Michael Firmin

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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 scientific visualization.

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)

WORK EXPERIENCE

Visualization Lead — March 2016 - present
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

- Architect, design, implementation, and maintenance of framework for realtime data communication and manipulation, including realtime client to client communication and serialization of applications for sharing and modularization.
- Creation of web based, highly interactive scientific visualization library.
  - Integration of 3D and 2D visual components
  - GPU focused
- The frameworks and libraries developed at 3point Science 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 ARANZ Geo in 2016
- Languages Used: Javascript, GLSL, Python, HTML5, CSS
- Other Tools: WebGL, THREE.js, d3.js, Polymer Web-Components

T.A. for Data Structures and Algorithms — September 2012 - May 2013
University of British Columbia, Vancouver, BC

- Helped design and manage course project on identifying data structures
- Graded Projects and Assignments
- Held weekly office hours and lab sessions
- Maintained course web page

T.A. for Linear Algebra and Computer Graphics courses August 2011 - May 2012
Colorado School of Mines, Golden, CO

- Graded Projects and Assignments
- Taught occasional lectures and lab sessions
- Held weekly office hours

Lab Technician May 2008 - May 2012
Luca Technologies, Golden, CO

- Designed and carried out microbiological experiments.

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
- Primary language: C++
- Tools used: Open Dynamics Engine (ODE), Maya, openGL, Boost's xpressive grammar libraries, bash, git
- Cross-compatible with Linux (Mint, Ubuntu, openSUSE) 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

Raytracer/Photon Mapper - Computer Graphics, CSM

- Basic raytracer for simple 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
- Ported to the GPU and web as a personal project using WebGL and GLSL shaders
- Primary language: C++, Javascript, GLSL, HTML5, CSS
- Tools used: openMP, MPI, Three.js, WebGL
- `mfirmin.github.io/glslRaytracer`

3D Function Grapher - Individual Project

- Adapted parallelized raytracer to graph 3D mathematical functions.
- Ported to the GPU and web using WebGL and GLSL shaders
- Primary languages: C++, Javascript, GLSL, HTML5, CSS
- Tools Used: Three.js, WebGL
- `mfirmin.github.io/glsl-function-grapher`

Web Based Front End to MSc Research - Individual Project

- Set up a Python Flask server to communicate (through websockets) between the C++ Daemon running the physics simulation and front-end client in charge of rendering.
- Primary language: Javascript, Python, C++
- Tools Used: Socketio, websockets, Flask, Three.js, WebGL, ODE

COACH.js - COntrolling Articulated CHaracters - Individual Project

- Designed and implementated a web-based library for creating and controlling custom, physically-simulated articulated characters.
- Used to create web implementation of SIMBICON (`https://mfirmin.github.io/SimbiconJS`)
- Tools Used: Ammo.js (Web port of Bullet Physics), Emscripten, Three.js, WebGL
- `https://github.com/mfirmin/coach.js`

Fluid Simulation - Numerical Partial Differential Equations term project, UBC

- Implemented simple smoke simulator
- Primary language: Matlab, C++
- Tools used: Euler libraries (C++)

Snake Motion Simulation - Computer Animation term project, UBC

- Modelled the motion of a snake using spring and damper system.
- Primary language: Matlab, C++
- Tools used: Euler libraries (C++), openGL

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
- Primary language: C++
- Tools used: Euler libraries (C++), openGL, MOSEK

LEADERSHIP ROLES AND AWARDS

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