Tony Yiding Tian

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Education

University of Pennsylvania - School of Engineering and Applied Sciences Philadelphia, PA

Bachelor of Engineering in Computer Engineering *May 2027*

Master of Engineering in Computer Graphics and Game Technology *May 2027*

- Grade/Credit: GPA 3.74 / 26 Credit Hours
- Relevant Courses: GPU Programming, Advanced Rendering, Interactive Computer Graphics, Operating Systems Design & Implementation, Data Structure & Algorithm, Embedded Systems, Electrical Circuits & Systems

Experience

Learning Directed Operating System (LDOS), Researcher May 2025 – Present

Distributed Systems Laboratory at UPenn *Philadelphia, PA*

- Penn Undergraduate Research Mentorship (PURM) 2025 Scholarship awardee, student of Prof. Sebastian Angel.
- Developed eBPF-based kernel monitoring tools collecting real-time TCP networking metrics across 5+ workload types including iperf3 and Redis benchmarks
- Built data analysis pipeline processing 10,000+ TCP state transitions per second, identifying performance bottlenecks in kernel networking policies
- Contributed to open-source KernMLOps repository with 2000+ lines of C and Python code for kernel probing infrastructure

Social Media Mobile App Feature Researcher & Designer Jan 2025 – May 2025

YesTech, Corp. *Remote*

- Worked in user-centric team of the startup company to develop a social media app Best Friends Network.
- Researched and designed Friendship Portal, a core feature of the app that encourages friends to share their moods.
- Tested various app features, designed and distributed surveys, and provided constructive feedback to developers.

Guest Service Attendant May 2024 – Aug 2025

Residential and Hospitality Services at UPenn *Philadelphia, PA*

- Facilitated the move-in of 1000+ high school students over the summers.
- Managed important access credentials of the building for residents and facility workers.
- Distributed essential college house resources to residents in need (temporary credentials, carts, linens).
- Communicated frequently with residents including minors, delivering excellent customer service to the guests.

Genshin Impact, Quality Inspector Dec 2022 – Oct 2023

miHoYo *Remote*

- Participated in the open-world mobile role-play game Genshin Impact's beta tests before the release of each major update every 6 weeks.
- Quality assurance of the game's product: characters eligible of in-game purchases. Provided thorough assessment of 20+ characters' performance and design before their release, each character harnessing over $1M of sales profit.
- Tested the open-world experience of combats and puzzles in the game. Discovered and reported bugs in gameplay.

Projects

Monte Carlo Path Tracer & Real-Time PBR Renderer | *C++, GLSL* Jan 2025 – May 2025

- Implemented Monte Carlo path tracer supporting Cornell Box, glass refraction, microfacet materials, and environment mapping with 60+ FPS real-time performance
- Developed physically-based rendering (PBR) shader pipeline with albedo/metallic/roughness maps achieving real-time ray tracing on modern GPUs
- Engineered custom BRDF models for materials including chrome, plastic, and complex surface properties
- Demo: https://github.com/tonytgrt/render-demo

T&T Slots - Sense the Win | *ATMega328PB, SPO2 Sensor, I2C, Embedded C* Mar 2025 – May 2025

- Built an electronic slot machine that takes into account the player's heart rate to adjust the probability of winning, developing core software features:
- Graphical gameplay GUI on a LCD display connected to the Microchip ATMega328PB, developed the graphical library for the embedded system.
- Communication of the MAX30102 SPO2 heart rate sensor using I2C, developed an sensor-specific I2C library.
- Sound effects via a buzzer using PWM digital output.

- Links: Project Website Github repo

PennOS - UNIX-like Operating System | *C, Make, GDB* Mar 2025 – May 2025

- Architected and implemented a complete user-level operating system in C with team of 4, featuring 8000+ lines of systems code with full process lifecycle management
- Designed Process Control Block (PCB) data structure managing 50+ concurrent processes with metadata including PID allocation, priority levels, parent-child relationships, signal handling, and user/kernel stack management
- Implemented preemptive multi-level priority scheduler supporting 3 priority levels with Round Robin time-slicing (10ms quantum), preventing starvation through priority aging and achieving 95% CPU utilization
- Built POSIX-compliant interactive shell supporting 15+ built-in commands (ps, kill, jobs, fg/bg), I/O redirection, pipeline chaining, and batch script execution with robust error handling
- Developed comprehensive system call interface including p_spawn(), p_wait(), p_sleep(), signal delivery (SIGTERM, SIGSTOP, SIGCONT), and file I/O wrappers with proper resource cleanup and zombie process reaping
- Implemented job control and signal handling system supporting background process management and graceful process termination across parent-child hierarchies

Mini Minecraft - Voxel-based 3D Game | *C++, OpenGL, Qt, GLSL* Oct 2024 – Dec 2024

- Collaborated in team of 3 to develop fully-featured voxel game engine in C++ using OpenGL 4.1, generating infinite worlds with 1M+ blocks and maintaining 60+ FPS performance
- Engineered procedural terrain generation system using layered 2D/3D Perlin noise algorithms, creating 5 distinct biomes (Grassland, Mountain, Desert, Islands, Caves) with biome-specific block distributions and procedurally placed vegetation assets
- Implemented post-processing rendering pipeline with custom GLSL fragment shaders, featuring dynamic underwater/lava distortion effects using UV coordinate manipulation and real-time crosshair overlay rendering
- Developed dual physics simulation system: gravity-based collision detection with terrain for ground movement, and buoyancy calculations for water/lava interaction, plus creative fly-mode with 6-DOF movement
- Built efficient chunk-based world management system with frustum culling and LOD optimization, reducing draw calls by 80% through face culling of adjacent blocks
- Implemented real-time block manipulation (mining/placing) with ray-casting intersection testing and immediate mesh updates, supporting 16 different block types with unique textures and properties
- Project demo showcasing all features: https://youtu.be/jRb4EHV5KQI

TremorChecker | *Python, Raspberry Pi, Microchip MGC* Jan 2021 – Jun 2023

- Designed and built a Parkinson's disease early screening device that calculates human hand's tremor frequency by creating an electrostatic field to detect the electric potential change.
- Implemented the PD screening device with Microchip MGC3030 sensor and Raspberry Pi 4b developing board.
- Used Python to write the software that manages the data input and report file output of the device.
- Conducted experiments with PD patients and performed screening to 50+ local residents in Shenzhen.
- Obtained utility patent in China and participated in the 2023 International Science and Engineering Fair (ISEF).

Technical Skills

Programming Languages: C/C++, CUDA, GLSL, Python, Java, eBPF, Assembly, JavaScript, LATEX
Graphics & Rendering: OpenGL, DirectX, Real-time Ray Tracing, Path Tracing, PBR, Procedural Generation
Systems & Tools: Linux Kernel Development, Docker, Qt, Git, CMake, Embedded Systems, TCP/IP
Frameworks & APIs: Qt, Raspberry Pi, ATMega, VMware, CloudLab, Jupyter Notebook