

# KARIM MOHAMED

## GRAPHICS / ENGINE PROGRAMMER

Riyadh, Saudi Arabia | +966573166308 | [Email](#) | [Portfolio Website](#) | [GitHub Account](#) | [LinkedIn Account](#)

## EXPERIENCE

---

### Graphics Programmer, The Forge Interactive Inc. (Remote)

April 2024 - July 2024

- Maintained the cross-platform framework for PlayStation, Xbox, Switch and other gaming platforms.
- Upgraded software ray-traced shadows to hardware-accelerated ray-traced shadows.
- Worked with platform-specific graphics debuggers, learning troubleshooting and optimization techniques.
- Worked on the internal testing of the framework, improving testability and stability.

### Graphics Programmer, Sensor Foundries Inc. (Remote)

May 2022 - April 2024

- Transitioned numerous features from Vulkan-based Hazel to the OpenGL-based software.
- 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.

### Rendering Engineer Contributor, Studio Chernobyl (Remote)

March 2021 - April 2022

- Developed a Forward+ Renderer to enhance lighting performance. (Watch: [youtu.be/e0YTIOUr4o](https://youtu.be/e0YTIOUr4o))
- Implemented Screen Space Reflections (SSR), utilizing cone tracing for rough reflections.
- Integrated Ground Truth Ambient Occlusion (GTAO), leading to more realistic ambient lighting.
- Introduced Horizon-Based Ambient Occlusion (HBAO) for improved visual depth.
- Implemented Percentage-Closer Soft Shadows (PCSS) tailored for point/spot lights.

## PERSONAL PROJECT

---

### Beyond Engine: A custom extension of Hazel Engine.

October 2023 - Present

- Integrated NVIDIA DLSS, enabling higher performance and visual quality through AI upscaling techniques.
- Optimized CPU code using multiple techniques, including shader metadata caching and reading, reducing load times from 8s to 5s.
- Engineered a custom ray tracer using Vulkan's hardware-accelerated ray tracing pipeline.
- Integrated NVIDIA RTX Global Illumination (RTXGI) to enable real-time dynamic global illumination.
- Designed a physically-based path tracer to improve rendering quality for cinematic scenes.
- Optimized memory usage with Block Compression (BCn) formats and caching strategies using DDS to store all LODs.
- Optimized compilation times by reducing header parsing counts, cutting compilation time from 75s to 60s on an i5 13600KF.
- Enhanced rendering performance and flexibility using bindless descriptors.
- Optimized resource descriptor processing by implementing a bit-manipulated hashmap, reducing times from 1ms to 0.02ms.

## SKILLS AND EXPERTISE

---

### Programming & Rendering:

- Proficient in **C++**, **Intel x86 Assembly**, **GLSL** and **HLSL**.
- Experienced with tools and pipelines like **Premake**, **CMake**, **Git**, **Jenkins (CI/CD)**.
- Extensively experienced in **Vulkan** and **OpenGL**, focusing on real-time rendering and **optimization**.
- Skilled in **shader programming**, **ray tracing**, and advanced **post-processing techniques**.
- Experienced in **multi-threading**, **SIMD**, and modern C++ features.

### Tools & Engines:

- Experienced in game engines like: **Unreal Engine**, **Unity Engine**, and **Godot Engine**.
- Skilled in **performance analysis** and **graphics debugging** tools like: **VTune Profiler**, **NVIDIA Nsight**, **PIX**, **Razor**, and **RenderDoc**.
- Skilled in **Autodesk Maya** and **Blender** for **3D modeling**.

## EDUCATION

---

[Multimedia University in Malaysia](#)

Bachelor's degree in Computer Science (Hons.) - Software Engineering Specialisation.

GPA: 3.11

July 2018 - July 2021