

Stephen G. Berard

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EDUCATION

Ph.D., Computer Science

Rensselaer Polytechnic Institute, Troy, NY

May 2009

Bachelor's Degree, Mathematics and Computer Science with high Honors

Clark University, Worcester, MA

May 2003

RESEARCH AND PROFESSIONAL EXPERIENCE

Graduate Research Assistant, Dept. of Computer Science, RPI, Troy, NY

2003 - Present

- Investigated use of simulation for planning and design of robotic systems with intermittent contact.
- Assisted in writing grant proposals.
- Developed four new time-stepping methods, which were constructed for a variety of reasons, including accuracy, performance, and design.
- Implemented and maintain a new physical simulation library (several thousand lines of C/C++ code), currently used in research at RPI and UPENN and classes at RPI and Northwestern.
- Performed a numerical study on the accuracy of our time-steppers, and experimentally validated them.
- Devised an optimization framework to learn the control inputs of a device that realize a desired goal. The solution found by simulation was experimentally validated on the real device.
- Formulated a non-recursive non-linear filter to estimate the system's parameters. The filtering problem is particularly challenging, since the underlying mathematical model is nonsmooth.

Technical Intern, Raytheon Electronic Systems, Tewksbury, MA

Summer 2001

- Developed a GUI front end for hardware validation software
- Worked with a team of 3 to develop hardware validation software

TEACHING EXPERIENCE

Teaching Assistant, Computer Science II, RPI, Troy, NY

Spring 2009, Fall 2007

CS2 is a course in elementary data structures and their use in programming. Conducted weekly lab section, prepared and maintained web based submission, gave several lectures, and graded assignments.

Teaching Assistant, Data Structures and Algorithms, RPI, Troy, NY

Spring 2007

Conducted weekly lab section and graded assignments.

Teaching Assistant, Three-Dimensional Computer Graphics, RPI, Troy, NY

Fall 2006

Gave several lectures, developed image morphing project, and graded assignments

TECHNICAL SKILLS

Languages (In order of proficiency): C++, C, Java, L^AT_EX, BASH, and Scheme

Software: Linux, UNIX, Windows, gcc/g++, gdb, valgrind, STL, OpenGL, MATLAB

HONORS

Best Student Paper, Robotics: Science and Systems

2007

PHI BETA KAPPA National Honor Society

2003

PUBLICATIONS

Book Chapters

- [1] Kevin Egan, Stephen Berard, and Jeffrey C. Trinkle. *Toward Sensorless Acquisition of Multiple Contact Points Between Planar Parts*, pages 113-131. Number 18 in STAR - Springer Tracts in Advanced Robotics. Springer Berlin / Heidelberg, 2005. Workshop on Multi-point Interaction in Robotics and Virtual Reality

Refereed Journal Articles

- [1] N. Chakraborty, S. Berard, S. Akella, and J. C. Trinkle. An Implicit Time-Stepping Method for Multibody Systems with Intermittent Contact. *International Journal of Robotics Research*, (Submitted).
- [2] Stephen Berard, Binh Nguyen, Kurt Anderson, and J.C. Trinkle. Sources of Error in a Simulation of Rigid Parts on a Vibrating Rigid Plate. *ASME Computational and Nonlinear Dynamics*, (Submitted).

Papers Under Preparation

- [1] Binh Nguyen, Stephen Berard, J. C. Trinkle. Modeling Nonconvex Configuration Space Using Linear Complementarity Problems.

Refereed Conference Articles

- [1] Stephen Berard, Binh Nguyen, and J.C. Trinkle. Sources of Error in a Rigid Body Simulation of Rigid Parts on a Vibrating Rigid Plate. In *ACM Symposium on Applied Computing*, May 2009.
- [2] N. Chakraborty, S. Berard, S. Akella, and J.C. Trinkle. An implicit compliant model for multibody systems with frictional intermittent contact. In *ASME International Design Engineering Technical Conferences*, October 2007.
- [3] N. Chakraborty, S. Berard, S. Akella, and J.C. Trinkle. An implicit time-stepping method for multibody systems with intermittent contact. In *Robotics: Science and Systems*, June 2007. **Best Student Paper Award.**
- [4] Stephen Berard, Jeff Trinkle, Binh Nguyen, Benjamin Roghani, Vijay Kumar, and Jonathan Fink. daVinci code: A multi-model simulation and analysis tool for multi-body systems. In *IEEE International Conference on Robotics and Automation*, pages 2588-2593, April 2007.
- [5] J.C. Trinkle, Stephen Berard, and J.S. Pang. A time-stepping scheme for quasistatic multibody systems. In *IEEE International Symposium on Assembly and Task Planning*, pages 174 - 181, March 2005.
- [6] Stephen Berard, Kevin Egan, and J. C. Trinkle. Contact modes and complementary cones. In *IEEE International Conference on Robotics and Automation*, pages 5280 - 5286, April 2004.

Non-Refereed Articles

- [1] Stephen Berard, Binh Nguyen, Kurt Anderson, and J.C. Trinkle. Sources of error in a simulation of rigid parts on a vibrating rigid plate. Technical Report 08-10, Department of Computer Science, Rensselaer Polytechnic Institute, 2008.
- [2] Stephen Berard. Cooking with complementarity: A recipe guide for complementarity based rigid-multibody dynamics simulation. Technical Report 06-08, Department of Computer Science, Rensselaer Polytechnic Institute, 2006.
- [3] K.T. Egan, Stephen Berard, and J.C. Trinkle. Modeling nonconvex constraints using linear complementarity. Technical Report 03-13, Department of Computer Science, Rensselaer Polytechnic Institute, 2003.
- [4] K.T. Egan, Stephen Berard, and J.C. Trinkle. Computing wrench bounds along a curved surface in 2d. Technical Report 04-09, Department of Computer Science, Rensselaer Polytechnic Institute, 2004.