SooHyun (Alan) Lee

Contact

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🌐 alannos.com

Education

University of Pennsylvania

- MSE in Computer Graphics and Game Technology [Expected Grad 2025]

Carnegie Mellon University

- BS in Computer Science [Grad Dec 2023]
- Minors in Computer Graphics, Game Design, and Film & Media Studies
- QPA: 3.62/4.00; Dean's List, High Honors since Fall 2021

Skills

Programming: C/C++, C#, GLSL, WGSL, Python, Swift

Technologies: Vulkan, WebGPU, OpenXR, Android XR, CUDA, NVIDIA Nsight, OpenGL, OpenCV, OpenMP, Git, Unity, Unreal Engine 5, PyTorch, Blender, Maya

Relevant Coursework

- GPU Architecture & Programming
- Parallel Data Structures & Algorithms
- Computer Graphics
- Physics-based Rendering
- Visual Computing Systems
- Computer Systems
- Algorithm Design and Analysis
- Machine Learning
- Computer Vision
- Computer Animation
- Computational Photography
- Computer Game Programming
- Game Design and Production
- Compilers (Spring 2025*)
- Operating Systems Design and Implementation (Spring 2025*)

Work Experience

Software Engineer Intern
Samsung Electronics, MX

Jun 2024 - Aug 2024
Suwon, South Korea

- Improved Project Moohan's XR Framework for compositor's foveated rendering pipeline designed with C++, OpenXR and Vulkan, running on Android XR OS
- Developed an Android XR C++ native testing application for swiftly comparing real-time rendering performance differences from incremental graphics pipeline and Vulkan extension utilization changes
- Aided development of XR head-mounted device sensor data visualization framework for validating input data's reference space transformations as well as verifying recorded coordinates' temporal and spatial continuity

Research Assistant
Carnegie Mellon University

May 2023 - Aug 2023
Pittsburgh, PA

- Prototyped and developed a multiplayer digital audio workstation utilizing frequency representations instead of musical scales with Dr. Jim McCann
- Designed and reinforced spectrogram visualization strategy of wave files using fast fourier transform, quadratic peak detection, and transient detection
- Structured and implemented audio-to-image conversion application to additionally accommodate track envelope feature, constant-Q transform and filterbank strategies in C++

Teaching Assistant
CMU, 15462/662 - Computer Graphics (S22~F23)
CMU, 15466/666 - Computer Game Programming (F23)
CMU, 15468/668 - Physics-based Rendering (S24)

Jan 2022 - May 2024
Pittsburgh, PA

- Implemented optimization improvements and corrected implementation and documentation errors of an open-source graphics course software package Scotty3D as a part of the CMU-Graphics organization
- Designed and co-authored written and coding assignments as well as exam questions on various graphics concepts (vector rasterization, geometry processing and mesh editing, raytracing, and kinematics-based animation)
- Reviewed 100+ games written in C++ and OpenGL to evaluate and feedback on code performance, artistic insight and intention, and areas of improvements

Project Experience

WebGPU NPR Path Tracer
WebGPU, Typescript

Oct 2024 - Current
Philadelphia, PA

- Designed and developed WebGPU path tracer with integrated non-photorealistic rendering stylization and cloth simulation based on SIGGRAPH 2024 papers
- Implemented and analyzed WebGPU clustered forward and clustered deferred renderer with gltf scene loading and 10,000 moving point light sources, achieving on average **65.4x** speedup and **98.5%** render time save over naive shader

CUDA Path Tracer
C++, CUDA, OpenGL

Sep 2024 - Oct 2024
Philadelphia, PA

- Implemented and analyzed GPU path tracer with CUDA shading kernels and stream compaction for path termination and contiguous memory material sorting
- Developed and integrated features such as OBJ loading, BVH construction / traversal, texture and bump mapping, environment map lights, depth of field, Open AI Image Denoiser, and restartable path tracer
- Achieved at most **90%** reduction in render time compared to CPU implementation

GPU-Based Global Mesh Operation Acceleration
C++, OpenMP, Open MPI, OpenGL

Aug 2023 - Dec 2023
Pittsburgh, PA

- Spearheaded development and benchmarking of global mesh operation acceleration schemes using OpenMP and Open MPI in C++
- Modified a custom graphics package, Scotty3D, to support thread-safe execution of primitive generation and connection for polygon triangulation
- Achieved at most **6.03x** speedup over a reference serial implementation