ANNIE QIU

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EDUCATION

University of Pennsylvania **Philadelphia, PA**
Master of Science in Engineering, Computer Graphics & Game Technology (M.S.) May 2025

- Cumulative GPA: 3.97/4.00

University of Rochester **Rochester, NY**
Bachelor of Science in Computer Science (B.S.) May 2023

- Overall GPA: 3.81/4.00

Courses: Computer Graphics, Advanced Rendering, Computer Animation, Production Pipeline, 3D Modeling, GPU Programming And Architecture, Game Design Practicum (Unity, Unreal, VR), Human Computer Interaction, Mobile App Development, Computer Organization, Computation & Formal System

SKILLS & SOFTWARE

Programming Languages & APIs :C++, C#, Python, Java, Swift, TypeScript, MEL, GLSL, CUDA, WebGPU, Vulkan, OpenUSD, SQL (MySQL)
Graphics & Game Engines: Unity, Unreal Engine, OpenGL, WebGPU, Vulkan
DCC Tools & Plugins: Houdini, Maya, Qt Creator
Data & Backend: MongoDB, MySQL

PROJECTS

Eclipse of Domain - Unreal Engine / Blueprint / Shader Debugging/ Level Design

- Built a third-person horror game with dynamic lighting mechanics to define visual tone and atmosphere.
- Designed levels, environmental settings, trap, lighting and post-processing shaders for the immersive gameplay.

VR Cooking Game – Unreal Engine/ Blueprint, VR

- Prototyped a hibachi VR cooking game in Unreal, with hand-based tracked interaction, physics-driven cooking actions, modular order validation, and interactive VFX.
- Enhanced player immersion by refining hand-object physics and adding responsive visual/audio feedback.

Procedural City Generator Plugin- Houdini/ Unreal Engine/ Substance Designer

- Created customizable procedural cyberpunk city generators in a 3-person team, reducing manual setup time by 70%.
- Enabled dynamic texture swapping and city generation using PDG and Houdini, and integrated into Unreal Engine.

Mini Minecraft - C++/ GLSL/ OpenGL/ Qt Creator

- Built a Minecraft-like game with **procedural terrain generation**, **post shader, user interface,** and **player mechanics** with OpenGL.

CUDA Path Tracer - C++/ CUDA

- Developed a GPU path tracer with **stream compaction** and **material binning**, achieving **~55% higher ray throughput**.
- Optimized **memory access patterns** and **warp coherence** to reduce divergence and improve GPU occupancy.

WebGPU Deferred Rendering - C++/ WEBGPU

- Implemented Naive, Forward+, and Clustered Deferred rendering pipelines with tile- and cluster-based light culling.
- Achieved 165 FPS with 500+ dynamic lights by optimizing fragment shader memory layout and light indexing structure.

Vulkan Grass - C++/Vulkan

- Implemented a real-time grass rendering system leveraging frustum, distance, and orientation culling to minimize overdraw.
- Improved frame stability by optimizing draw call batching and GPU instancing within the Vulkan rendering pipeline.

Stylization Shading - Unity

- Designed a stylization pipeline with rim lighting, edge glow, brush outlines, and paper-texture post FX.
- Exposed tunable material parameters for rapid style iteration by artists.

USD Asset Library - Universal Scene Description (USD)/ Python/ Houdini/ MongoDB/ Solaris

- Collaborated with a 15-person team to develop a USD-based 3D asset library supporting asset browsing, versioned import, export, and real-time collaboration in a film/game production pipeline.
- Built a **Houdini**-based pipeline to procedurally generate and process USD assets, including automated LOD creation and material assignment via Poly-Reduce scripting, then stored them into the centralized asset library for scalable reuse.

Floating Bubble Plugin - C++/ Houdini/ Maya/ MEL

- Developed a SIGGRAPH-inspired plugin to simulate realistic fluid-bubble interactions in Maya
- Provided real-time parameter controls for procedural generation of bubble dynamics.

L-System Plugin - C++/ Python/ Houdini/ Maya/ MEL

- Created a Maya plugin for procedural branch/flower generation using L-system rules and custom UI.

Behavior Animation Simulator - C++/ Unity

- Implemented **behavior-based** controllers for characters used in games and animation, with six individual behaviors, three group behaviors, and two combined behaviors.

Post-Processing & Procedural Shaders – C++ / OpenGL / GLSL / Qt

- Implemented real-time rendering effects including Blinn-Phong and matcap shading, Sobel edge detection, Gaussian blur, and noise-driven surface and post-process deformations using Perlin, Worley, and FBM noise.

Signed Distance Fields and Subsurface Scattering - C++/ Qt Creator/ OpenGL/ GLSL

- Built a real-time raymarching shader supporting SDF-based geometry and subsurface scattering for translucent materials.
- Implemented physically based lighting and procedural shape generation with adjustable roughness and metallic parameters.

PUBLICATIONS

X. Zhou, Y. Zhou, Y. Gong, Z. Cai, A. Qiu, Q. Xiao, A. N. Antle, and Z. Bai. 2024. "Bee and I need diversity!" Break Filter Bubbles in Recommendation Systems through Embodied AI Learning. 23rd Annual ACM Interaction Design and Children Conference (IDC '24). Association for Computing Machinery, 44–61. https://doi.org/10.1145/3628516.3655802

EXPERIENCES

University of Pennsylvania School of Engineering **Philadelphia, PA**

Teaching Assistant: Advanced Computer Graphics And Animation Jan 2025 - May 2025

- Assisted students **with C++ coding, Maya, and Houdini plugin** assignments, and updated homework structures to improve the effectiveness of course materials.

University of Rochester School of Engineering **Rochester, NY**

Developer Group Leader April 2022 - June 2024

- Collaborated with a Ph.D. student to develop a **VR game** teaching K-12 students about robotic arm mechanics, using **Unity, C#, Oculus and VRTK4**.

University of Rochester School of Engineering **Rochester, NY**

Researcher & Developer April 2022 - March 2024

- Developed an **AR application** to teach K-12 students Artificial Intelligence concepts, using **Unity, C#** and **ARKit**.
- Conducted the user studies and analyzed data from users to generate AR for Machine Learning discovery.