

# PAUL ALEXANDER WELCH

3D Engine Programmer.  
OpenGL, DirectX, WebGL,  
CUDA, OpenCL.

Main Languages: C, C++, C#,  
Javascript, Python, Bash

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## Antstream Arcade

London,UK —January 2020- Present

- Interactive streaming video error correction and quality specialist.
- Moving legacy streaming systems to WebRTC.
- Implementing hardware video decoding for native mobile apps using legacy streaming system.

## Boston Consulting Group Digital Ventures/Mulight

Berlin,Germany —August 2019- December 2019

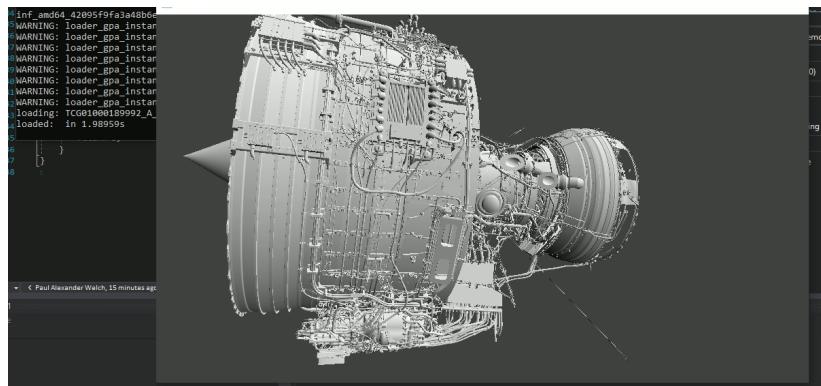
- Implemented Physically Based Rendering, Clear Coat shading, subsurface scattering and anisotropy for AR application using Google Filament as a guide.
- Manage asset production pipeline from outsourced production companies, for virtualized AR products being sold through Android and iOS app.



## VR CAD Company

West London,United Kingdom — January- July 2019

- Designed and implemented Vulkan renderer for CAD models, using parallel hot loading. Loads a 90m triangle model with 200k parts in 1.1 seconds, compared to 1hr in Siemens's NX.
- Implemented application streaming with WebRTC.



SERI research is confidential so not all details can be given here.

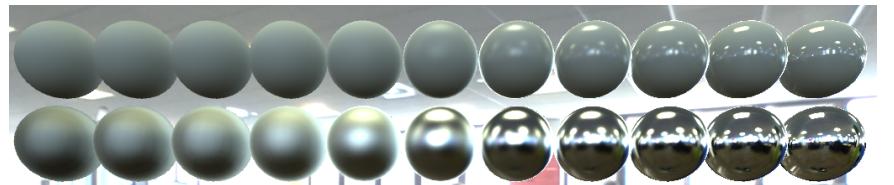
- Deep learning with Keras and Tensorflow. GANs/CNNs
- Q-Learning
- ARCore modification and integration.
- Realistic rendering.

Optimized CUDA parts of paper [Two-Shot SVBRDF Capture for Stationary Material](#), achieved 1000-5000 times performance improvement over original implementation. Started on replacing traditional numerical optimization methods with GPU accelerated simulated annealing with Tensorflow.



**Figure 1:** Given an flash-no-flash image pair of a "textured" material sample, our system produces a set of spatially varying BRDF parameters (an SVBRDF, right) that can be used for relighting the surface. The capture (left) happens in-situ using a mobile phone.

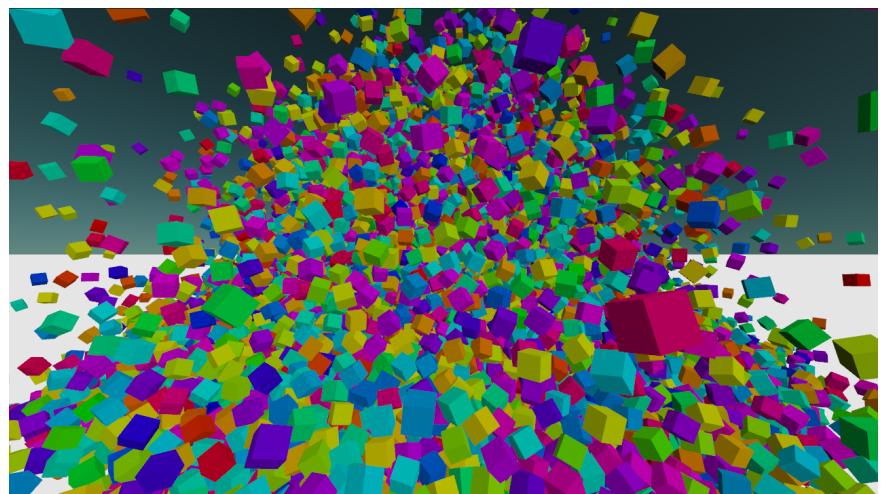
- Fixed Samsung's metal/roughness materials and Cook-Torrance split-sum approximation shader.



### Research Project: Parallelism

Stable Stacking of Rigid Bodies using Compute Shaders.

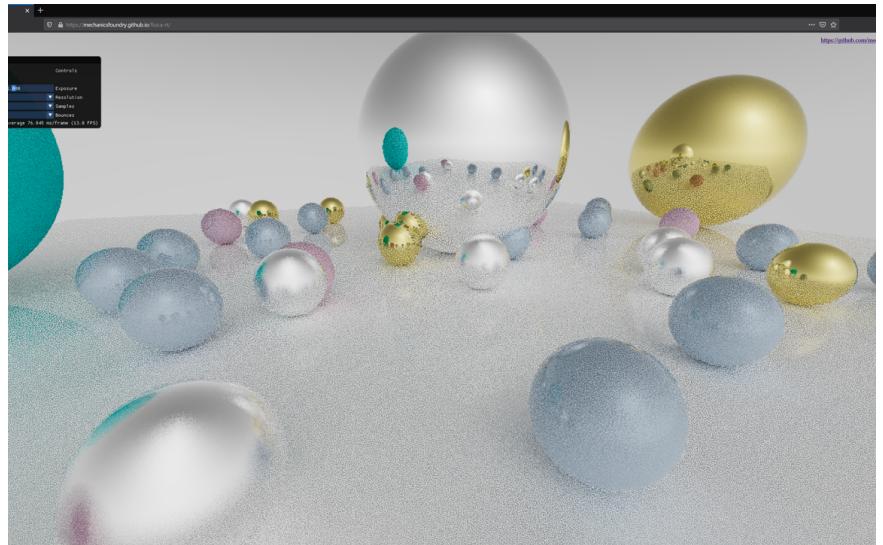
Unique algorithm allows mobile compatible simulation of 100,000~1,000,000 bodies, with stable stacking and constraints on GPU.



## Research Project: High Performance Computation in Browser

Realtime physically based ray tracing framework.

- Using WebAssembly and WebGL to perform parallel computation.

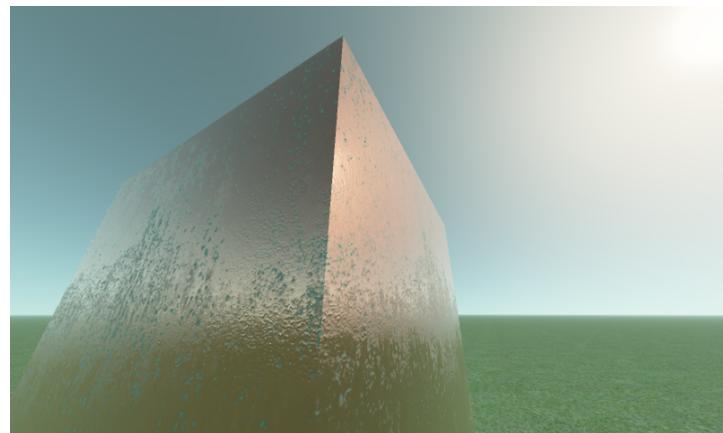


<https://twitter.com/binaryfoundry/status/1366672080763318274>

## Virtual Arts

Cambridge, United Kingdom — 2017 (contract)

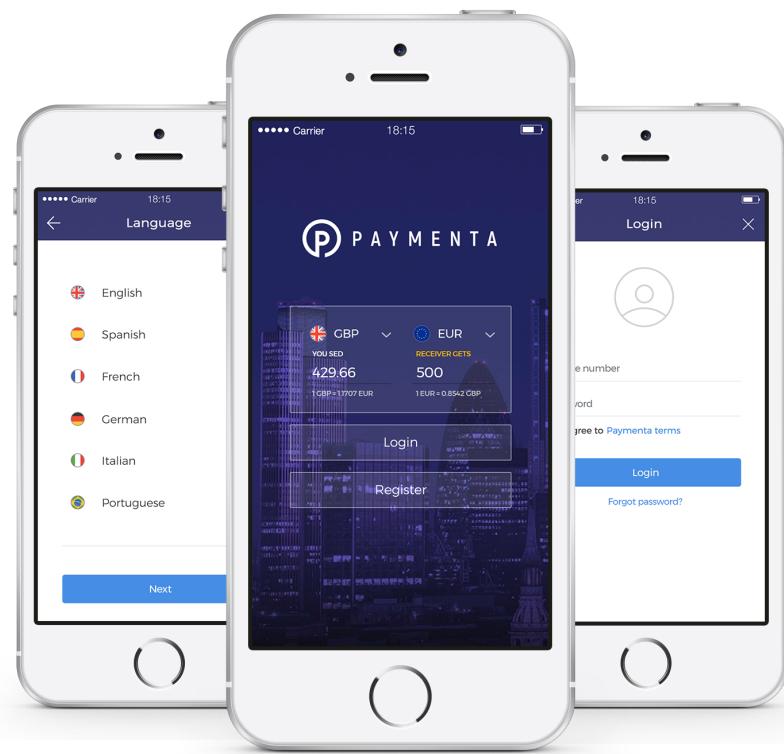
- Mobile compatible physically based global illumination rendering.
- Virtual reality development.
- High fidelity 2d and 3d text rendering with signed distance fields.



**Software Engineer, DSSCTech Financial Services** (contract)  
Lisbon, Portugal — 2016-2017

Developed automated trading platforms.

- Development for various financial services.
- .NET Core, React Native, iOS, Android NDK.
- Back-end cloud server development Linux and WinServer.
- Web front end development. HTML, CSS, React.
- Server administration.



## Senior Developer, Jumpgate/Taurus Securities

Seoul, Korea— 2014-2015

Developed automated trading platforms.

- Traded over \$1bn of securities in the first 3 months.
- C/C++ trading platform with KRX DMA access.
- C# WPF risk management and control interface.
- Low level Linux kernel event timing to reduce trade calculations from micro-seconds to nano-seconds.
- Machine-learning auto-regression for short term options/futures price prediction with random-forest.
- Optimise SVM kernels with CUDA for long term portfolio selection.
- Accurate order queue reconstruction for backtest simulation.

<https://www.youtube.com/watch?v=zs0M0UQcFZk>

Issue Code	Name	Price	Bid/Offer Ratio	Volume Up/Down Tick Ratio	Trade Up/Down Tick Ratio	Move from Yesterday's Close %	Move from Open %
KR70000000007	Woori Bank	10200	1.327788	14:13	0.980322	0.4901961	
KR70109500004	S-Oil	68000	0.1227762	61:60	3.338171	0.2902758	
KR70176700001	SKTelecom	254000	0.9556685	18:18	0.984252	-0.1968504	
KR70000000003	SK Innovation	105000	0.9440081	42:40	2.013343	0.8032129	
KR70000000004	SK hynix	47900	0.6442533	26:27	0.9242753	-0.2342753	
KR70036000004	SK	195500	4.45	99	0.7876334	0	
KR70555500000	ShinhanGroup	41150	0.5969981	22:20	0.8050468	-0.1225067	
KR70124500000	SamsungTechno	32500	0.7390252	20:14	1.538462	0.7692308	
KR70161600000	SamsungLogic	61800	1.502140	30:31	0.6472492	-0.3236246	
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KR70176200021	MIRMAASSETSEC	59100	1.264463	112:11	0.8460237	0.1689347	



## Chief Technical Officer, Gamebase USA

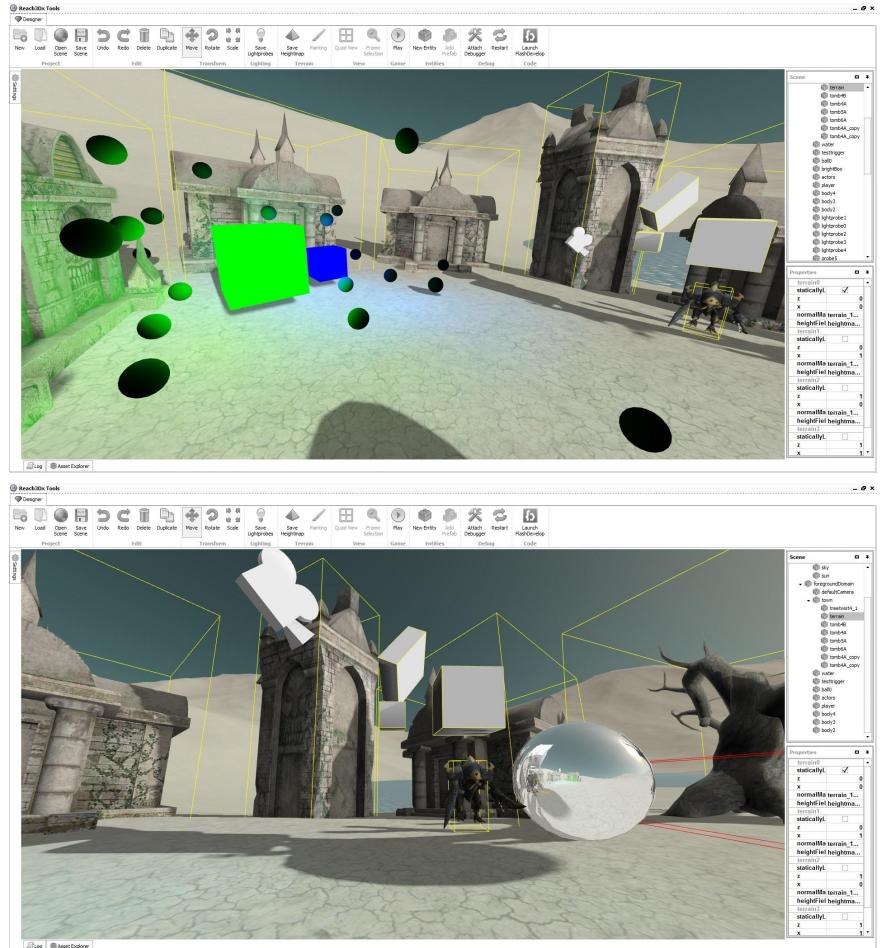
Seoul, Korea — 2012-2014

Gamebase is the owner of the Gamebryo engine, the cross-platform renderer used in the Fallout series of games and numerous Disney titles. Worked on PS3, WII and PC builds, re-wrote materials system for OpenGL ES 2.0/3.0 and worked with a team to implement mobile rendering.

Created a completely new cross-platform 3D game engine as Technical Director, leading a small team to produce the first competitive 3D HTML5 interactive content creation platform. Native code applications are also generated from the same code for high-performance mobile content.

### Accomplishments

- Supported PC and console builds of Gamebryo.
- Create a new cross-platform game/rendering engine presented at GDC 2014.
- Modified BulletPhysics engine from source, cross-platform builds and engine integration.





### Software Engineer, Company 100

Seoul, Korea — 2011-2012

Back-end server side. Designed and implemented a scalable big-data MMO game server using node.js, Redis, MongoDB and Hadoop on AWS. Assisted with hardware acceleration of mobile HTML5 content using a modified WebKit. Extensive OpenGL and shader development work.

#### Accomplishments

- Assisted developing OpenGL Accelerated HTML5 Canvas.
- Unity3D middleware development.
- Developed Unreal Engine 3.0 mobile game with custom shader pipeline, and other substantial UE3 engine modifications from source.
- Mobile shader and Hardware acceleration work.



**Software Engineer, Various Military Contracts**

UK, Portsmouth — 2004-2010

Military simulation and training games. C++, Flash/AS3, various game and simulation engines.

**Accomplishments**

- Developed hardware accelerated Navier-Stokes fluid simulator for pump simulation.
- Supported Unreal 2.0 project development.
- Pre-calculated lighting engine with sub-surface scattering.

