Kryštof Przeczek

CONTACT

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PROFILE

I am a well-rounded person and I take lots of pride in my ability to be trustworthy, level-headed and curious. I find myself able to pick up new skills quickly, and am eager to learn new things. I am most passionate about graphics-related projects, as it's a perfect marriage of all my interests - Computer Science, Maths, Physics and Art.

SKILLS

- Well-versed in C, C++, C#, GLSL and HLSL (both for rasterisation and compute tasks), Java and Python.
- Experience with OpenGL and Vulkan.
- Know how to use *git* for source control, and generally adept with the Unix terminal.
- Skilled with graphics-debugging tools: *RenderDoc*, *Xcode* and *Radeon Developer Suite*.
- Experience with the C# FNA library and other more high-level game engines like *Godot* and *GameMaker Studio 2* for creating games and smaller projects.

PROJECTS

Lilythorn
https://github.com/kryzp/lilythorn,
A physically-based rendering engine implemented via Vulkan and SDL3, using a hybrid forward/deferred clustered rendering system. Integrated Assimp for model loading, in addition to general resource management of textures, shaders, buffers, etc... which all ties into the material system. Has support for both point lights and directional lights, in addition to shadowmapping. Built a custom Vulkan abstraction layer to simplify resource handling, and utilized modern C++ standards to ensure maintainable, high-performance code for 3D graphics rendering. Also designed with cross-platform compatibility using MoltenVK on macOS in mind. Additionally, has other more specific features, such as GPGPU-driven particle systems, volumetrics, and realistic water based on the fourier series of real ocean waves.

Leviathan
https://github.com/kryzp/leviathan,
A framework for creating 2D games inspired by FNA/MonoGame, written in C++ using the SDL and OpenGL libraries. It features its own custom maths library and container implementations, and handles basic asset loading/unloading, entity management, input and event handling, and rendering.

Path Tracer
https://github.com/kryzp/pathtracer,
Simple path tracer based on the raytracing in one weekend series, it traces multiple rays from the cameras view source position accounting for surface properties, which it then uses to create a final output image.

2D Finite-Element Solver
https://github.com/kryzp/simple-finite-element-solver,
Given a set of 2D beams of different materials and shapes inter-connected between each other, a set of input forces and boundary-conditions, it forms a stiffness matrix which it uses to form a linear equation that is then be solved for the deflection of each point.

2D Navier-Stokes Fluid Solver
https://github.com/kryzp/simple-navier-fluid-sim,
Iteratively updates a fluid velocity-grid following Navier-Stokes equations by first applying external forces, then applies the diffusive term, and finally applies advection. In-between, it re-projects the velocities to keep the divergence of the field zero.

WORK EXPERIENCE

Microsoft (June 2022), I had a summer work placement at Microsoft shadowing a senior software engineer, where they explained the kinds of tools and algorithms they use on a daily basis to ensure rapid response times in their high-speed communications network.

EDUCATION

University of Southampton (2024-Present), Computer Science MEng.

Hills Road Sixth Form College (2022-2024), A-Levels,

- Maths: A
- Further Maths: A
- Computer Science: A
- Physics: B

Cambourne Village College (2017-2022), 11 GCSEs with,

- Maths: 9
- Physics: 9
- Further Maths: 8
- Computer Science: 8
- Statistics: 8
- Chemistry: 8
- Biology: 8
- Art & Design: 7

HOBBIES

I enjoy breaking apart and understanding how features were implemented in other programs. For instance, reading graphics breakdowns of games, where we intercept the data being sent to the GPU from the CPU (such as textures and render calls) to really understand all the work that goes into a single frame from a game, and any interesting techniques / algorithms they use. I find it very inspirational.

I also enjoy experimenting with esoteric shaders on *Shadertoy*, and generally using graphics programming to create eye-catching scenes.

Other than that, I enjoy solving complex maths and physics problems in my spare time, as reaching the correct solution after hard work is very rewarding.

I have a natural sense for the little details in art and design, which helps me with graphics-related programming. Sketching landscapes or animals, playing the guitar, or simply listening to music are ways I enjoy relaxing. Working with my hands is another, like when I built my own crossbow.

ACHIEVEMENTS

- I have completed my Duke of Edinburgh's Award (DofE) where I refined my chosen skill, game development; sport, swimming and volunteered at my local library.

- I have done the Advent of Code challenges every year since 2022, where each day of December a new coding challenge is released at exactly 5:00AM (GMT) which progressively gets harder and harder. In my first Advent of Code, I joined my schools private leaderboard and came 2nd overall, and 1st in my year group (Y12) out of a total of 130 participants. In the next year (Y13), I came 1st in the entire school out of 150 total participants.
- I have participated in both the British Informatics Olympiad (BIO) and British Physics Olympiad (BPhO), in which I earned silver.
- I have completed 104 Project Euler problems alone, placing me in the top 5% of all competitors.