Patrick Gordon

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Programmer for over ten years, currently a professional software developer and research engineer at Hadean. I am the lead developer of Hadean's distributed spatial simulation engine, Aether, and our spatial technology. Working at a startup from the very early stages I have taken on a wide range of responsibilities, including growing our engine development team, researching and designing the spatial technology, and developing it using agile methods.

Key areas of interest are:

- Spatial Data Structures and Spatial Acceleration
- Accelerators including CPU SIMD, GPGPU, and FPGA programming
- Novel Developer Tooling for parallel programming

CEO, Hadean: "I've never seen someone come into a company and have as big an impact as that"

VP Eng, Hadean: "He gets s*** done"

Key Skills

Communication

- Writing many technical but accessible blog posts for our company blog
- Teaching and onboarding within the company
- Communicating externally in a pre-sales role with Partners and Investors
- Promoting the company at events, including Game Developer Conference
- Collaborating with Game Developers, Physicists, Biologists, Engineers and many Software Engineers

Development

- Using my expertise in spatial partitioning and simulation I started and continue to lead development of Aether (Hadean's distributed spatial simulation engine)
- At Createc I developed multiple spatial processing, storage, and visualisation pipelines for applications in nuclear decommissioning and remote viewing. It involved pointclouds and meshes and fusing data from multiple sensors (Lidar, Camera/Video, IMU, Radiation).
- My final year project at Cambridge was a performant sparse voxel octree raycasting system, for desktop GPUs
- In my spare time I have built:
    - A compiler for a new programming language intending to be used for high performance code on a variety of accelerators (multicore CPUs, SIMD coprocessors and GPUs)
        - LLVM, GLSLang, Lex/Flex, Yacc/Bison, C++
    - A network visualiser for processes distributed across machines
        - Javascript, D3.js, Linux iproute2 tool SS
    - A combined sampling and tracing profiler
        - Python, BPF, DWARF debug info
    - An experimental (tiny) soft 8 bit processor core on an FPGA
        - Verilog, FPGAs
    - A boot loader in x86 assembly
        - x86 Assembly
    - A dynamic website backed by a database
        - Go, Javascript, HTML, CSS

Tools

- Expert: C, C++, GLSL and GPU programming, Linux, Git, Gdb, Make

- Experienced: Python, Bash, Javascript, HTML, CSS, CMake, Meson
- Learning: BPF, Rust, Nix, Verilog and FPGAs, x86 Assembly

Libraries

- Game Engines and Simulation: PhysX, Eigen, Unreal Engine, OpenGL
- Robotics and Computer Vision: ROS, SLAM,
- Deep Learning: Tensorflow, Caffe,

Employment

Hadean September 2017 - Present

- Hadean was a small startup when I joined, looking for market fit in three verticals. After quickly getting up to speed on the HadeanOS technology they were building, within two weeks I started developing Aether for Gaming, Simulation and Science. We quickly found traction in gaming after going to GDC with a small demo, using Aether as an MMO backend. We accelerated development and I helped grow the team, hiring and onboarding new engineers. I grew a huge amount by being the lead developer, getting the chance to work closely with all different business functions.
  PhysX

Createc July 2016, September 2016 - September 2017

- I joined Createc in summer 2016 for an internship and, due to my excellent work and attitude, within three days was offered a permanent post. I gained valuable experience working with ROS and real-time and embedded systems on drones with many sensors including radiation sensors. These systems are currently in use in extremely challenging environments at Fukushima (Japan) and Sellafield (UK). I developed a deep-learning system, to classify X-Ray images of baggage as threat or benign, using Caffe on a multi GPU system, for deployment on an embedded system. I used computer vision algorithms on a lightweight, embedded, aerial platform. I worked on a scanner system for industrial purposes, to accurately map, and present potentially hazardous environments remotely. One of my favourite parts of working for Createc was the mentoring, for example teaching debugging a device driver. My proudest achievement while working there was developing a system to ingest point cloud data from many sensors, fuse it into a single cloud, store the tens of millions of points efficiently, pass it through processing steps, and then display it to a user interactively, based on the hardware position sensor data. This system is in use on multiple different projects that are central to the company.

University of Cambridge, Computer Science October 2013 - June 2016

- Due to my outstanding A-level results and passion, I had the opportunity to study at Cambridge, attaining a 2:1. Among my favourite courses were Machine Learning, Advanced Rendering, Bioinformatics, Comparative Architectures, Computer Vision, and Information Retrieval, I found these particularly rewarding because they focused on understanding large, complex, real-world subjects. In the second year, I worked with a team (contributing a large part of the code, experience and bugfixes) to develop a game system for an external company, Frontier. The client feedback was that the product and teamwork was excellent. My final year project was on an advanced voxel ray-tracing pipeline for desktop GPUs, which was written in C, OpenGL and GLSL and which showed a performance increase of 25x over the benchmark version of the renderer.

Citrix August 2012

- In August 2012, I worked in the XenClient team of Citrix, a multinational virtualisation software provider. At Citrix, I was asked to write an automated test suite for network connectivity, for an interface I had never seen, in a language I had never used before (Python). I swiftly learned the fundamentals of the interface and language. After completing the test suite, my work went into production while I was there. Unbeknown to me, my supervisor had bet his colleagues that I would not be able to complete this task in the time set. I confounded his expectations by learning the new language and completing the whole task in less than two weeks.

Education

University of Cambridge, Selwyn College October 2013 - June 2016

- Computer Science, BA (Hons) - 2:1

Nelson Thomlinson School, Cumbria (State Comprehensive) September 2008 - June 2013

- Maths - A (taken one year early - highest grade available)
- Further Maths - A*
- Physics - A

Interests

- *National Cipher Challenge* Whilst still at school I reached the final round for the last three years and won two awards.
- *Robotics Engineering and Space Science* I participated in a two week Imperial College Summer School when I was 11. This was led by Dr Richard Palfrey, who said "Patrick... was able to articulate his ideas extremely well. Patrick's final presentation (on robotics) was excellent."
- *UK Mathematical Challenge* Run by Leeds University. Starting with the regional final, I achieved a Gold Award and four Silver awards.
- I am keen on Bouldering, Badminton and Cycling, being part of the Selwyn 2nd team for Badminton for 2 years.

Articles

- MMORPGs PART 1: Itâ€™s time to rethink game architectures
- MMORPGs PART 2: Applying data-driven design to optimize computation
- Introducing a new Open Source C++ library for Spatial Representations
- Hitboxes: Giving Your Game Physicality also re-published in Wireframe Magazine (issue 22, page 30)
- Net relevancy and compression: how to push Gbps of gamestate over the internet
- Optimisation of Voxel Rendering for Large Scenes on Desktop GPUs

References

Available upon request