Spencer Melnick

Software Engineer
1016 Hemlock Lane
Enola PA 17025

Email: smelnick97@gmail.com Portfolio: spencermelnick.net Github: spencer-melnick

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Skills

- ***Graphics Programming:*** Volumetric raymarching, 3D noise generation, Blinn-Phong shading, normal mapping, compute shader programming, post processing, general graphics pipeline, realtime fast-fourier transformations
- ***Mathematics:*** Linear algebra, vector mathematics, signal processing, collision detection
- ***Programming Languages:***
    - **Advanced:** C++, C, HLSL, GLSL
    - **Proficient:** Python, Java, Javascript, C#, HTML, CSS
- ***Development Tools:*** Visual Studio, GCC, GDB, CMake, Git
- ***APIs and Libraries:*** OpenGL, Vulkan, SDL, GLEW, STL
- ***Game Engines:*** Unreal Engine 4, Unity 3D, Godot
- ***General Programming:*** Data structures (linked lists, queues, stacks, object pools), multithreaded programming (Mutexes, condition variables, atomics, producer/consumer queues), network programming (replication, remote procedure calls, transport layer programming), object-oriented design

Projects

2020 **GPU Ocean Wave Simulation (Unreal Engine)**

Solo Developer

- Researched academic papers on various techniques for computing wave displacement data
- Researched different algorithms for fast-fourier transformations
- Developed proof-of-concept project in Python before porting to engine and compute shader code
- Analyzed complex engine code to utilize cutting-edge/undocumented Unreal Engine features
- Developed custom method for precomputing butterfly operations, while minimizing memory cost
- Parallelized algorithm to take full advantage of GPU processing power

2019 **Volumetric Cloud Renderer (Unity 3D)**

Solo Developer

- Studied technical presentations by developers to understand emerging rendering techniques
- Developed external plugin for 3D Perlin and Worley noise generation to improve iteration time
- Implemented volumetric raymarcher as a material shader in HLSL
- Created custom depth blend function to enable early exit on half/quarter resolution rendering

2020 **Global Game Jam 2020 Entry - Meritocracy Train (Unity 3D)**

Gameplay Programmer

- Worked with artists, musicians, designers, and programmers to determine minimal viable product
- Programmed main input system with keyboard and multiple gamepad support
- Developed platforming character dynamics with finely tuned collision resolution, acceleration, friction, variable air control, and jump extension to ensure core controls were fun and responsive
- Trained new team members on version control principles and resolved catastrophic merge failures

- Programmed state machines to drive character animation based on gameplay data

2019 **Global Game Jam 2019 Entry - Hearth (Godot Engine)**

Lead Programmer

- Programmed main character controls and core heat and health systems
- Programmed animations, particle effects, lighting effects, and sound effects
- Trained other programmers on how to develop games with the Godot Engine

2018 **Temple Robotics Frontend Mission Control Software (NASA Robotic Mining Competition)**

Lead Programmer

- Programmed simple OpenGL renderer for 3D visualization of telemetry data
- Created basic Blinn-Phong lighting system in GLSL
- Created custom .OBJ model importer
- Developed protocol for control and telemetry data with limited bandwidth on top of TCP/UDP
- Utilized multithreading to ensure other subsystems would not interfere with robot control
- Created cross-platform build process using CMake

Education

- 2015 - 2020 *BSE in Electrical Engineering (Computer Engineering Concentration)*
  Temple University

Professional Experience

- 2018 - 2019 *Undergraduate Research Assistant (C++ Programming)*
  Temple University Computer Science Department
  - Improved performance on algorithms by multithreading existing code and utilizing sparse data structures where appropriate