

Ryan Schmidt

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Education

- B.Sc. Computing Science (University of Calgary, Alberta, Canada) April 2002
- 3.8 / 4.0 Grade Point Average in Computer Science
 - Minor in Pure Mathematics
 - NSERC Undergraduate Student Research Award (summer 2001)
 - 2 years of extracurricular research in SENG and computer graphics
- Technical Workstudy (Banff New Media Institute, Banff, Canada) Summer 2002
- Attended and facilitated artistic/scientific conferences
- M.Sc. Computing Science (University of Calgary, Alberta, Canada) (In Progress)
- 4.0 / 4.0 Grade Point Average
 - First author of 4 publications in first year (2 full conference papers)
 - Expected graduation date: April 2006

Work Experience

- Software Developer, Cimmetry Systems, Inc May 2003 – May 2004
- Core systems team, responsible for 2D and 3D graphics engines
 - Maintenance and debugging of 500,000 line C/C++ source base
 - Fixed several long-outstanding critical bugs in first week
 - Identification and optimization of system bottlenecks
 - Personally responsible for an order-of-magnitude increase in 3D performance
 - Research into new 2D and 3D features
 - Wrote literature summaries, proof-of-concept code, and made implementation recommendations
- Research Assistant, Interactions Lab, University of Calgary 2004-2005
- Designed and supervised construction of \$100,00 high-resolution multi-projector display wall, as well as several smaller construction projects
 - Designed and implemented camera-based input system for large displays
 - Assisted in CFI grant funds allocation
- Research Assistant, Interactions Lab, University of Calgary Spring 2003
- Developed OpenGL/MFC Elastic Presentation Space user interface
 - Researched commercially available advanced display technologies
 - Made purchasing recommendations for over \$300,000 in CFI grant funds
- Software Developer, Graphics Jungle Lab, University of Calgary 2001-2003
- Developed 3D geometrical modeling / rendering / animation system
 - Maintained and debugged existing code base (100,000+ lines)
 - Designed, implemented, tested and debugged mathematical libraries

Assistant Developer, Software Engineering Research Network

2000

- Developed J2EE-based project management web application
- Designed user interfaces and debugged server issues
- Identified and integrated relevant Open-Source and commercial software
- Worked with IBM developers to debug IBM open source software
- Presented system to major corporate sponsor

Major Research Projects

ShapeShop, Graphics Jungle Lab, University of Calgary

2004-2005

ShapeShop is an interactive tool for sketch-based 3D modeling with implicit surfaces. I developed and published a hierarchical spatial caching system that, for the first time, supports interactive manipulation of complex 3D implicit models, and have demonstrated this with interactive modeling software. I am currently improving this system and designing new implicit modeling techniques suitable for use in interactive systems. To reduce complexity in the modeling interface I am exploring sketch-based interaction techniques. This work is funded by NSERC (PGS-M).

MAD Box Project, Interactions Lab, University of Calgary

2003-2005

The MAD Box project was conceived as a “plug-and-play” high-resolution display wall with a modular design that minimized the technical requirements for large-display research. The projector-based modular display units were designed in collaboration with Visual Structures Inc. The 8 display modules can be stacked and tiled in a wide variety of configurations, and can be connected to a single computer. To support direct wall interaction, I developed an input system based on colored light (laser pointers, LEDs, etc) that uniquely identifies individual pointers using off-the-shelf webcams. The input system is portable to a wide variety of other displays, including projected displays on arbitrary curved surfaces. Funding for this project is provided by CFI and NECTAR.

Spinal Tap, Graphics Jungle Lab, University of Calgary

2001-2004

SpinalTap is an architecture for real-time bone drilling simulation, developed for use in a spinal drilling surgical training system. The initial project, completed as part of an undergraduate thesis, utilized state-of-the-art variational surface reconstruction software (<http://farfieldtechnology.com/casestudies/spine/>) and provided simulation rates significantly higher than what had been achieved before (<http://www.unknownroad.com/projects/spinaltap/index.html>). I revisited the project in 2004 when new experimental bone-drilling force measurements became available. The equations derived from this experimental work were integrated into my simulator and highly accurate simulated results were produced. Additional software optimizations produced a ten-fold increase in simulation rate, guaranteeing a minimum of 1000Hz in the worst case.

Publications

Conference Proceedings

- Generalized Sweep Templates for Implicit Modeling (2005). Schmidt, R., Wyvill, B. 3rd International Conference on Computer Graphics and Interactive Techniques in Australasia and Southeast Asia (GRAPHITE 2005), pp 187-196.
- Interactive Implicit Modeling with Hierarchical Spatial Caching (2005). Schmidt, R., Wyvill, B., Galin, E. Proceedings of Shape Modeling International 2005, pp. 104 - 113.

Workshop Papers

- ShapeShop: Sketch-Based Solid Modeling with BlobTrees (2005) Schmidt, R., Wyvill, B., Sousa, M.C., Jorge, J.A. 2nd Eurographics Workshop on Sketch-Based Interfaces and Modeling, pp. 53-62, 2005.
- Sketch Based Construction and Rendering of Implicit Models (2005). Wyvill, B., Foster, K., Jepp, P., Schmidt, R., Costa Sousa, M., Jorge, J. A. Eurographics Workshop on Computational Aesthetics in Graphics, Visualization and Imaging.
- Schmidt, R., Penner, E., Carpendale, S. (2004) Reconfigurable Displays. Workshop on Ubiquitous Display Environments at Ubiquitous Computing (UBICOMP) 2004, Nottingham, England.

Sketches / Posters / Videos

- The GPU Cluster without the Clutter: A Drop-in Scalable Programmable-Pipeline with Several GPUs and Only One PC (2006) Penner, E., Schmidt, R., Carpendale, S. Symposium on Interactive 3D Graphics and Games (I3D 2006). (Poster, To Appear)
- Sketch-Based Modeling with the BlobTree (2005). Schmidt, R., Wyvill, B., Sousa, M.C. SIGGRAPH 2005 Technical Sketch

Technical Reports

- Schmidt, R., Wyvill, B. (2005) Implicit Sweep Surfaces. Technical Report 2005-778-09, Department of Computer Science, University of Calgary.
- Schmidt, R., Penner, E., Carpendale, S. (2004) MAD Boxes: A Plug-And-Play Tiled Display Wall. Technical Report 2004-768-33, Department of Computer Science, University of Calgary.
- Schmidt, R. (2002) SpinalTap: An Architecture for Real-Time Vertebrae Drilling Simulation. Technical Report 2002-705-08, Department of Computer Science, University of Calgary.