
Cris Cecka <ccecka@stanford.edu>

<http://www.stanford.edu/~ccecka/>

EDUCATION

Stanford University *2006-Present*

- PhD Student, Computational and Mathematical Engineering (ICME).

Harvey Mudd College *2002-2006*

- B.S. Physics
 - Theoretical and Computational focus. Physical Modeling, E&M, Optics, Quantum Mechanics.
- B.S. Computer Science / Mathematics
 - Emphasis in Modeling and Algorithms - Numerical Integrators, Graphics, Game Algorithms.
 - Algorithm development and design:

<http://www.stanford.edu/~ccecka/research/>

WORK EXPERIENCE

Discovery Middle School *Oct 2000 - Mar 2001*

Teacher/Coach

- Created and implemented a curriculum for Discovery's MATHCOUNTS program.
- Organized and led multiple teams in competition. My students received 2nd at state level.

Syracuse University *Jun 2004 - Present*

Research Assistant, Outside Consultant

- Research and development in Computational Condensed Matter Physics.
<http://physics.syr.edu/condensedmatter/thomson/>
- This tool now hosts the most extensive and interactive database on the generalized Thomson Problem in the world.
- Mesh generation, graphics engine, and all algorithms are original.

Harvey Mudd College *Jun 2005 - Aug 2005*

Quantum Programming and Quantum Computing

- Researched and developed a framework for quantum computing languages. Requirements and restrictions of any quantum computing language - quantum operator and quantum bit manipulation, reversibility, state coherence, no cloning, etc.
- Researched current quantum computing algorithms and studied improvement, optimization, implementation, and correctness of these algorithms. (Deutsch-Jozsa, Grover, Shor, teleportation, encryption, operator decomposition, etc). Investigated existing quantum computing languages and simulators including QCL and Q-Language.

Harvey Mudd College with Los Alamos National Laboratories

Aug 2005 - May 2006

Biological Modeling

- 5 HMC students in conjunction with LANL vascularized a multiscale model of a developing tumor spheroid and added various models of chemotherapy. The model was composed of
 - Extracellular Model - Diffusion of chemicals between cells.
 - Cellular Model - Monte Carlo governed cell movement and growth.
 - Subcellular Model - Cell cycle, protein network, and protein expression.
- Primarily, I researched and developed a diffusion equation integrator with time and space dependent source/sink terms which could be applied to a system with arbitrary Dirichlet boundary geometries.

Stanford University

Jan 2007 - March 2007

Course Assistant for CME106 - Intro to Prob/Stat for Engineers

- Responsible for grading rubrics, office hours, review sessions, and occasional lectures.

Stanford University

March 2007 - Present

Fourier Based MLFMM for the Helmholtz Equation

- Researching optimizations, error control, and implementation. Applications to electromagnetic and acoustical scattering problems.

Stanford University

July 2008 - Present

FEM on the GPU

- Computations on unstructured meshes accelerated with GPUs.

AWARDS AND ACHIEVEMENTS

- NSF Fellowship Honorable Mention.
- Graduated from Harvey Mudd College with double major and high honors.
- Outstanding Award in ICM Competition 2006.
 - 1 of top 4 out of 225 entries
 - Over a 96 hour weekend, we built a mathematical model for the spread of HIV, analyzed the future economic impact of treating HIV under preventative, retroactive, and proactive treatments and the impact of the emergence of resistive strains of HIV. The model was applied to 6 countries using current UNAIDS data and analyzed for accuracy and predictive strength.
 - The paper has been published in the Journal of Undergraduate Mathematics and its Applications.
- Washington Junior Science Symposium
 - State Finals (2001) - Research and experiment in Physics.
“Physical Modelling of Contained Systems.”
 - State Finals (2002) - Research and experiment in Psychology.
“Effects of Level and Scope of Propaganda.”
- Science Olympiad - State Level: 2nd in Practical Data Gathering, 4th in Physics
- Youth Achievement Award, Dean’s List, Putnam, MCM, ICM.

INTERESTS, HOBBIES, AND SKILLS

- Computer Programming (Java, C++, CUDA, C#, Fortran, Perl, Python, SML, Rex, Flash.)
- Play: National level Racquetball, State level Crew, Rollerblading, Skateboarding, Sailing, Rock-Climbing, Chess.
- Modeling, Computational Physics, and Algorithms.
 - Personal work on Connect Four and other game theory.
 - Continually developing and expanding the Thomson applet linked above.

REFERENCES

- Professor Eric Darve. Stanford University - Mechanical Engineering.
Tel: 650-725-2560 darve@stanford.edu
- Professor Mark Bowick. Syracuse University - Condensed Matter Physics.
Tel: 315-443-5979 bowick@phy.syr.edu