

Michael Firmin

906 - 60 Colborne St
Toronto, ON. M5E 1E3

mcfirmin@gmail.com
<https://mfirmin.github.io>

ABOUT ME

I have a strong background in both computer science and mathematics, and am interested in the computer graphics and animation fields. In particular, I am inspired by physically realistic animation, including physics based character animation, ray-tracing, and physically based rendering.

WORK EXPERIENCE

Independent Video Game Developer July 2018 - present
Toronto, ON

Visualization Lead March 2016 - June 2018
Seequent Solutions Canada Ltd (Formerly ARANZ Geo), Calgary, AB

- Lead engineer involved in all aspects of design, testing, and implementation.
- Continued development of existing visualization and data management libraries.
- Followed Agile development practices

Technical Lead March 2015 - March 2016
Contractor July 2014 - March 2015

3point Science Inc, Vancouver, BC

- Architected, implemented, and maintained framework for realtime data communication and manipulation, including realtime client to client communication and serialization of applications for sharing and modularization.
- Authored web based, highly interactive scientific visualization library integrating 3D and 2D components.
- These frameworks and libraries were instrumental in allowing the company to pivot to new projects with little overhead, and a driving force behind the acquisition of the company by Seequent in 2016
- Primary Languages: Javascript, GLSL, Python, HTML5, CSS
- Tools Utilized: WebGL, THREE.js, d3.js, Polymer Web-Components

Teaching Assistant

University of British Columbia, Vancouver, BC September 2012 - May 2013
Colorado School of Mines, Golden, CO August 2011 - May 2012

- Helped design and manage course project on identifying data structures
- Taught occasional lectures and lab sessions for Computer Graphics course
- Maintained course web page for Data Structures course
- Held weekly office hours and lab sessions
- Graded projects and assignments

Lab Technician

Luca Technologies, Golden, CO May 2008 - May 2012

- Designed and carried out microbiological experiments.

EDUCATION *Master of Science, Computer Science* August 2012 - November 2014
University of British Columbia, Vancouver, BC,
Research Area: Physics-Based Character Animation

Bachelor of Science, Applied Mathematics and Computer Science 2008 - 2012
Colorado School of Mines, Golden, CO,
Concentration: Applied Mathematics
Effective Minor: Computer Science
GPA: 3.92 (Summa Cum Laude)

RESEARCH *MSc - Physics Based Character Animation* January 2013 - November 2014
University of British Columbia, Vancouver, BC

- Designed a scripting language to easily author controllers for motion of physically simulated humanoid characters.
- Designed an Optimization framework for learning new transitions between motions
- Cross-compatible with Linux and OSX

Publications and Conferences

- Controller Design for Multi-Skilled Bipedal Characters
Journal Paper, Computer Graphics Forum, May 2015
- Design and Integration of Controllers for Simulated Characters
MSc Thesis, UBC, November 2014
- Towards a Control Language for Authoring Humanoid Motions
Abstract and Poster, Dynamic Walking, June 2014

**PROJECT
PORTFOLIO**

Atmospheric Scattering

- Implementation of Rayleigh and Mie Atmospheric Scattering for use in my video games
- <https://mfirmin.github.io/atmospheric-scattering>

Raytracer

- Ported course project to the GPU and web as a personal project using WebGL and GLSL shaders
- <https://mfirmin.github.io/glslRaytracer>

3D Function Grapher

- Adapted parallelized raytracer to graph 3D mathematical functions.
- Ported to the GPU and web using WebGL and GLSL shaders
- <https://mfirmin.github.io/glsl-function-grapher>

Web Based Front End to MSc Research

- Set up a Flask server and websockets to communicate between a C++ Daemon running a physics simulation and a front-end client in charge of rendering.

COACH.js - COntrolling Articulated CHaracters

- Designed and implemented a web-based library for creating and controlling custom, physically-simulated articulated characters.
- Built on Ammo.js physics engine (web port of Bullet Physics)
- Used to create web implementation of SIMBICON

- <https://github.com/mfirmin/coach.js>
- <https://mfirmin.github.io/SimbiconJS>

**COURSE
PROJECTS**

Raytracer - Computer Graphics, CSM

- Basic raytracer for simple 3D scenes
- Extended to include photon mapping, as well as mirror and glass surfaces
- Parallelized on CPU and GPU as a term project for a later course

Fluid Simulation - Numerical Partial Differential Equations term project, UBC

- Implemented simple smoke simulator using Navier-Stokes equations of fluid motion

Snake Motion Simulation - Computer Animation term project, UBC

- Modelled the motion of a snake using spring and damper system.

Optimization Based Control of Simulated Articulated Rigid Bodies

Numerical Optimization term project, UBC

- Controlled the motion of a physically simulated N-link rigid articulated pendulum using a prioritized optimization scheme

SKILLS

Advanced: Javascript, C++11, GLSL, WebGL, Three.js, OpenGL, Ammo.js/Bullet, Open Dynamics Engine

Intermediate: Blender, Matlab, Python, Java, HTML5, CSS

Familiar: openMP, MPI, Maya, Euler Libraries (C++), MOSEK

**LEADERSHIP
ROLES AND
AWARDS**

<i>President, UBC CS Grad Student Association</i>	June 2013 - May 2014
<i>Councilor, UBC Alma Mater Society</i>	2013 - 2014
<i>Councilor, UBC Graduate Student Society</i>	2013 - 2014
<i>UBC CS Graduate TA Award</i>	2012
<i>CSM President's Scholarship</i>	2008 - 2012
<i>CSM Dean's List</i>	2008 - 2012
<i>Member of KME Mathematical Honor Society</i>	2011 - 2012