ARPIT SHARMA

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EDUCATION

MS in Game Programming, DePaul University, Chicago, IL **3.98/4.0** Nov 2022
BS in Computer Science Engineering, Kurukshetra University, Haryana, India **3.81/4.0** May 2017

TECHNICAL SKILLS

- *Software:* Unity3D, Unreal, MS Visual Studio, VSCode, RenderDoc
- *Languages:* C, *Optimized Multi-threaded* C++, C#, GLSL, HLSL
- *Others:* GitHub, SourceTree, Perforce, Photoshop, Aseprite
- *Libraries:* OpenGL, DirectX11, Google Proto-buffers, GL3W, Box2D, Windows API, Lidgren
- *Software Development:* Agile, Lean, Kanban

ACADEMIC PROJECTS

Game Engine Development (C++| OpenGL| GLSL| GL3W| Win32| Google-ProtoBuffers| SIMD) Sept 2021 – June 2022

OpenGL game engine we worked on over several quarters, iteratively adding new functionalities.

*Libraries created***:**

Math:

- A Math library for Trigonometry (for double precision avoidance), Vectors and Matrices operations.
- Optimized for performance using SIMD, proxy technique and return value optimization.

Memory System:

- Developed a Heap based Memory Allocator for efficient allocation memory management.
- Overloaded new and delete for memory assignment and cleaning up.
- Support for tracking the memory usage and leaks.

Data structures and File System:

- Static libraries for PCS (Parent-Child-Sibling) Tree and Pooled Double Linked List, both with iterators.
- File system to write and read files using Win32 library.

Functionalities:

- 3D models in multiple shading styles (Lit, flat, wireframe etc.),
- Included primitive shapes (Sphere, Cube, Pyramid) in Engine.
- 2D sprites and UI text with multiple camera rendering support.
- Collision detection for frustum culling.
- Developed CMD-line tool to convert .glb files to custom proto buffer files.
- Animated skinned 3D models on GPU using Compute shaders.
- Transitioning smoothly between skinned animations on GPU as well.

Particle Research (C++| OpenGL| GLSL| GL3W) Summer 2022

A flexible particle system API added to my game engine.

- Researched particle system features to implement.
- Large frame delta compensation calculation
- Extensible code with clean architecture.
- Sub-particle emitter support.

C++ Performance Optimization (C++| SIMD) Winter 2021

Optimized a particle system with 15,000 particles by **7**x faster frame times.

- Updated data alignments and structures for improved caching and memory usage.
- Optimized Math library using SIMD instruction set for Vectors and Matrix Math.
- Avoided unnecessary memory allocations during game loop and general logic improvements.
- Implemented Load-in-Place for cache and data initialization improvements.

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DirectX3D 11 Graphics Library (C++| DX3D11| HLSL) Winter 2022

A 3D graphics Engine API wrapping DX11 + HLSL with a runtime illuminated Demo scene.

Functionalities:

- Needed HLSL Shaders: Flat color, Textured, Lit, Toon etc.
- In-built primitive 3D models: Plane, Sphere, Cube, Cylinder and Cone.
- Runtime terrain generation using height map.
- Dynamic Phong lighting with multi-lights support.
- A mirror effect using multi pass rendering, and fog effect.

Multi-Threaded Programming (C++| XAudio2) Spring 2021

Implemented an Audio Engine within an existing 3D graphics Engine using Microsoft's low level XAudio2 API.

Functionalities:

- Data driven inter-thread queue-based communication.
- Play, Pause, Volume controls, stereo Panning, playlist creation.
- 5 concurrent threads used: Game, File, Playback, Callback, and XAudio2.
- Priority System, Async file loading, and Custom callback support.

WORK EXPERIENCE

DOGS (DePaul Original Games Studio), DePaul Center, Chicago, IL Jan – Nov 2022

Unreal Game Programmer, Graduate Assistant

Project Yesterlandia*:* Unreal 5 Engine *Team Size:* 6-10 *Role*: System Programmer

Description: Worked closely with designers to develop tools and systems for a 3D RTS Turn based Unreal game Project.

- Spline based map path creation tool,
- Objective System state machine tool with parallel quests support using LogicDriver Pro,
- ARCore image recognition prototype using ARCore,
- And character abilities using Gameplay Ability System (GAS).

Innotical Solutions May 2018 – July 2019

Unity XR/Game Developer

- Successfully published 4 mobile games with close to no supervision.
- Developed prototypes mechanics (including AR/VR) for company portfolio.
- Maintained the code along with proper documentation using Doxygen.

My Favorite project there out of many:

Shuffle: The Mobile Deck*:* Unity3D Android App. *Team Size:* 3 *Role*: Game Programmer

Description: Shuffle is a deck of cards simulator that runs both Local-online and offline. Used math to procedurally animate the cards. Despite the small team, we achieved 1k+ downloads.

PERSONAL PROJECT

Modular Bars: Unity3D Tool *Team Size:* 1

Description: A powerful UI Tool for designers to create modular progress bars right from Unity Editor. The tool is available on the Unity Asset Store.

EXTRACURRICULAR ACTIVITIES

- Board member at DePaul Game Dev Club (DGDC) for Chicago Game developers.
- Published my own progress bars UI tool on Unity Asset store as lockdown project.
- Participated in multiple Game Jams, check ArcAid.Itch.io to try some games.
- Have played/finished abundant video games of different genres.