Wesley Chang

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Education

BASc in Computer Engineering @ **University of British Columbia** *2017 - Exp. 2022*

- Cumulative average of 92% (3.92 CGPA, A+)
- Planning on attending grad school in Fall 2022 for rendering research

Publications

Intersection Prediction for Accelerated GPU Ray Tracing

Lufei Liu, **Wesley Chang**, Francois Demoullin, Yuan Hsi Chou, Mohammadreza Saed, David Pankratz, Tyler Nowicki, Tor M. Aamodt

54th IEEE/ACM International Symposium on Microarchitecture (MICRO), 2021

Acceptance rate: 94/430 ≈ 21.9%

Industry and Research Experience

Undergraduate Researcher @ **UBC** *Sep. 2021 - Present*

- Researching improvements to multiple importance sampling in light transport algorithms under supervision of Prof. Toshiya Hachisuka from the University of Waterloo and Prof. Derek Nowrouzezahrai from McGill University.

Rendering Engineer Intern @ **Huawei** *May. 2021 - Aug. 2021*

- Researched screen-space global illumination (GI) and directional occlusion (DO) algorithms for mobile platforms.
- Experimented with two novel strategies that fix noise and flickering artifacts in the GI and DO algorithms.
- Developed and improved sampling strategies, resulting in over a magnitude of visual quality and performance improvements.

Software Engineer @ **Vital Mechanics Research** *Jan. 2021 - Apr. 2021*

- Investigated mesh deformation and digital sculpting techniques for adjusting garments and body parts on a 3D model in real-time.
- Designed a BVH library for accelerating ray casting and nearest-neighbour searching, improving the performance of virtual body-garment tools by 30x.

Undergraduate Research Assistant @ **UBC** *Sep. 2020 - Apr. 2021*

- Investigated ray tracing accelerator architectures on GPUs under supervision of Prof. Tor Aamodt.
- Designed hash functions, replacement policies, and other algorithms to improve the performance of hardware-accelerated ambient occlusion workloads, prototyping them in PBRT, and modelled them in GPGPU-Sim with a CUDA and Embree frontend.
- Second-authored a paper accepted to appear at the 54th IEEE/ACM International Symposium on Microarchitecture (MICRO).

Software Engineer Intern @ **Vital Mechanics Research** *May. 2020 - Aug. 2020*

- Re-architected a 3D model viewer for visualization of apparel fit simulation results using React, ThreeJS, and WebGL, leading to the VitalFit product's first beta test.
- Developed multiple interactive 3D tools such as a probe to query body and garment attributes, and a tape measure to calculate point-to-point lengths.
- Designed an extensible placement tool for adjusting garments on the body in real time by leveraging digital sculpting techniques such as Laplacian smoothing.

Software Developer Intern @ **1QBit** *Apr. 2019 - Aug. 2019*

- Enhanced 1QBit's quantum-inspired CPU solvers using C++ and OpenMP by fixing threading and multi-core issues and tracking execution time across all CPU cores.
- Generated and ran NP-hard optimization problems on hardware accelerators such as FPGAs and digital annealers to determine the time/memory requirements to solve them.
- Developed infrastructure to support test, deployment, and release automation using Docker, Travis CI, and Amazon S3.

Projects

Nova *Jul. 2019 - Present*

- Developed a GPU-accelerated, physically based, ray tracing renderer using OpenCL/CUDA from scratch without the use of any existing ray tracing frameworks.
- Implemented progressive, unbiased, Monte Carlo path tracing with multiple importance sampling and incorporated deep learning based denoising.
- Designed an abstraction layer over GPU APIs to allow for multiple backends.
- Obtained a 30x speed-up on an Nvidia Quadro P5000 GPU compared to an equivalent multi-threaded implementation on an 8th Gen Intel Core i7 CPU.

Skills And Interests

Interests	Rendering, Computer Graphics, GPUs, Machine Learning, AR/VR, Software Optimization
Programming/Technologies	C++, Python, JavaScript, CUDA, OpenGL, GLSL, OpenCL, Docker, Git, Linux