Jacob Costen - CV

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Personal Summary

I'm fascinated by graphics, rendering techniques and the technical side of art, image processing, and videogame development. I'm excited to explore interesting and performant graphical projects and novel rendering techniques. I'm comfortable developing with both low and high level programming/scripting languages, and I have a solid understanding of mathematical principles, geometric reasoning, and linear algebra. My investigative attitude to learning allows me to get to grips with complex systems easily and to produce novel solutions/concepts. I have a solid artistic foundation and drawing skills which help me to visualise ideas. My organisational and communication skills allow me to work effectively in a team and collaborate on large projects.

Key Skills

Programming - I'm experienced in several languages, including C/C++, C#, GLSL, Assembly. However, I also have strong transferable skills: I'm confident solving complex problems by breaking them down, debugging code, and following best practice to develop efficient, maintainable, readable, modular code.

Rendering techniques - my Pre-U further maths studies have given me a solid understanding of the maths underlying 3D graphics, such as linear algebra, differentiation, integration, geometry, and statistical methods.

Technical art - my understanding of shader languages (GLSL as well as visual scripting languages) and my analytical attitude helps me to construct shaders and post-processing effects to specification. I'm familiar with techniques for optimisation of both shaders and source models and textures. I have particular experience creating heavily stylised post-processing effects to go beyond realism.

Teamwork - I have an open, friendly attitude which allows me to collaborate effectively with others. My drawing skills help me communicate ideas from visual design to program architecture. I'm also familiar with using source control such as Git and Plastic SCM, and collaboration tools such as MS Teams, Discord, and kanban boards.

Familiarity with tools - I've worked with various industry tools including Unreal Engine 4/5, Unity, Godot, and Visual Studio for design and development. I'm very familiar with Blender for 3D modelling and procedural texturing.

Work Experience

1UP Scheme (Summer 2024)
This was an internship program run by Staffordshire University where I spent 6 weeks working with a select group of students from different levels and staff to build two videogames from scratch. I enjoyed closely collaborating with others to organise tasks and implement features, and being part of the tech team taught me a great deal about Unreal Engine's blueprint and AI behaviour tree systems. I found myself challenged to understand the pre-existing prototype in order to properly integrate new/refactored systems with the existing codebase. For example, I wrote a system which allowed players to stop playing or even disconnect their controllers, and swap in an AI player to play for them until they plugged in or picked up their controller again.

Movement Detroit Commission (Early 2024)
I was commissioned by the Movement Detroit music festival to produce a short video to advertise their upcoming

festival. For this I created custom 3D models, including a sci-fi hard-surface DJ stand with screens on which videos could be played, and stylised wireframe models of places closely associated with the festival; all of which I textured with a mixture of procedural and hand-painted methods. This experience also both improved my practical skills in video editing, and demonstrated my ability to work with a client and iterate with their input to create a final product to their specifications.

Education

GCSEs (Hampton School, 2020) - I achieved top grades across all my subjects; Maths, English Language, English Literature, Physics, Chemistry, Biology, Latin, Music, German, Design Technology, and Computer Science. The last of these I taught myself, only taking the exams in school.

A Levels (Hampton School, 2022) - I received an A* in Computer Science, A in Psychology, and distinctions in both Maths and Further Maths. These subjects provided me with an excellent foundation in the maths, programming, and research skills I've since developed further and applied as described above.

Foundation Drawing (OCA Online, 2023) - during my gap year I studied a foundation drawing course which provided me with useful visualisation and artistic abilities I've found extremely useful for art projects, graphical thinking, and conveying ideas.

Computer Games Programming Bsc (Staffordshire University, ongoing) - I'm currently studying games programming at Staffordshire University, and so far I've completed my first year and achieved top grades across all modules.

Projects and Milestones

Exhibition in Tate Modern and Tate Britain
Through art contests run by Tate Collective (an outreach program of the Tate art galleries in UK) I have had digital artworks exhibited in both Tate Modern and Tate Britain. In September 2022 I submitted a work to an open call with the theme of 'Cyborg Futures' set by Shawanda Corbett, and was exhibited in Tate Britain along with around 80 others. In November 2022 I submitted a piece to a contest celebrating Paul Cezanne's work themed around apples, and was selected to be exhibited in Tate Modern along with only 9 others.

Kernel Project
One of my ongoing projects is a from-scratch computer kernel, which I intend to build my own 3D renderer inside. This project has tested my abilities in C++ as well has forced me to learn assembly. I've learned a lot of lessons about debugging through encountering difficult problems relating to memory corruption, error handling, and more. It has also challenged me to think more carefully about program architecture for large projects. So far I've implemented output over serial, basic memory allocation, a simple GUI framework, hardware interrupt handling, and keyboard input, and my next task will be communicating with onboard timing systems. The project can be found here: github.com/oculometric/novos

Text-based Game 'Agaricus Obscura'
For an assignment during my first year of university, I developed a text-only game. This game was closely inspired by the original Legend of Zelda game, and utilised ASCII art to create a top-down dungeon crawler. The finished project includes a growth algorithm for the 'goop' the player must battle through, a health system, weapon upgrades, bombs and barriers, as well as remembering which rooms have been cleared by the player. It generates room layouts procedurally, so every run is different. I received a first for this project. The project can be found here: github.com/oculometric/agaricus-obscura

3D Game 'A Lonely Greenhouse'
A recent personal project was this single-player puzzle game about exploring a surreal abandoned greenhouse on a tower. The game is made in Unity, with every part of it, models, textures, materials, lighting, level design, and code (excepting sound effects, which were used according to license from Freesound.org) created by me. In the style of 3D pixel-art, the project fits nicely in the 'lo-fi' aesthetic. It features a smooth interaction system where the player can pan around, pick up and place down objects, and use tools on other objects. The ivy is created using a custom procedural generation tool I wrote for the Unity editor just for this project. Most of the assets were produced in kits (for instance, the rusty greenhouse kit), and all of them were created using Blender and Gimp. The level even features various collectables hidden around, and I highly recommend giving it a play. The project can be found here: oculometric.itch.io/a-lonely-greenhouse