# AMARNATH MURUGAN
## GRAPHICS PROGRAMMER | RESEARCHER

## LINKS

Mail | Portfolio | LinkedIN | Github

## EDUCATION

**MS CS, Graphics & Viz Specilization**
University of Utah
*GPA: 4.0/4.0*
2022 - 2024

**B.Tech Computer Science & Engineering**
SRM Institute of Science & Technology
*89% Score | 50% Merit Scholarship*
2015 - 2019

## TECHNICAL SKILLS

### PROGRAMMING
C | C++ | C# | Python | Julia | GLSL

### SOFTWARES
Unity | Unreal | Substance Painter

### LIBRARIES
OpenGL | CUDA | PyTorch | Skimage | OpenMP | MPI

## SERVICE & TEACHING

**Graduate Teaching Assistant | Univ Utah**
*08/2022 - 12/2022*
TA for COMP1010 - Programming for all.

**Volunteer | SIGGRAPH RCDC**
*Since 02/2021*
Working towards establishing a
mentorship program for undergrads

**Student Ambassador | Unity**
*11/2017 - 06/2019*
Conducted events to democratize Game development among students

## AWARDS

**Manhole | 3rd, Unreal Shorts Challenge**
*12/2021*
Competed against renowned studios & filmmakers and won $15,000 [Link]

**Winner | Music Hack Day, Mumbai**
*12/2019*
Won best music hack for building a multi-user VR tool for music collaboration

**Winner | Smart India Hackathon '17**
*04/2017*
Won the World's largest Hackathon at the time for an AR/VR museum app

## COURSES

- CS6610 Interactive Computer Graphics
- CS6160 Computational Geometry
- CS6660 Physics-Based Animation
- CS6640 Image Processing
- CS6230 High Performance Computing
- CS6353 Deep Learning

## WORK EXPERIENCE

**Research Assistant | University of Utah**        *Since 01/2023*
Working on a GPU port of a Finite-Volume simulation. Reduced the runtime of a 8 second CPU-side subroutine to 600 µs using CUDA

**Technical Director | Manhole Collective**        *03/2020 - 01/2022*
Oversaw the creation of the real-time animated short-film 'Manhole', which was funded by and created in Unreal Engine. The film was screened at 5 film festivals including the prestigious *Annecy festival*

**Research Assistant | IMXD Lab, IIT Bombay**        *02/2019 - 01/2022*
Conducted research on narratives and novel interaction techniques for VR & AR. Produced 8 publications at international conferences

**Virtual Intern | Empathic Computing Lab**        *05/2021 - 08/2021*
Worked on compute shaders in Unity for editing volumetric videos

**Research Intern | IMXD Lab, IIT Bombay**        *06/2018 - 07/2018*
Conducted research on passively interactive live-action VR films

**Intern | Merkel Haptic Systems**        *06/2017 - 07/2017*
Implemented medical training and visualization demos in AR & VR

**Intern | XR Labs, Chennai**        *12/2016 - 01/2017*
Created remote monitoring and product viz demos for Hololens

## PROJECT HIGHLIGHTS

**Graphics Programming**        *Since 02/2020*
- Implementing an *OpenGL* renderer in *C++* that supports blinn shading,textures,shadows,environment mapping and tesselation.
- Worked on a discrete elastic rods based real-time hair system. implemtend Marschner's shading model, collisions with Rigidbodies using PBD and voxel-based strand-strand repulsion.
- Implemented remeshing using disk parameterization of 3D Models.
- Implemeted Ridigbody & Softbody dynamics in C++.
- Wrote a raytracer with support for dielectrics, non-uniform volumes, and Bounding Volume Hierarchy.
- Wrote raymarched shaders that uses SDFs to render fractals and a volumetric animated 22 from Pixar's Soul [Shadertoy]

**Deep PBR textures**        *11/2022 - 12/2022*
- Implemented three modified versions of the ResNet architecture to regress a lit image to diffuse, normal & roughness maps

**Manhole - Short Film**        *03/2020 - 01/2022*
- Implemented an animated wet & grimy look for a character model through *shaders* based on a technique from 'Last of Us 2'
- Wrote a script to automate retargeting of an hour of mocap data
- Implemented buoyancy on an interactive fluid simulation plugin by sampling density & velocity buffers while smoothing aliasing issues

## PUBLICATION HIGHLIGHTS

- *Murugan, A.,* Vanukuru, R.,& Pillai, J. Towards Avatars for Remote Communication Using Mobile Augmented Reality | IEEEVR'21
- Sakhardande, P., *Murugan, A.*, & Pillai, J. S. Exploring Effect of Different External Stimuli on Body Association in VR | IEEEVR'20
- Pillai, J. S., *Murugan, A.*, & Dev, A. Cinévoqué: Design of a Passively Responsive Framework for Seamless Evolution of Experiences in Immersive Live Action Movies | INTERACT'19

## SPEAKING ENGAGEMENT HIGHLIGHTS

**24 Hours of Chaos**        *09/2021*
Spoke on the development process of the film 'Manhole'

**Unite India**        *12/2018*
Spoke on 'Interest driven Cinematic VR' at Unity's national conference