Lawson Fulton

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ABOUT Lawson is an experienced software engineer and researcher with a diverse background in 3D graphics, simulation, machine learning, generative design, geometry-processing, cloud and web development. He has a history of writing production-scale systems in modern C++ and Python—drawing on over five years of industry experience, and four years of full time research and internship experience. He is seeking an applied research and development position within the intersection of computer graphics and machine learning.

EXPERIENCE

Augmenta   January 2020 - November 2021 · March 2022 - present
Senior Computational Scientist & Consultant   Toronto, ON

· Founding engineer and technical lead of a team building the Augmenta Electrical **generative-design** platform—a cloud-based system that synthesizes complex 3D construction-ready models
· Designed many of the fundamental **algorithms** and the overall **software architecture** by working closely with customers to understand their complex human-centric design processes
· Implemented core modules in **modern C++** including **geometry** and **graph** processing, scene building, **optimization**, etc
· Developed the first cut of many other components such as a **C#** Revit plugin, with an embedded web-based **React/Typescript** UI and debug visualizations using **Python** scripting in **Blender**
· Managed the engineering estimates and planning of future development work
· Recruited, onboarded and **mentored new team members** as the team grew from 4 to 8 developers
· Designed a **machine learning** approach to high-precision calibration of a robotic arm FK/IK system

MESH Consultants   July 2018 - December 2019
Technical Lead   Toronto, ON

· Led software development at a boutique consultancy solving critical geometry problems in industry
· Created tools for **design** and **simulation** of lattice-based metamaterials for mass-production **3D printing** using nonlinear **optimization** methodologies and **OpenVDB**
· Implemented a **real-time sphere-tracing renderer** on the **GPU** to accelerate lattice previews
· Developed algorithms for efficient large-scale **crowd simulation** on complex domains in **C++**
· Investigated point-cloud **surface reconstruction** with **neural implicit surfaces** in **PyTorch**
· Delivered **presentations** to clients communicating solutions and recommendations

University of Toronto   2017 - 2019
Research Master's Student at the Dynamic Graphics Project Lab   Toronto, ON

· Developed a novel approach to accelerate **physical simulation** via **machine learning** (see publications)
· Implemented a **real-time elastic-dynamics simulation** in **C++** with in-the-loop **Tensorflow** models
· Assisted in the development of a **real-time bio-mechanics** simulator using reduced **FEM**
· President of the Computer Science Graduate Student Union

Dropbox   2015 - 2017
Software Engineer   San Francisco, CA

· **Full-stack** development in a multi-million-line codebase with **Python**, **Typescript**, and **React**

EDUCATION

University of Toronto – M.Sc, Computer Science (Graphics & ML Research)   2017 – 2019
University of Waterloo – B.Math, Honours Computer Science – Co-op (With Distinction)   2010 – 2015

PUBLICATIONS

[Latent-space Dynamics for Reduced Deformable Simulation](#)
<u>Lawson Fulton</u>, Vismay Modi, David Duvenaud, David I.W. Levin, Alec Jacobson.
Computer Graphics Forum 38(2). (Proc. Eurographics 2019)
Honourable Mention for Best Paper Award - Oral presentation in Genova, Italy - May 2019

"A novel, well motivated, and intelligently designed approach to reduced deformable model simulation. An inspiration for future work in learning-based simulation techniques." - <u>Eurographics Award Committee</u>

[EMU: Efficient Muscle Simulation in Deformation Space](#)
Vismay Modi, <u>Lawson Fulton,</u> Shinjiro Sueda, Alec Jacobson, David I.W. Levin.
Computer Graphics Forum 38(2). (Proc. Eurographics 2020)

INTERNSHIPS

LinkedIn - *Data Analytics Infrastructure Team*   **2013**
Software Engineer Intern   Mountain View, CA

Autodesk Research - *High Performance Computing Group*   **2011 · 2012 · 2013 · 2014**
Research Software Developer Intern   Toronto · Shanghai · San Francisco

TECHNICAL SKILLS

· Languages: **C++11/14/17/20, Python, C#, Typescript, Javascript**
· Numerics: **Eigen, NumPy, SciPy, OpenMP, autograd**
· Geometry/Graphics: **libigl, OpenVDB, Blender (incl. scripting), GLSL, OpenGL, etc**
· Machine Learning: **Pytorch, Tensorflow, Keras, Linear Algebra, Calculus, Statistics**
· UI Libraries: **React, QT, Dear ImGui**
· Operating Systems: **MacOS, Linux, Windows**
· Build Systems: **Bazel, CMake, Make**
· Version Control: **Git, Perforce**
· Cloud: **Protobuf, Docker, AWS**