Erfan Momeni

Graphics Engineer

Summary

Graphics and systems software engineer focused on performance-sensitive C++ rendering. Builds real-time graphics systems for desktop and mobile GPUs, with experience in GPU resources, synchronization, shaders, profiling, and platform integration. Developed distributed VR and Vulkan path-tracing systems.

Experience

Unikie **Dec 2024 - Present**
Graphics Engineer

- Develop and optimize rendering features in a production C++ engine for Android and mobile GPUs using Vulkan, OpenGL ES, and GLSL.
- Implement volumetric clouds, super-resolution, compute-based particles, and Vulkan ray-tracing features.
- Diagnose GPU performance, synchronization, resource-binding, and shader issues with RenderDoc, Nsight Graphics, and vendor tools.

Tampere University **Sep 2022 - Dec 2024**
Research Assistant

- Master's thesis: built a distributed VR system that rendered path-traced stereo frames on a remote Vulkan server and streamed them to a standalone headset.
- Integrated OpenXR/Monado tracking, NVENC HEVC encoding, UDP transport, Android decoding, and headset presentation; profiled the complete pipeline at up to 60 FPS.

Selected Projects

Vulkan Path Tracer **Private Project**
Physically Based Renderer *C++, Vulkan Ray Tracing, GLSL*

- Developing a Vulkan GPU path tracer with acceleration structures, programmable ray-tracing shaders, image accumulation, and physically based glTF materials.
- Implemented BRDF importance sampling, direct-light sampling, and next-event estimation; use RenderDoc and Nsight Graphics to debug and profile GPU execution.

Syndra **GitHub**
3D Engine / Renderer *C++, Vulkan, OpenGL*

- Built a real-time 3D engine with Vulkan and OpenGL backends, deferred PBR rendering, image-based lighting, shadow mapping, post-processing, and glTF scene import.
- Developed supporting engine and editor systems including an ImGui interface, ECS-based scene management, and YAML serialization.

glTF Research Scenes **GitHub**
Graphics Research Scene Pipeline *Python, glTF 2.0, PBRT*

- Created and validated glTF 2.0 versions of common graphics research scenes with a Python PBRT-to-glTF conversion pipeline.

Skills

Languages: C++, C, GLSL, Python

Graphics & XR: Vulkan, OpenXR, Monado, OpenGL, OpenGL ES, Vulkan Ray Tracing

Systems & Platforms: Linux, Android, CMake, low-latency rendering, hardware video encoding, networked rendering, GPU synchronization

Performance & Debugging: RenderDoc, Nsight Graphics, GPU profiling, shader debugging, CPU-GPU synchronization analysis

Rendering: Physically based rendering, rasterization, ray tracing, path tracing, volumetric rendering, compute shaders

Education

Tampere University **2022 - 2024**
M.Sc. in Computing Sciences, Signal Processing and Machine Learning

K. N. Toosi University of Technology **2016 - 2021**
B.Sc. in Computer Engineering