Brennen Green

brennengreen@outlook.com | 859-312-0852 | brennengreen.dev | 108 Erica Drive
Georgetown, KY

RESEARCH INTERESTS

Computer Graphics, Computational Geometry, Computer Vision, Parallel Computing, Data Science, Artificial Intelligence

EDUCATION

Computer Science, B.S. (Math and Computer Science Double Major), University of Kentucky, May 2023 (Expected) , 3.92 GPA

RESEARCH EXPERIENCE

Dr. Peng Wang's A.I. for Smart Manufacturing Lab, University of Kentucky, Jan. 2021 – Present
Undergraduate Research Assistant
- Developed one shot learning process for part prognosis with $R^2 = \sim 99\%$
- Profiled multiple different hyperparameter configurations and convolutional neural network architectures, to find the best solution to our problem.
- Worked with PyTorch to develop, profile, debug, and test our convolutional neural networks.
- Self-Studied many aspects of math and statistics to develop a solid foundation in optimization and machine learning techniques.

Dr. Guoqiang Yu's Biomedical Optics Lab, University of Kentucky, Mar. 2020 – Oct. 2020
Undergraduate Research Assistant
- Solely responsible for the optimization of biomedical imaging system, making me responsible for ~6-10k lines of code.
- Parallelized an entirely sequential code base that allowed our imaging device to improve performance by 300% [1] using CUDA and general-purpose GPU computing techniques.
- Contributed to the development of near real-time cerebral blood flow data visualization system using NIRFAST
- Wrote weekly reports detailing my improvements to the code base to present my findings every week at the lab meeting.

Research into Volume Rendering Using Probabilistic Density Functions, Self-Guided
Principal Investigator (Informally Advised by Dr. Peter Shirley, NVIDIA)
- Studied and implemented many widely accepted techniques of rendering participating media, such as woodcock tracing.

INDUSTRY EXPERIENCE

Twitch Interactive – Video Streaming Engineering Intern May 2021 – August 2021
- Contributed to the development of video streaming on the Android Mobile App
- Lead a project to develop an improved broadcasting experience for mobile gaming

Intel Corporation – Controller Integration Engineering Co-op October 2020 – May 2021
- Wrote automated test simulations for the Simics platform in C and Python
- Debugged and validated various processor firmware configurations simulated via FPGA
- Used knowledge of computer architecture and systems programming to analyze processor architectures

PUBLICATIONS

[1] Green, Brennen, et al. "*High-Speed Imaging of Cerebral Blood Flow Using Parallel Computing on the Graphics Processing Unit*." Biomedical Engineering Society Annual Meeting, 2020

[2] Mohtasebi, Mehrana, et al. "*Noncontact Optical Assessment of Spontaneous Low-Frequency Fluctuations of Cerebral Blood Flow in Neonatal Intraventricular Hemorrhage*" Society of Photo-Optical Instrumentation Engineers Photonex + Vacuum Expo, 2020.

CONFERENCE PRESENTATIONS

2020, Brennen Green, "High Speed Imaging of Cerebral Blood Flow Using Parallel Computing on the Graphics Processing Unit" Biomedical Engineering Society Annual Meeting and Commonwealth Computation Summit, Virtual.

OPEN-SOURCE CONTRIBUTIONS

Blender Foundation: https://www.blender.org/
- Contributed tooling updates to various features in the Blender software that enabled artists to experiment with computer graphics.
- Developed a precise algorithm to randomly selected a specific number of objects in a scene without extensive use of costly RNG Engines.

Godot Game Engine: https://github.com/godotengine/godot
- Contributed features to several different areas of the Godot Game Engine, primarily I worked under the engine's rendering pipeline as well as tooling.
- Worked on creating material pipelines that automatically generated GLSL shader code based on editor settings.

PERSONAL PROJECTS:

Physically Based Path Tracer: https://github.com/brennengreen/Raytracer
- Wrote a ~5k line physically based path tracer, originally from scratch.
- Implemented multiple BRDF's such as Lambertian, Oren-Nayer, Blinn-Phong, Disney.

OpenGL Rendering Engine: https://github.com/brennengreen/Shaders
- Wrote a real-time toy rendering engine in OpenGL from scratch.
- Implemented several shaders, like Cel and Gooch, using OpenGL Shader Language
- Developed a confident understanding of the graphics pipeline for efficiency

RELEVANT COURSEWORK

Formally Taught: Numerical Methods, Intermediate Computer Graphics, Artificial Intelligence, Machine Learning, Optimization, Probability, Statistics, Linear Algebra, Calculus 1-3, Differential Equations

Self-Taught: Differential Geometry and Geometry Processing, Physically Based Rendering from Theory to Implementation

SKILLS

Languages: C++, C, Python, GLSL, HLSL

Frameworks/Software: OpenGL, Unity, MATLAB, Jupyter Notebook, Torch, NumPy, CUDA, Blender, Godot Game Engine

HONORS / AWARDS
- University of Kentucky College of Engineering Dean's List (Fall 2019-May 2021)
- University of Kentucky College of Engineering Scholarship (2020-2021)

SERVICE / MEMBERSHIPS / AFFILIATIONS
- Computer Science Outreach Chair, Engineering Outreach Board (2019-2020)
- Association of Computing Machinery
- Biomedical Engineering Society
- Association of Computing Machinery SIGGRAPH