

JOSHUA BARCZAK

<http://www.joshbarczak.com>

SUMMARY OF QUALIFICATIONS

- Expertise in computer graphics and interactive simulation.
- Experience developing large, efficient, software systems in C++, in a production environment.
- Strong GPU programming background.
- Experience in data-parallel programming and low-level performance optimization.
- Proficient in C++ and the STL, also familiar with Lua, Java, Visual Basic, SQL, LISP, Perl, and various shader languages.
- Implements complicated algorithms for fun and profit.

EMPLOYMENT HISTORY

Software Engineer, AMD (former ATI) Jan 2006 – Present

- Developed and maintained a multi-platform rendering engine as part of a three-person team. This engine has been used to produce launch demos for all subsequent ATI Radeon GPUs. Contributions included :
 - Development of scene management and animation systems.
 - Implementation of DX9 and DX10 rendering backends.
 - Integration of a generic plugin system into the existing engine architecture.
 - General performance tuning throughout the codebase.
- Implemented rendering algorithms and shaders for production of GPU launch demos, including motion blur, depth of field, shadow mapping, dynamic SH lighting, terrain rendering, character animation, culling, and LOD management.
- Designed and built a scalable parallel physics engine for the Radeon HD3000 launch demo.
- Conducted independent research on real-time rendering. Developed and released the *ATI Tootle* mesh optimization library based on research published in I3D 2006.

Intern, ATI Research Summers 2004, 2005

- Implemented prototype applications to investigate use cases for DX10 geometry shaders.
- Developed a D3D9 wrapper DLL which provided a transparent framework for automatic multi-pass partitioning of pixel shaders.

Graduate Research Assistant, UMBC Sep 2003 - Dec 2004

- Developed a testbed software rasterizer with procedural shading capability. Modified an existing shader compiler to target this rasterizer.
- Conducted research into automatic shader simplification, focusing on novel compiler transformations.

Teaching Assistant, UMBC Jan-Dec 2005

- Designed and graded projects for advanced undergraduate courses, including introductory computer graphics courses.

Intern, BD Diagnostic Systems Summers 2001,2002,2003

- Developed and maintained various engineering support tools and database applications using Visual Basic, C++, and SQL Server.

EDUCATION

M.S. Computer Science, UMBC

Sep 2003 - Jan 2006

- Concentration in computer graphics.
- 4.0 GPA

B.S. Computer Science, UMBC

Sep 1999 - May 2003

- 3.85 GPA

TECHNICAL PUBLICATIONS

Fast Triangle Reordering for Vertex Locality and Reduced Overdraw

Sander, P.V. Nehab, D. Barczak, J.

ACM Transactions on Graphics (Proceedings of SIGGRAPH 2007)

Describes an improved algorithm for vertex cache optimization, and an efficient heuristic for overdraw optimization. Unlike previous techniques the algorithms presented are fast enough to be run interactively.

Triangle Order Optimization for Graphics Hardware Computation Culling

Nehab, D. Barczak, J. Sander, P. V.

ACM 2006 Symposium on Interactive 3D Graphics and Games (I3D2006)

Describes a preprocessing technique which optimizes meshes for reduced overdraw, while maintaining a high vertex cache hit rate. The methods presented in this paper were implemented in the *ATI Tootle* mesh optimization library.

Interactive Illumination Using Large Sets of Point Lights.

Barczak, J.

M.S. Thesis, University of Maryland, Baltimore County

Describes a system for rendering diffuse global illumination and soft shadows at interactive rates, using instant radiosity. Shadows from large sets of point lights are rendered using a new half-octahedral shadow map projection, using a variety of optimization techniques to avoid redundant computation.

PERSONAL PROJECTS

- I designed and implemented a photon mapping engine in my spare time, which I use to render artwork as a personal hobby. I possess deep knowledge of raytracing and global illumination, acquired primarily through independent study.
- I am in the process of building an interactive raytracing engine, employing state of the art SIMD packet tracing techniques. My current prototype is capable of double-digit framerates on a dual core laptop.

References available upon request