Mark Gillespie

Curriculum Vitae

Education

2014–2018 **B.S. Computer Science**, *California Institute of Technology*, Pasadena, GPA: 4.1/4.3.
The degree involves courses in systems, algorithms, functional programming, and complexity theory. I supplemented these courses with electives in computer graphics and advanced algorithms.

Work and Research Experience

Summer 2016 **Arthur R. Adams Undergraduate Researcher**, *Caltech*.
Under Professor Mathieu Desbrun, developed a new algorithm for computing polymer conformation using dimensionality reduction techniques.
- Implemented algorithm in c++
- Experimented with applying the algorithm to point cloud denoising

Jan. 2016 – present **Undergraduate Researcher**, *Caltech*.
Under Professor Alan Barr, explored applications of interval analysis to root-finding and solving differential equations
- Implemented interval analysis library in Haskell
- Implemented graphical viewer for interval root-finding and minimization algorithms

Winter 2016 **Teaching Assistant for CS 38, Introduction to Algorithms**, *Caltech*.
Under Professor Leonard Schulman, graded problem sets and held weekly office hours

Summer 2015 **Software Engineering Intern**, *Google*.
Prototyped new credit card entry interface for Android library. Developed in Java

Programming Languages

C/C++, Python, Java, Mathematica, Matlab, Haskell, Ocaml, LaTeX

Talks Given

Mar. 2017 **Continuous and Discrete Mechanics for Variational Integrators**, *Caltech CS 177b*.
1.5 hour final presentation for a computer graphics class. Gave an overview of Hamiltonian/Lagrangian mechanics and how to discretize them to produce variational time integrators

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Dec. 2016 **Measurement in Quantum Mechanics**, *Westfield High School Seminar in College Mathematics*.
30 minute presentation to a high school math class. Gave an introduction to projective measurements in Quantum Mechanics, working through the example of the Stern-Gerlach device

Oct. 2016 **Computing Chromosome Embedding from Contact Frequencies**, *Caltech Summer Research Seminar Day*.
15 minute presentation on the results of my summer research

Selected Classes Taken

CS 177ab **Discrete Differential Geometry** *discrete study of: differential forms, deRham cohomology, Poisson problems, variational mechanics*

CS 176 **Introduction to Computer Graphics Research** *geometry processing, data visualization, vector fields and flows*

CS 171 **Introduction to Computer Graphics Laboratory** *shaders, geometry processing, physical simulation, ray tracing*

Ma 109b **Introduction to Geometry and Topology** *smooth manifolds, smooth vector fields, Gauss-Bonnet theorem, geodesics*

CS 150 **Probability and Algorithms** *analysis of probabilistic algorithms, the probabilistic method*

CS 139 **Analysis and Design of Algorithms** *streaming algorithms, experts algorithm, SDPs, spectral graph theory*

Ma 120a **Abstract Algebra** *graduate course in commutative algebra*

Publications

ongoing **Smooth Embeddings from Pairwise Distances**.
I am currently working with Professor Mathieu Desbrun to write up the work we did together to submit for publication