

CURRICULUM VITAE

Tobias Schafhitzel

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Education

- 2004 - 2008 Ph.D. candidate in Computer Science
 Focus on flow visualization
 Institute of Visualization and Interactive Systems
 University of Stuttgart, Germany
- 1998 - 2004 Student of Computer Science
 Focus on visualization, computer graphics and programming languages
 Diploma in Computer Science
 University of Stuttgart, Germany
- 1995 - 1998 High School Student
 High school diploma
 Technisches Gymnasium der Max Eyth Schule Kirchheim, Germany

Professional Career

- 03/2009 - present System Engineer
 Algorithms for Avionics Systems
 Visualization, flight navigation, height field processing
 EADS Germany, Friedrichshafen
- 12/2004 - 12/2008 Research Associate
 3D visualization and computer graphics:
 Focus on flow visualization and ray tracing
 Scientific projects and teaching
 Visualization and Interactive Systems Institute
 University of Stuttgart, Germany
- 07/2002 - 11/2004 Student Assistant
 Software development for visualization applications
 Volume rendering, flow visualization, and ray tracing
 Author of an English e-Learning script
 Institute of Visualization and Interactive Systems
 University of Stuttgart, Germany
- 12/1998 - 06/2002 Student Assistant
 Software development for a commercial GUI-based
 programming language, project work, and software support
 ISA Tools GmbH, Germany

Skills

Languages. German (native speaker), English (fluent) and French (school knowledge).

Computer programming. Experience in C/C++, Graphics APIs and Graphics Hardware programming (OpenGL, DirectX, GLSL, Cg and HLSL, ASM) on MS Windows and Linux/Unix. Familiar with Java, QT, HTML, XML and JavaScript.

Operating Systems. Windows, Linux/Unix and MS Dos.

Other. Very good at creative tasks, team-work and experienced in dealing with tight deadlines. Experience in organizing and supervising projects. Knowledge in fluid dynamics.

Private Interests

Sport Trekking, climbing, alpine skiing, and biking.

Music Making music (guitar, drums).

Literature Reading contemporary literature and technical literature.

Traveling Get to know other cultures and landscapes.

Professional Interests

Flow visualization Real-time methods, texture-based flow visualization, feature extraction, and visualization of coherent structures.

Ray tracing General ray tracing, GPU-based ray tracing, non-linear ray tracing, ray casting.

Volume rendering Multi-field rendering, flow visualization, medical visualization.

Real-time computer graphics

General-purpose computation using graphics hardware

Projects, Exchanges and Awards

DFG Research Grant (2005-present)

Funding: German Research Council (DFG).

Project description: Imaging methods for experimental flow measurements.

Position: Project member (team “Flow Feature Detection and Extraction”).

Accomplishments: Developed several visualization tools for real-time flow visualization and feature extraction in collaboration with experts in fluid dynamics. This tools were used by other project members in order to compare the results of experimental measurements and simulations of 3D unsteady flow.

Invited Academic Exchange Project (July 2006)

Destination: Simon Fraser University, Vancouver, Canada.

Project: Texture-based flow visualization and vortex detection.

Accomplishments: Worked on methods for combining real-time texture-based flow visualization methods with extracted flow features. The results have been published at the International Symposium on Flow Visualization 2006.

SFB Research Grant (2004-2005) .

Funding: Collaborative Research Center (SFB).

Project name: SFB 382: Methods and algorithms for simulating physical processes on super computers.

Position: Project member.

Accomplishments: Real-time rendering of the Martian and the Earth atmosphere combined with terrain rendering. This method was also used for the movie “From the Earth to the Big Bang” produced for the Einstein exhibition in Bern 2005.

Award 2004: Best Student Thesis

This award was funded by the network of information technology (IVS) University of Stuttgart, Germany.

External Activities and Talks

External Reviewer IEEE Visualization 2008, Eurographics 2008, IEEE Transactions on Visualization and Computer Graphics, Computer Graphics Forum, PacificVis 2008, Pacific Graphics 2008, Spie VDA 2008, Eurographics 2007, Eurovis 2007, ACM Siggraph 2006, IEEE Visualization 2006, Eurographics 2006, I3D 2006, VMV 2006, WSCG 2006, Information Visualization 2006, ACM Siggraph 2005, EGVE 2005

Talks International Symposium on Flow Visualization 13 (Nice), VISUS colloquium (Stuttgart), Eurovis 2008 (Eindhoven), DFG workshop (Münster), 15-th International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (Prague), DFG workshop (Stuttgart), International Symposium on Flow Visualization 12 (Göttingen), DFG workshop (Erlangen), 3rd International Conference on Coordinated & Multiple Views in Exploratory Visualization (London)

Teaching

Summer 2008

Advanced seminar: Global illumination

Winter 2007/2008

Advanced seminar: Geometry for visualization and computer graphics.

Summer 2007

Advanced seminar: Time-dependent data visualization.

Winter 2006/2007

Lecture assignments: Modeling and animation

Summer 2006

Lecture assignments: Visualization.

Winter 2005/2006

Lecture assignments: Modeling and animation

Graphics programming lab.

Summer 2005

Graphics programming lab.

Advised Diploma, Master and Student Theses

Student thesis, Mikael Vaaraniemi, 2007

Segmentation and tracking of shear layers in unsteady flow.

Diploma thesis, Clemens Spenrath, 2007

Hardware-accelerated point-based rendering of surfaces and volumes.

Student thesis, Tjark Bringewat, 2007

Rendering photo-realistic scenes with combined ray-tracing techniques.

Diploma thesis, Jörg Oberfell, 2006

Physically-based snow simulation.

Diploma thesis, Thomas Derr, 2006

Interactive visualization of simulated snow.

Student thesis, Martin Falk, 2006

Generating panorama maps using GPU-based non-linear ray tracing.

Diploma thesis, Joachim Vollrath, 2006

GPU-based ray casting on adaptive mesh refinement data.

Master Thesis, Pablo Nigorra, 2005

Planning and implementation of a ray tracer optimized for the Cell processor.

Publications

- [1] T. Schafhitzel. *Particle Tracing Methods for Visualization and Computer Graphics*. PhD thesis, Universität Stuttgart, 2008.
- [2] T. Schafhitzel, J. Vollrath, J. Gois, D. Weiskopf, A. Castelo, and T. Ertl. Topology-Preserving lambda2-based Vortex Core Line Detection for Flow Visualization. *Computer Graphics Forum (Eurovis 2008)*, 27(3):1023–1030, 2008.
- [3] T. Schafhitzel, K. Baysal, U. Rist, D. Weiskopf, and T. Ertl. Particle-based vortex core line tracking taking into account vortex dynamics. In *Proceedings International Symposium on Flow Visualization '08*, 2008.
- [4] R. Laramée, G. Erlebacher, C. Garth, T. Schafhitzel, H. Theisel, X. Tricoche, T. Weinkauff, and D. Weiskopf. Applications of Texture-Based Flow Visualization. *Engineering Applications of Computational Fluid Mechanics*, 2(3):264–274, 2008.
- [5] M. Falk, T. Schafhitzel, D. Weiskopf, and T. Ertl. Panorama Maps with Non-linear Ray Tracing. In *Graphite '07: Proceedings of the 5th international conference on Computer graphics and interactive techniques in Australasia and Southeast Asia*, pages 9–16, 2007.
- [6] T. Schafhitzel, E. Tejada, D. Weiskopf, and T. Ertl. Point-based Stream Surfaces and Path Surfaces. In *Proceedings of Graphics Interface 2007*, pages 289–296, 2007.
- [7] T. Schafhitzel, M. Falk, and T. Ertl. Real-Time Rendering of Planets with Atmospheres. In *Journal of WSCG 2007*, pages 91–98, 2007.
- [8] E. Tejada, T. Schafhitzel, and T. Ertl. Hardware-accelerated point-based rendering of surfaces and volumes. In *Proceedings of WSCG 2007 Full Papers*, pages 41–48, 2007.
- [9] T. Schafhitzel, F. Rössler, D. Weiskopf, and T. Ertl. Simultaneous Visualization of Anatomical and Functional 3D Data by Combining Volume Rendering and Flow Visualization. In *Proceedings of SPIE Medical Imaging 2007: Visualization and Image-Guided Procedures*, pages 650902 1–9, 2007.
- [10] D. Weiskopf, T. Schafhitzel, and T. Ertl. Texture-Based Visualization of 3D Unsteady Flow by Real-Time Advection and Volumetric Illumination. *IEEE Transactions on Visualization and Computer Graphics*, 13(3):569–582, 2007.
- [11] J. E. Vollrath, T. Schafhitzel, and T. Ertl. Employing Complex GPU Data Structures for the Interactive Visualization of Adaptive Mesh Refinement Data. In *Proceedings of the International Workshop on Volume Graphics '06*, pages 55–58, 2006.
- [12] T. Schafhitzel, D. Weiskopf, and T. Ertl. Interactive Investigation and Visualization of 3D Vortex Structures. In *Electronic Proceedings International Symposium on Flow Visualization '06*, 2006.
- [13] D. Weiskopf, M. Borchers, T. Ertl, M. Falk, O. Fechtig, R. Frank, F. Grave, P. Jezler, A. King, U. Kraus, T. Mueller, H.-P. Nollert, I. Rica Mendez, H. Ruder, T. Schafhitzel, C. Zahn, and M. Zatloukal. Explanatory and Illustrative Visualization of Special and General Relativity. *IEEE Transactions on Visualization and Computer Graphics*, 2006.
- [14] D. Weiskopf, M. Borchers, T. Ertl, M. Falk, O. Fechtig, R. Frank, F. Grave, P. Jezler,

- A. King, U. Kraus, T. Mueller, H.-P. Nollert, I. Rica Mendez, H. Ruder, T. Schafhitzel, C. Zahn, and M. Zatloukal. Visualization in the Einstein Year 2005: A Case Study on Explanatory and Illustrative Visualization of Relativity and Astrophysics. In *Proceedings of IEEE Visualization '05*, pages 583–590, 2005.
- [15] T. Schafhitzel, D. Weiskopf, and T. Ertl. Interactive Exploration of Unsteady 3D Flow with Linked 2D/3D Texture Advection. In *Proceedings of the 3rd International Conference on Coordinated and Multiple Views in Exploratory Visualization (CMV 2005)*, pages 96–105, 2005.
- [16] D. Weiskopf, T. Schafhitzel, and T. Ertl. Real-time advection and volumetric illumination for the visualization of 3D unsteady flow. In *Proc. Eurovis 2005 (EG / IEEE VGTC Symposium on Visualization)*, pages 13–20, 2005.
- [17] D. Weiskopf, T. Schafhitzel, and T. Ertl. GPU-Based Nonlinear Ray Tracing. *Computer Graphics Forum (Eurographics 2004)*, 23(3):625–633, 2004.

References

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