Neil Purvey

Creative Technologist & Real-time Graphics Developer

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Summary

As a self motivated creative thinker, I act as the glue between art and technology by producing and managing the development of creative software solutions that enhance the perception of space in real-time virtual environments.

Experienced in a number of creative environments; AAA game production, live event production, projection mapping, Volumetric capture, VR/AR/MR and interactive. I thrive when collaborating with other creatives, engineers and researchers, being self directed or led by creative and technical directors. I believe that the collaboration between creative and technical experts in a multi-disciplined environment is the key to pushing technology forward.

I am currently extremely passionate about the interaction of the physical world with virtual environments and making blends between them, solving technical challenges with nascent technology along the way. I have a life long passion for real-time graphics development and finding unique ways of simulating the real world that are perceived to be physically correct.

Specialties

- Development of real-time systems according to clients requirements
- Applied R&D into nascent technology and hardware to keep ahead of the curve
- High fidelity interactive graphics development to simulate real world objects in real-time at optimum frame-rates
- Multi-threaded / multi-processor engine design and implementation
- Optimization of all stages of the creative pipeline, user interactivity, work-flow and the real-time systems themselves
- Performance profiling and optimization for CPU, GPU and GPGPU solutions
- Empirical knowledge of current and next generation rendering technology, hardware, rendering APIs and their use in a real-time context
- Language and platform agnostic but highly experienced using C, C++, C#, HLSL, GLSL, Cg, DirectX11 and 12, OpenGL, Unity, Compute, games console low level graphics APIs and assembly languages
- working knowledge of creative coding frameworks and scripting languages - WebGL, THREE.js, OpenFrameworks, Python, Javascript

Experience

Senior Graphics Engineer, Founding team at Scatter Studios

Brooklyn, New York.
VR/AR/MR Startup production studio specializing in Volumetric capture.
February 2017 – December 2018

Member of the core founding team of the Emmy award winning Scatter Studios.

Optimization of multi-camera 3D volumetric depth sensor fusion/reconstruction algorithms to ensure playback of multiple (14+) volumetric capture instances in VR in the Blackout VR project. Additional graphics performance consultancy on Blackout VR, to ensure smooth delivery of volumetric assets at real-time framerates. Blackout VR premiered at Tribeca film festival 2017.

Development of the Depthkit Volumetric capture and editing tool, the core system, owner and architect of the cross platform multi-threaded graphics backend and development of front end user interface. The Depthkit volumetric capture and editing tool is robust, performant (real-time) and makes volumetric capture accessible to anyone, regardless of their skillset or creative pipeline requirements.

Further development of volumetric reconstruction algorithms within custom Unity plugins, to play back and sequence captured volumetric content from the Depthkit capture and editing tool in real-time and with VR performance constraints. Supporting a slew of platforms such as Oculus Rift, HTC VIVE, Microsoft Hololens and mobile VR & AR platforms.

Delivery of tools used by creative directors to produce award winning VR film, an emerging artform. Tools also used to produce real-time VR & AR experiences for acts such as Eminem and Imogen Heap. Depthkit driven films are premiering at film festivals such as Sundance, Tribeca and Cannes.

Managing relationships with technology partners with development and performance goals as the primary driver.

Senior R&D Developer at d3 Technologies

London, UK.
Audio Visual and live events Industry
May 2014 – January 2017

Working in a fast paced, dynamic environment where direct collaboration with clients is a key element.

Producing artist and show driven bespoke solutions for live events, allowing creatives to sequence live show content and lighting in a real-time simulated and rendered environment. The key of the d3 software suite is to be as flexible as possible, allowing bespoke features to be developed on request. My role in this position, reporting directly to the technical director, was Senior R&D developer but with a focus on real-time graphics development and optimization. Optimization can include; user interface optimization to aid in sequencing, optimizing the back-end and its data, and low level graphics optimization for GPU driven simulation solutions.

In this position I was the computer graphics technology focal, providing direction on projects that require new graphics tech to be researched and developed.

Select Completed projects

- Rivers Of Light (Disney Imagineering) - interactive, physically based volumetric lighting simulation, water particle simulations (Lead/Sole developer)
- 2015 Super bowl half-time live show (projection and graphics tech optimization)
- Marvel Live! live show (projection tech optimization and development of projector blending technology)
- Cirque Du Soleil "Toruk" live show (projection and graphics tech optimization)

Areas of development and research

- Interactive physically based lighting simulation/rendering, controlled by external DMX lighting desks
- GPU based solution for automatic blending of projector content between many projectors in real-time, using projection contribution fusion to find optimal sampling given a number of orientated projectors
- Load balanced multi-threaded content streaming

- DirectX11 engine implementation and optimization
- R&D into emerging rendering technologies to future proof the rendering engine such as moving the rendering engine to DirectX12 and later Vulkan
- Re-writing the in-engine render state and shader pipeline for usability, performance and to move to a DX12 architecture to take advantage of asynchronous queuing and data transfers for efficient data streaming
- Real-time effects and content compositing (rendering optimization and tool pipeline improvements)
- R&D into bespoke real-time geometric or post effects requested for specific live show projects

R&D Graphics Programmer at Milestone s.r.l

Milan, Italy.
April 2013 – April 2014 (fixed term contract)

I was hired to lead the development of a next-gen rendering engine and tools pipeline for PS4 and DirectX11 hardware. Working with the in-house proprietary engine, I delivered a system which is being used for the release of future titles from the studio, including MotoGP, RIDE and WRC franchises.

Using features of next-gen rendering APIs and hardware I was able to deliver a new graphics engine that both performed well, meeting its real-time performance requirements and also providing a good immersive experience for the game player. During this time I also developed a new method for rendering mass crowds and foliage to increase the perceived realism within the game environment. This was achieved by leveraging the compute power of the GPU and exploiting the GPU pipeline features to its fullest.

Graphics programmer at d3t Ltd.

June 2012 - July 2012 (fixed term contract)

I was hired as a technical consultant and graphics optimization specialist to help a client with the delivery of their new XBOX360 title. I provided an optimization strategy and developed solutions that enabled the title to meet its real-time performance requirements giving a performance increase of 200% within 4 weeks.

Graphics programmer at Sumo Digital Ltd.

October 2011 - June 2012 (fixed term contract)

I was hired as a PlayStation VITA / mobile graphics optimization specialist, developing many different graphics solutions to make sure that the VITA version of the game met its real-time performance requirements. The systems developed included fully rigged and skinned character animation, water simulation, post processing effects, real-time shadows and baked shadow rendering. The game (Sega Sonic All-stars Racing transformed) was shipped on time and gained a 7.8/10.0 Meta critic rating.

Graphics and Technology Programmer at Voofoo Studios

March 2010 - March 2011

At this startup studio I prototyped and developed a number of real-time systems; Character animation with skinning and motion blending, a dynamic camera direction system and procedural geometry based effects. These systems were developed for DirectX10, PlayStation 3 and PlayStation VITA consoles and involved developing systems for both the tools pipeline and the real-time systems themselves. These systems were delivered in the Hustle Kings title, a 1st party Sony title and was on the top of the PlayStation network for the following year.

Technology Programmer at Juice Games, THQ.

January 2006 - March 2010

In this position I was hired to lead the development of new multi-core parallel processing technology on PlayStation 3 (cell). This included R&D into new hardware and low level graphics APIs to maximize the performance of the in-house proprietary engine both using the multi-core CPU, vector units and the GPU. Within time I became the PS3 specialist and technology focal for the whole studio.

Later in this position I turned my skills to the XBOX360 platform, concentrating more on graphics algorithm development, post processing, optimization and also tools pipeline development working closely with artists. The most successful title released in my time at this studio was Juiced2, at the same time we reached 4million sales of the Juiced franchise.

Notable systems designed:

- Multi-core / Multi-threaded system development on PS3 and XBOX360 including offloading and pipe-lining tasks and low granularity jobs using SIMD optimized SPU/Altivec
- Multi-core push-buffer management
- Multi-core (SPU & Altivec SIMD optimized) tile-based occlusion sw rasterisation
- Systems level RSX optimization on SPU
- Post processing optimization and development: depth of field, multi-resolution soft particles
- SPU based font tessellation R&D
- Interactive water simulation and rendering

Education

University of the West of England

Bristol, UK.

BSc (hons) Computing for Real-time Systems 1997 – 2001

Autonomous robotics (dissertation project), computer graphics, real-time systems design, embedded systems, software engineering.

Interests

With a passion for emerging technology and real-time graphics, I like to do research in my spare time, whether this involves taking inspiration from others' work or creatively coding new projects to keep my creative mind active and progressive. I am currently writing both DX12 and Unity projects in my spare time and researching real-time ray-tracing in DX12. My current long term goal is researching the use of contemporary graphics APIs for real-time ray-tracing and using machine learning for optimizing the graphics pipeline.

Current research interests: real-time ray-tracing and physically based rendering, light field capture, volumetric capture.

I have been actively involved in the demo scene (real-time graphics sub-culture) for the past 20+ years, mostly as a graphics artist / designer on platforms such as Amiga, C64, PC and GBA.

I am passionate about film production and direction.

I am passionate about art, design and architecture.

I also like to run and spend time in the gym to keep fit.