Amarnath Murugan

Graphics Programmer
Mail | Portfolio | LinkedIn | Github | Demoreel

EDUCATION

MS in Computing, Graphics & Visualization track — **Aug 2022 - May 2024**
University of Utah — *Salt Lake City, Utah, USA*
3.976/4.0 GPA | Graduated through a research project on 3D Modelling

Bachelor of Technology in Computer Science Engineering — **Jul 2015 - May 2019**
SRM Institute of Science & Technology — *Kattankulathur, India*
Admitted with a 50% merit scholarship | Graduated with an overall score of 89%

SKILLS

Skillset: Graphics Programming, Game Development, GPGPU, HCI, 3D Art workflow | **Programming**: C++, C#, Python, Julia
Libraries: OpenGL, CUDA, PyTorch, OpenMP | **Software**: Unity, Unreal, RenderDoc, NSight Compute, NSight Systems

WORK EXPERIENCE

Graphics Programmer — **Jul 2024 – Present**
Marmoset — *Salt Lake City, Utah, USA (Remote)*

Research Assistant — **Aug 2023 – May 2024**
Realistic Computer Graphics Lab, University of Utah — *Salt Lake City, Utah, USA*

- Working with Dr. Cem Yuksel on a research project for making 3D modelling easier
- Implemented geometry picking and manipulation features on a custom OpenGL/C++ engine
- Implemented sculpting using compute shaders that directly manipulate vertex buffers in the GPU

Research Assistant — **Jan 2023 – July 2023**
High-Performance Computing Research Lab, University of Utah — *Salt Lake City, Utah, USA*

- Implemented the SUMMA algorithm in Julia for distributed large tensor contractions
- Ported a finite-volume simulation CPU subroutine to GPU in Julia using CUDA. Reduced runtime from 8 s to 0.6 ms

Technical Director — **Aug 2021 – Dec 2021**
Manhole Collective — *Mumbai, India*

- Oversaw the production of the 3D animated short film 'Manhole', which was funded by and created in Unreal Engine
- Created shaders for toon shading, animated wetness on skin, sewage surface animation and rendering
- Wrote custom scripts for automating mocap retargeting and adding buoyancy to a third-party fluid sim plugin
- Managed project timeline and collaboration with third-party artists. Contributed to texturing, lighting, & prop animation

Research Assistant — **Aug 2019 – Jan 2022**
IMXD Lab, Indian Institute of Technology Bombay — *Mumbai, India*

- Worked on AR/VR HCI research projects. Published 1 paper, 5 posters and 2 demos at reputed ACM & IEEE conferences
- Developed applications for HoloLens, Oculus Quest, HTC Vive, and Android using Unity

Internships — **Dec 2016 – May 2019**

- Completed three internships related to AR/VR development using Unity at XR Labs, Merkel Haptic Systems & IMXD Lab

PROJECTS

Real-time Softbody Simulation — **Nov 2023**

- Implemented mass-spring systems that run at 60 fps with large timesteps using block coordinate descent & Newton's method

Hair Rendering & Simulation — **Apr 2023**

- Implemented three hair shading algorithms, i.e Kajiya-Kay, LUT-based Marschner, and Procedural Marschner
- Added collisions and strand-strand interactions to a discrete elastic rods simulation. Also improved anisotropic hair stability

Disk Parameterization & Remeshing — **Apr 2023**

- Implemented disk parameterization for genus-0 meshes and remeshing based on the paper "Interactive Geometry Remeshing"

Rendering & Animation Coursework — **Jan 2023 - Apr 2023**

- Developed an OpenGL renderer in C++ with Blinn-Phong shading, shadow mapping, reflections & rigidbody dynamics

Signed Distance Field (SDF) Shaders — **Jul 2020 - Apr 2021**

- Wrote raymarched SDF shaders to render the mandelbrot, the mandelbulb & the character 22 from Pixar's Soul [Link]

AWARDS

Third Place, Unreal India Shorts Program 2021 — **Dec 2021**

- Competed against renowned studios as an independent team to make an animated short film in 3 months. Won $15,000

First Place, Smart India Hackathon 2017 — **Apr 2017**

- Developed an AR/VR app for museums and won 100,000 Indian rupees, besting 52 teams comprising 230 participants