KARIM SAYED

Graphics Rendering Engineer

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SUMMARY

An Egyptian rendering engineer with a robust foundation in computer science and software engineering. Immensely passionate about realistic graphics and taking on intricate challenges and exploring the limits of computer 3D graphics and game engine technology.

EXPERIENCE

Owner, Private Fork of The Cherno's Hazel Engine ***October 2023 - Present***

- Engineered a ray tracer leveraging the Vulkan's hardware-accelerated ray tracing pipeline.
- Incorporated NVIDIA RTX Global Illumination (RTXGI) to facilitate dynamic and fast global illumination.
- Devised a physically-based path tracer to generate realistic graphics, improving cinematic rendering quality.
- Utilized Block Compression (BCn) formats coupled with caching to optimize memory usage.
- Implemented Vulkan bindless descriptors, enhancing flexibility, efficiency and performance.

Independent Contractor, Sensor Foundries Inc. ***May 2022 - Present***

- Transitioned numerous features from Vulkan-based Hazel to the OpenGL-based Tensor.
- Implemented Planar Reflections, significantly improving reflection quality in rendered scenes.
- Integrated Linearly Transformed Cosines (LTC) area lights, improving lighting effects and visual appeal.
- Introduced Weighted Blended Order-Independent Transparency (WBOIT), enhancing transparency rendering.
- Utilized Atlas-Based Shadow Maps, improving shadow mapping efficiency.

Contributor, The Cherno's Hazel Engine ***March 2021 - April 2022***

- Developed a Forward+ Renderer to enhance lighting performance. (Watch: youtu.be/e0YTiO0Ur4o)
- Integrated Screen Space Reflections (SSR), utilizing cone tracing for rough reflections.
- Introduced Horizon-Based Ambient Occlusion (HBAO) for improved visual depth.
- Integrated Ground Truth Ambient Occlusion (GTAO), a substantial enhancement over HBAO.
- Implemented Percentage-Closer Soft Shadows (PCSS) tailored for point/spot lights.

SKILLS

Practical Knowledge:

- Background in **computer graphics** with a focus on bleeding-edge rendering techniques.
- Skilled in **multi-threading** and **data structures**, crucial for high-performance software development.
- Solid background of mathematical concepts like **linear algebra** and **trigonometry**.
- Familiar with **algorithm** and **memory optimization techniques**.
- Knowledgeable in **architecture optimization** and **data-oriented programming**, leveraging **data structures**.

Programming Languages:

- Proficient in **modern C++**, with skills in **Intel x86 Assembly**.
- Experienced in crafting shaders with **GLSL** and **HLSL**, proficient in **profiling** and **bottleneck identification**.
- Understanding of **SIMD** and **intrinsic functions** for efficient computation.

Software Tools:

- Proficient in using and optimizing **Vulkan** and **OpenGL** Graphics APIs.
- Familiar with rendering systems in **Unreal Engine**, **Unity Engine**, and **Godot Engine**.
- Experience in using **Visual Studio**, **NVIDIA Nsight**, **PIX**, and **RenderDoc**.
- Capable of creating 3D models using industry-standard tools like **Autodesk Maya** and **Blender**.

Education

Multimedia University in Malaysia ***July 2018 - July 2021***

Bachelor of Computer Science, Specializing in Software Engineering.
GPA: 3.11