R. Elliot English

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Education

Ph.D. Computer Science, Stanford University, June 2013

BSc. Honours Computer Science, University of British Columbia, May 2008

Peer-reviewed Publications

R. E. English, L. Qiu, Y. Yu, and R. Fedkiw, *Chimera Grids for Water Simulation*, ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA), 85-94 (2013).

R. E. English, L. Qiu, Y. Yu, and R. Fedkiw, *An adaptive discretization of incompressible flow using a multitude of moving Cartesian grids*, J. Comp. Phys. 254, 107-154 (2013).

R. E. English, M. Lentine, R. Fedkiw, *Interpenetration Free Simulation of Thin Shell Rigid Bodies*, IEEE TVCG 19, 991-1004 (2013).

A. Robinson-Mosher, R. E. English, and R. Fedkiw, *Accurate Tangential Velocities for Solid Fluid Coupling*, ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA), edited by Eitan Grinspun and Jessica Hodgins, 227-236 (2009).

R. E. English and R. Bridson, *Animating Developable Surfaces Using Nonconforming Elements*, Proc. ACM SIGGRAPH 2008.

K. van den Doel, F. Vogt, R. E. English and S. S. Fels, *Towards Articulatory Speech Synthesis with a Dynamic 3D Finite Element Tongue Model*, In Proceedings of ISSP 06, pages 59-66, 2006.

Awards & Scholarships

LBNL Computational Science Postdoctoral Fellowship, 2013-Present

P. Michael Farmwald Fellowship (Stanford Graduate Fellowship), 2010-2013

NSERC Postgraduate Scholarship Doctorate, 2010-2013

NSERC Undergraduate Student Research Award, 2006/2007/2008

Rick Sample Summer Internship, 2008

Research Experience

Postdoctoral Scholar
Lawrence Berkeley National Laboratory, Computational Research Division
September 2013 to Present

I am currently working under the supervision of Drs. Phillip Colella and Hans Johansen developing high order finite volume methods on mapped grids for climate modelling and incompressible flow simulation.

Research Assistant
Stanford University, Department of Computer Science

September 2008 to August 2013

Under the supervision of Dr. Ronald Fedkiw, I developed an adaptive method for solving the incompressible Navier-Stokes equations using overlapping Cartesian grids that scales to thousands of cores. I additionally developed algorithms for monolithic fluid-structure interaction problems, developed continuous collision detection and handling methods for rigid body dynamics, and explored fast multi-level solvers for contact problems.

Honours Thesis Research
University of British Columbia, Department of Computer Science
May 2007 to August 2008

Under the supervision of Dr. Robert Bridson, I developed a method for simulating inextensible materials using nonconforming finite elements in order to avoid the locking problem.

Undergraduate Reseach Assistant
University of British Columbia, Department of Electrical and Computer Engineering
May to August 2007
May to December 2006

Working on the biomechanical simulation project Artisynth, with Drs. John Lloyd and Sidney Fels, I developed robust methods for collision detection and handling between rigid and deformable bodies as well as implemented methods for incompressible finite element simulation and incomplete matrix factorizations.

Advising & Teaching Experience

Undergraduate Research Advisor, Aric Bartle, Stanford University B.S. 2013
"Efficient and Accurate Pairwise Discrete Collision Detection of Nonconvex Rigid Bodies"

Undergraduate Intern Advisor, Summer 2012

Stanford Computer Science Undergraduate Research Internship, 4 undergraduate students.

Army High-Performance Computing Research Center Summer Institute, 1 undergraduate from the University of Texas at El Paso, 1 from Stanford University.

China Undergraduate Visiting Researcher Program, 1 student from Tsinghua University, Beijing.

Undergraduate Intern Advisor, Summer 2011

Army High-Performance Computing Research Center Summer Institute, 3 undergraduates from the University of Texas at El Paso, 1 from Morgan State University.

During the summers of 2011 and 2012 I worked with undergraduate students who, under my direction, ported the PhysBAM physics library to Google's Android platform and developed both a real time interactive 3D rigid body engine and fully interactive 3D "Angry Birds" style game capable of running on both Android phones and tablets.

Teaching assistant, Stanford University. Computer Science 448x, Math and Computer Science behind Special Effects, Spring 2010.

Teaching assistant, Stanford University. Computer Science 205a, Mathematical Models for Computer Vision, Robotics, and Graphics, Fall 2009.

Teaching assistant, Stanford University. Computer Science 148, Introduction to Graphics, Summer 2009.

Invited Talks

Simulating Beyond 10^9 *Degrees of Freedom*, IEEE Control System Society Seminar Series, Santa Clara Valley Chapter, San Jose, CA, 2013

A Scalable Adaptive Spatial Discretization for Incompressible Flow using Overset Cartesian Grids, Lawrence Berkeley National Laboratory, Berkeley, CA, 2013.

A Scalable Adaptive Spatial Discretization for Incompressible Flow using Overset Cartesian Grids, NASA Applied Modeling & Simulation Seminar Series, Mountain View, CA, 2013.

Numerical Physical Simulation, IEEE Control System Society Seminar Series, Santa Clara Valley Chapter, Sunnyvale, CA, 2011

Academic Publication Review Experience

Journal of Computational Physics (JCP), 4 papers

Transactions on Visualization and Computer Graphics (TVCG), 1 paper

Computer Graphics International (CGI) 2012, 1 paper

SIGGRAPH Asia 2012, 1 paper

SIGGRAPH 2009, 1 paper

SIGGRAPH Asia 2008, 1 paper

Industry Work Experience

Technical Consultant for matter Intellectual Ventures v. Capital One Inc.
Feinberg Day Alberti & Thompson LLP
September 2013 to Present
I provided claim analysis and code review services analyzing banking systems.

Technical Consultant for matter Intellectual Ventures v. PNC Bank Inc.
Feinberg Day Alberti & Thompson LLP
September 2013 to Present
I provided claim analysis and code review services analyzing banking systems.

Technical Consultant for matter Intellectual Ventures v. Motorola Inc.
Feinberg Day Alberti & Thompson LLP
December 2012 to April 2013
I provided claim analysis and code review services analyzing Android Linux kernel, framework and application code.

Technical Consultant for matter HTC Corp. v. Apple Inc.
Feinberg Day Alberti & Thompson LLP
February 2012 to July 2012
I provided claim analysis and code review services analyzing Android Linux kernel, framework and application code.

Software Engineer

NGRAIN Corporation, Vancouver, BC, Canada
January to August 2005
I worked as part of the product development team developing the user interface for interacting with and editing volumetric 3D models. I developed a component assembly and disassembly familiarization simulation environment. I participated in regression testing done at the end of each release cycle, in addition to writing automated testing scripts.

Skill Set

Programming Languages:

- Strong: C/C++, C#, Java, PHP, SQL, DHTML/CSS, Javascript
- Familiar: Perl, Python, Fortran, COBOL, Bash

Programming Environments:

- Linux/GNU Toolset, Android, Mac OSX/Darwin, Windows API

Mathematical Tools:

- Environments: MATLAB, Octave, Mathematica, Maxima
- Libraries: PETSc, Eigen, Chombo, PhysBAM, OpenCV

Parallel Computation Tools/Environments:

- MPI, pthreads, OpenMP, Amazon EC2, Stampede

Applied Mathematics:

- Numerical solutions to partial differential equations (e.g. computational fluid dynamics and solid mechanics, strongly coupled multiphysics systems, continuous contact and collision detection/handling, fracture)
- Numerical optimization (e.g. large scale iterative solvers with linear and nonlinear constraints)
- Numerical linear algebra (e.g. parallel solutions to sparse systems with greater than 10^9 variables using preconditioned iterative methods, eigenvalue/SVD problem algorithms, multigrid solvers)
- Computational geometry (e.g. spatial acceleration structures, Delaunay triangulation, direct Voronoi diagram generation, remeshing algorithms)
- Computer vision (e.g. stereovision, feature detection and tracking)
- Machine learning (e.g. clustering algorithms, statistical regression, reinforcement learning)
- Computer graphics (e.g. scanline rasterization, raytracing, radiosity/global illumination)