

# VIRAJ SHIRODKAR

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## Education

### Master of Science, Game Science and Design

May 2023

Northeastern University, Boston (GPA 3.93/4.00)

Related coursework: Computer Graphics, Building Game Engines, Game AI

## Experience

### Associate Developer

Sept 2022 – Present

ReGame-XR Lab, Northeastern University, Boston, MA

- Worked primarily with **C++** and **C#** to develop research projects for **Bouvé College of Health Sciences** using **Unreal** and **Unity** game engines
- Implemented a **navigation subsystem** in **Unity Engine**, involving real-time geometry analysis, **A\* pathfinding**, and motion planning
- Integrated **Lab Streaming Layer protocol** using **Python** and **C#** scripts to capture data from **cadence** and **HRV** sensors with time-synchronization
- Reformed procedural code to use **object-oriented** programming techniques with abstraction for rehabilitation-focused research project
- Created visually appealing **gameplay** by implementing movement mechanics and particle system on prefabs and environments
- Built **gameplay HUD** elements and collaborated with audio engineers to program scripts for enhancing patient immersion and decision-making
- Managed team of 5 neurodivergent individuals in developing research-based games in collaboration with University of California, San Diego, and Ubisoft; provided support, technical mentorship, constructive feedback, and career development coaching

### Software Engineer Intern

Jun 2022 - Aug 2022

Age of Learning, Inc, Glendale, CA

- Employed **dependency injection framework** for the app landing page to bundle and deploy all assets to **increase memory performance**
- Implemented spine animation to move UI asset on application's map page by using **C# scripting** on **Unity** game engine
- Programmed sequential animation system for multiple UI buttons by utilizing **asynchronous programming** concepts, **interfaces**, and **events**
- Efficiently comprehended and modified/extended the source code to resolve long-standing backlogged bugs in a non-disruptive way
- Engaged in technical discussions and collaborated with design and quality assurance team to refine live features and get code merge ready
- Participated in **SCRUM** style development using **JIRA** and improved software engineering on-boarding process documentation on Confluence

### Research Assistant

Jan 2022 – Jun 2022

Virtual Reality Lab, Northeastern University, Boston, MA

- Designed and created training environments in **VR** using **C++** and **blueprint** scripting for **Massachusetts General Hospital**
- Used **Sparse Voxel Octrees** to create a navigation system for a 3D flight prototype game in **Unreal Engine 4**
- Optimized VR projects using algorithms like **Occlusion Culling** and **LODs**, improving the framerate by 10%
- Studied the art **pipeline** in the Unreal Engine with a focus on **texture**, **lighting**, materials and creating art assets while also utilizing **photogrammetry** tools and technologies to create environments and metahumans in **Unreal Engine 5**
- Created documentation and tutorials related for Unreal Engine and Unity game development, specifically focused on bug fixing and development on VR devices like **Meta Quest 2**, **Pico Neo 3**, **HTC Vive Pro** and integrating biometric devices like **Tobii Eye Tracker**, **EEG** and **GSR**

### Graduate Teaching Fellowship

Sept 2021 - Dec 2021

Northeastern University, Boston, MA

- Conducted in-person lectures, mentored, and graded 25 students for an undergraduate course of **HTML** and **CSS**

## Projects

### 2D GAME ENGINE

April 2022

- Created a 2D game engine using **C++**, **SDL2** with also using **Box2D** (open-source physics simulator)
- Built three games using the engine – Breakout clone, Platformer, and a Dungeon Crawler
- Engine can handle **physics**, **collisions**, **rendering** and **animations** while also having a **level editor** with an UI

### CLASH ROYALE CLONE AI

April 2022

- Developed a modular utility-based **AI** opponent for a clash royale clone using **behavior trees** and randomization with **leaf node**
- Implemented **A\* pathfinding algorithm** for the mobs with **steering behaviors** for mobility and collision avoidance

### 3D OBJECT MODEL PARSER

Nov 2021

- Parse and render .obj files with vertex, texture, and normal data with help of **3D math** using **C++** and **OpenGL**
- Rendered these models with **vertex** and **fragment shaders** using **GLSL**

## Publications

### Magic Mirror on the Wall: Reflecting the Realities of Lower Limb Rehabilitation in Virtual Reality

CHI 2022, New Orleans | IEEE ISMAR 2022, Singapore

- Based on medical research-oriented VR project for patient engagement with human movement and rehabilitation protocols

## Skills

Programming languages: C/C++, C#, Python, Java, HTML/CSS

Technologies: DirectX11/12, OpenGL, SDL2, Unity, Unreal Engine, Blender