- Top 300, William Lowell Putnam Mathematical Competition. 2022