

Zimu Guan

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EDUCATION

University of California San Diego · San Diego, CA <i>Master of Science in Computer Science</i>	Sept. 2022 – May. 2024
University of Illinois at Urbana-Champaign · Urbana, IL <i>Bachelor of Science in Computer Engineering · Minor in Mathematics</i>	Aug. 2018 – May. 2022 GPA: 3.91/4.00
Zhejiang University · Hangzhou, China <i>Bachelor of Engineering in Electronics and Computer Engineering</i>	Aug. 2018 – May. 2022 GPA: 3.93/4.00

WORK EXPERIENCE

Xinhua Zhiyun · Software Engineer Intern – Audio/Video Processing Infrastructure <i>C/C++, FFmpeg, OpenGL, skia, Audio/Video Processing</i>	July. 2022 – Sept. 2022 <i>Hangzhou, China</i>
<ul style="list-style-type: none">Maintained an audio/video synthesis & processing engine based primarily on FFmpeg, OpenGL, and skia, provided technical support for video production services with more than 10,000 requests per day.Added H.265 video codec support to the engine using FFmpeg API.Improved FFmpeg source code to adapt for video transcoding tasks in distributed systems, completely resolved the problems of increasing duration and audio glitches after video segmentation, transcoding, and concatenation. Beat Alibaba's cloud transcoding service which still generates tiny duration errors.	

RESEARCH EXPERIENCE

All-Hex Mesh Refinement with Density Control · Research Intern · [Link] <i>C++, 3D graphics, Algorithm Design, Advisor: Jin Huang</i>	Apr. 2021 – Aug. 2021 <i>State Key Lab of CAD & CG, Zhejiang University</i>
<ul style="list-style-type: none">Built a conformal all-hexahedral mesh refinement pipeline as a prototype for the group's follow-up research, aiming to improve physically-based animation, especially the adaptive finite element method.Transferred the selective padding method for mesh optimization to mesh refinement to achieve flexible density control, reduced the error in the estimation of density by %31.1 on average compared to the traditional method.Developed several geometry processing tools as infrastructures for the group's research, including mesh evaluation, element-by-element refinement, and visualization. Integrated them into the refinement pipeline.	

SELECTED PROJECTS

TLEOS (Unix based Operating System) · [Link] <i>C, x86-asm, Qemu, Operating System Design</i>	Apr. 2021 - May. 2021
<ul style="list-style-type: none">Developed a Unix-like operating system kernel from scratch that supports almost all basic functionalities of a Linux kernel, including scheduling, interrupts, system calls, exceptions, virtual memory and a read-only file system.Supported a range of devices including keyboard, mouse, sound card, serial port, RTC, PIT, network card and VGA.Developed some basic graphics functionality including high-resolution image display.	
TCP based on UDP · [Link] <i>C++, TCP & UDP Protocols, UNIX Network Programming</i>	Oct. 2021
<ul style="list-style-type: none">Implemented TCP protocol for reliable data transmission using C++ UDP socket.Achieved precise simulation of TCP congestion control, which contains slow start, fast recovery and congestion avoidance states that tolerate packet delays and losses in data transmission.Reached bandwidth fairness between concurrent TCP connections, meaning that the implementation can utilize $\pm 50\%$ of the bandwidth of a real TCP connection in the worst case.	
FPGA-Based 3D Graphics Renderer · [Link] <i>SystemVerilog, Graphics Pipeline, Parallel Architecture, Hardware System Design</i>	Dec. 2020
<ul style="list-style-type: none">Designed and implemented a basic real-time graphics pipeline on FPGA that renders 3D objects through Model View Projection transformation, viewport triangle clipping and rasterization.Achieved high-performance real-time rendering with smooth and stable 60FPS by efficiently utilizing numerous on-chip resources such as SRAM, DRAM, NIOS core, with the frame buffer and parallel hardware design.Developed smooth interactive interface with the position of the camera and the rotation of the object in control.	
Monte Carlo Ray Tracing Renderer · [Link] <i>C++, Physically Based Rendering, Graphics, Parallel Computing</i>	Dec. 2020
<ul style="list-style-type: none">Implemented a Monte Carlo ray tracer capable of rendering high-quality realistic images, with support for microfacet materials.Used a series of methods such as BVH tree data structure, thread pool, etc. to optimize and accelerate the rendering, improved the rendering speed of nearly %70.	

TEACHING EXPERIENCE

MATH 286 Intro to Differential Equation Plus · Teaching Assistant

Instructor: Thomas Honold

Jan. 2022 – May. 2022

ZJU-UIUC Institute

MATH 241 Calculus III · Teaching Assistant

Instructor: Thomas Honold

Sept. 2020 – Jan. 2021

ZJU-UIUC Institute

SKILLS

Programming Languages: C/C++, Python, Javascript/HTML/CSS, x86-asm, MATLAB, SystemVerilog(FPGA), Shell

Tools: CUDA, OpenGL, FFmpeg, NumPy, CMake, Git, Docker, L^AT_EX