

MICHAEL BUCKLEY

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EDUCATION

University of Massachusetts Amherst

Bachelor of Science Major: Physics Minor: Computer Science
GPA 3.62; Dean's List President of Society for Physics Students

Amherst, Ma
Spring 2018

EXPERIENCE

Computational Physics Research

Summer 2016-Spring 2018

Grason Research Group -- PI: Professor Grason, Polymer Science and Engineering

- Developed computational tools to simulate the evolution of structures in response to free energy minimization.
- Studied foam models and packing problems to apply the mathematics of such to real-world object formations.
- Modeled the potential energies of physical systems and tracked energy minima over their parameter spaces to efficiently capture key dynamics. *Paper from the research I conducted is in preparation.*
- Developed ability to parse scientific literature and translate mathematical expressions to suitable algorithms.

Computer Animation

Independent Work

Videos can be seen at vimeo.com/sunlit

- Well versed in Houdini, Maya, and Zbrush software tools. Houdini areas of expertise include FEM, Pyro, Rigid Body, and Flip simulation.
- Wrote code in Houdini to approximate double pendulum motion by solving for the Lagrangian and applying a forward Euler method of integration. By this I was able to obtain fairly realistic swinging of a character's arms given the velocity of the rest of their body without having to perform a lengthy and less controllable finite element simulation. *This technique can be seen in the Goldilocks video.*
- Wrote an interactive particle system and physics engine in C++. Real-Time interfacing and rendering is achieved using the OpenGL API. Forces include gravity, air resistance, elasticity, and collision. Inter-particle collision detection utilizes the OpenVDB library for added speed and efficiency.
- Wrote a number of basic computer graphics tools in Java using the OpenGL API including a multi-threaded ray tracer with anti-aliasing and a linear, Bezier, and spline curve maker.
- Familiar with Unix based operating systems and development tools like GCC and Bash.
- Worked with a small group (5) of students on an animated short phduring a semester for which I did the FX.

COURSEWORK

Mathematics

- Ordinary Differential Equations, Linear Algebra, Calculus I, II & III, Vector Calculus, Fourier Analysis

Physics

- Mechanics, Quantum Mechanics, Statistical Mechanics, Electromagnetism, Solid State Physics, Electronics

Computer Science

- Data Structures, Computer Graphics, Computer Systems, Probabilities

PROFICIENCIES

Programming Languages

- Python, C++, C, Java, Vex, GLSL, Wolfram, Hscript, Mel, bash, DOS, Lisp

Programs

- Houdini, Maya, ZBrush, Photoshop, Nuke, After Effects, PTGui, Mathematica, Surface Evolver

Libraries and APIs

- OpenGL, OpenVDB, OpenCV, Numpy, SciPy, SQLite, Pele, Django

REFERENCES

Greg Grason Research Supervisor
Polymer Science and Engineering; Umass Amherst
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Chris Perry Animation Mentor
Cognitive Science Department; Hampshire College
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