Shuyang Zhang

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Education

University of Southern California (USC), Los Angles, US — Aug. 2023 – Present

M. S. in Computer Science Game Development (CSGD), expected May 2025

- Game Engine Development(A), 3D Graphics and Rendering, Computer Animation and Simulation, 3D Vision, Geometric Shape Modeling

Beijing Jiao Tong University(BJTU), Beijing, China — Sep. 2019 – Jun. 2023

B.S. in Software Engineering (SE)

Skills

- Programming Languages: C/C++(primary use), Python, C#, JavaScript, TypeScript, Java, Shell, SQL
- Graphics Libraries and Languages: OpenGL, DirectX12, WebGPU, GLSL, HLSL, Shaderlab, WGSL
- Game Engines and DCC Tools: Unity, UE5, Blender, Maya
- Operation Systems and Clouds: Linux, Git, AWS, Azure DevOps, Docker, Kubernetes
- Frameworks: Vue.js, Quaser, React, Django, FastAPI

Projects

WebVHuman code — Dec. 2023 - Jan. 2024

Advanced web facial renderer by WebGPU

- Real-time **subsurface scattering(SSS)** using Diffusion profile that introduced by Jensen et al. 2001 and Donner and Jensen 2005. Using **separate passes** to generate gaussian blurred irradiance textures and calculate the diffusion color.
- Implemented **microfacet BRDF** using Kelemen and Szirmay-Kalos model that compatible for poor performance computers.
- Using Real-time shadow mapping and PCF to enhance quality.

D3DRT code — Oct. 2023 - Nov. 2023

Implement rasterazation and raytracing renderer using DX12, DXR pipelines

- Implement rasterazation and raytracing renderers to render scene, and switch renderer in runtime.
- rasterazation renderer implement Blinn-Phong and Disney Principled material pipeline.
- Raytracing renderer implement **Disney Principle BRDF**, monte carlo integration.
- Implement **multiple important sampling** on Principled BRDF layers.
- dynamically adjust model's params by imgui.
- Using low discrepancy sampler **Sobol** to generate random number.

Volcan code — Oct. 2023

Minecraft shader based on Optifine and OpenGL.

- Implemented **PCSS** for real-time shadow
- Implemented **Blooming** by gauss blur and mipmap
- Implemented water reflection by **Screen space raytracing**

EdenRenderer code — Aug. 2023 - Sep. 2023

Software Renderer implemented by C++

- Implemented rasterization pipeline including space transformation, depth testing, frustum culling, barycentric interpolation.
- Support **model and texture loading** using assimp, stb lib
- Implement **Blinn-Phong lighting model**, using **normal map** to improve quality

PrimeEngine-Dev Aug. 2023 - Dec. 2023

Develop features in Prof. Artjoms Kovalovs's low-level game engine PrimeEngine

- Implement bounding box and camera culling
- Implement collision detection for moving objects
- Implement particle emitter with params adjustable in runtime

Experience

UIS Intelligence Software Laboratory (BJTU) Nov. 2022 – Mar. 2023

Research Assistant (Intern)

- Establish a VR music **game prototype** using Unreal Engine 5 and design user guidance for HCI research, including 3D modeling by Blender, collision detection, controller mapping etc. Tested by Oculus Quest 2.
- Conduct experiment for studying the impact of different **user guidance** on user experience and learning rate in virtual reality environments.
- Analyze experiment data and build up machine learning model to predict the best game guidance mode for different types of people.

Microsoft (Beijing) Co., Ltd. Jun. 2022 – Nov. 2022

Software Development Engineer Intern AI Platform department

- Optimize the Machine Learning container creation process by asynchronous check and increase the creation speed by 60%
- Maintain Azure cloud platform backend by C# and enhance scalability and reliability.
- Migrate a backend microservice by Docker and Kubernetes, meet more production requirements.

Honors & Rewards

- 1st Prize, The 15th National Student Software Innovation Competition
- 2nd Prize, The Contemporary Undergraduate Mathematical Contest in Modeling(CUMCM)