Cyril Crassin, Ph.D

Born: 13/04/1983
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Websites: NVIDIA, INRIA, Icare3D Personal Website

Doctor in computer graphics

Research interests: *Image synthesis, real-time realistic rendering, voxel representations, ray-tracing, massively parallel GPU algorithms & data structures, out-of-core rendering.*

EDUCATION

2007 – 2011 **Ph.D in Computer Graphics**.
Grenoble University / INRIA, Grenoble, France. ARTIS Team. LJK Laboratory.
Advisor: Fabrice Neyret. Merit-based Ph.D grant from Ministry of Research and Higher Education.
Dissertation topic: **GigaVoxels: A Voxel-Based Rendering Pipeline For Efficient Exploration Of Large And Detailed Scenes**.
Committee members:
- Mathias Paulin, *Professeur, Université Paul Sabatier, Toulouse (Rapporteur 1)*
- Michael Wimmer, *Associate Professor, Technische Universität, Wien (Rapporteur 2)*
- Jean-Michel Dischler, *Professeur, Université de Strasbourg*
- Carsten Dachsbacher, *Professor, Karlsruhe Institute of Technology*
- Miguel Sainz, *Director of Developer Technology, NVIDIA*
- Francois Sillion, *Directeur de Recherche, INRIA*
- Fabrice Neyret, *Directeur de Recherche, CNRS*

2006 – 2007 **M.Sc in Computer Graphics**. With honors.
National Polytechnic Institute of Grenoble (INPG), Grenoble, France. EVASION Team (LJK-INRIA).
Thesis: Algorithms and Representation for Interactive Exploration of Large and Detailed Procedural Volumes.
Advisor: Fabrice Neyret. In collaboration with Sylvain Lefebvre.

2003 – 2006 **M.Eng in Computer Science** *(Engineering School)* with Computer Graphics specialization.
Belfort-Montbéliard University of Technology (UTBM), Belfort, France.

PROFESSIONAL EXPERIENCE

2011-now **NVIDIA Corporation** Research group. *Santa Clara, CA, USA*.
Research scientist.

2010 **Weta Digital**. Fx & Research group. *Wellington, NZ*.
3 months. R&D collaboration on voxel based special effects engine for movies production.

2008, 2010 **NVIDIA Corporation**. Developer Technology group. *London, UK*.
3 + 2 months. Summer intern. Sparse voxel octree for video games (CUDA), real-time indirect illumination.

2007 **INRIA Rhone-Alpes**. EVASION Team of LJK Laboratory. *Grenoble, France*.
6 months. Master's degree. Design and development of new data structures and algorithms for interactive exploration and rendering of large and detailed volumes on GPU. Fabrice Neyret, Sylvain Lefebvre.

2006 **Dassault Systemes** (CAD-CAM Softwares). Research team (3D4All). *Suresnes, France*.
6 months internship. Engineer's degree. Development of a real time 3D Navier-Stokes fluid simulation for gaseous and liquids phenomena on GPU (GPGPU). Prototype targeting *Catia* and *Virtools*.

2005 **French Atomic Energy Commission** (CEA). Military applications CEA/DAM, *Bruyères le Chatel, France*.
6 months internship. Engineer's degree 2nd year. R&D in 3D scientific visualization and parallel computing.

2003 **Computer Science laboratory of Orléans University** (LIFO). *VR research team, Orléans, France*.
3 months internship. Associate's Degree. Parallel Virtual Reality R&D. Development of a distributed Virtual Reality demo on PC cluster using parallel physics simulation and cellular automata.

PUBLICATIONS AND TALKS

[CNS+11] **Interactive indirect illumination using voxel cone tracing**. Cyril Crassin, Fabrice Neyret, Miguel Sainz, Simon Green, and Elmar Eisemann. In *Computer Graphics Forum (Proc. of Pacific Graphics 2011)*, September 2011. http://research.nvidia.com/publication/interactive-indirect-illumination-using-voxel-cone-tracing.

[CNLE09] **Gigavoxels : Ray-guided streaming for efficient and detailed voxel rendering**. Cyril Crassin, Fabrice Neyret, Sylvain Lefebvre, and Elmar Eisemann. In *ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D)*. ACM, February 2009. http://artis.imag.fr/Publications/2009/CNLE09.

[BNM+08] **Interactive multiple anisotropic scattering in clouds**. Antoine Bouthors, Fabrice Neyret, Nelson Max, Eric Bruneton, and Cyril Crassin. In *ACM Symposium on Interactive 3D Graphics and Games (I3D)*, 2008. http://www-evasion.imag.fr/Publications/2008/BNMBC08.

[CNSE10] **Efficient rendering of highly detailed volumetric scenes with gigavoxels**. Cyril Crassin, Fabrice Neyret, Miguel Sainz, and Elmar Eisemann. In *GPU Pro*, pages 643–676. A K Peters, 2010. http://artis.imag.fr/Publications/2010/CNSE10.

[CG12] **Octree-based sparse voxelization using the gpu hardware rasterizer**. Cyril Crassin and Simon Green. In *OpenGL Insights*. A K Peters [ONGOING PUBLICATION], 2012.

[BNM+07] **Rendu interactif de nuages réalistes**. Antoine Bouthors, Fabrice Neyret, Nelson Max, Eric Bruneton, and Cyril Crassin. In *AFIG '07 (Actes des 20èmes journées de l'AFIG)*, pages 183–195, Marne la Vallée, France, November 2007. AFIG. http://artis.imag.fr/Publications/2007/BNMBC07.

Talks and posters with selection committee

[CNS+11] **Interactive indirect illumination using voxel cone tracing: An insight**. Cyril Crassin, Fabrice Neyret, Miguel Sainz, Simon Green, and Elmar Eisemann. In *SIGGRAPH 2011 : Technical Talk*. ACM SIGGRAPH, August 2011. http://maverick.inria.fr/Publications/2011/CNSGE11a/.

[CNS+11b] **Interactive indirect illumination using voxel cone tracing: A preview**. Cyril Crassin, Fabrice Neyret, Miguel Sainz, Simon Green, and Elmar Eisemann. In *Poster ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D). Best Poster Award.*, February 2011. http://artis.imag.fr/Publications/2011/CNSGE11.

[CNL+09a] **Beyond triangles : Gigavoxels effects in video games**. Cyril Crassin, Fabrice Neyret, Sylvain Lefebvre, Miguel Sainz, and Elmar Eisemann. In *SIGGRAPH 2009 : Technical Talk + Poster (Best Poster Award Finalist)*. ACM SIGGRAPH, August 2009. http://artis.imag.fr/Publications/2009/CNLSE09.

Dissertations

[Cra11] **Gigavoxels: A voxel-based rendering pipeline for efficient exploration of large and detailed scenes**. Cyril Crassin. In *Ph.D Thesis in computer science and applied mathematics*. Grenoble University, July 2011. http://maverick.inria.fr/Membres/Cyril.Crassin/thesis/CCrassinThesis_EN_Web.pdf.

[Cra07] **Représentation et algorithmes pour l'exploration interactive de volumes procéduraux Étendus et détaillés**. Cyril Crassin. In *Dissertation de M2 Recherche*. UJF/INPG, INRIA, July 2007. http://maverick.inria.fr/Publications/2007/CN07/.

[Cra06] **Animation temps réel de phénomènes fluides basée sur une technologie gpgpu**. Cyril Crassin. In *Dissertation de projet de fin d'études d'ingénieur*. Dassault Systemes, July 2006. http://www.icare3d.org/myprojects/internships/stage_st50_dassault_systemes.html.

[Cra05] **Rendu volumique accéléré matériellement en environnement parallèle à mémoire distribuée**. Cyril Crassin. In *Dissertation de stage d'ingénieur*. CEA, February 2005. http://www.icare3d.org/myprojects/internships/stage_st40_cea-dam.html.

Major invited talks and seminars

[Cra11] **Real-time ray-casting and streaming of highly detailed voxel scenes**. Cyril Crassin. In *University of California-Davis (UCDavis), VIDI, SciDAC Institute for Ultra-Scale Visualization, CA, USA*, February 2011.

[Cra11b] **Interactive indirect illumination using voxel cone-tracing**. Cyril Crassin. In *Chapitre Francais de l'ACM Siggraph, Paris, France*, June 2011.

[Cra10a] **Parallelisme au coeur du rendu haute performance**. Cyril Crassin. In *Laboratoire d'Informatique Fondamentale d'Orleans, Orleans, France*, January 2010.

[Cra09] **Ray-guided streaming for efficient and detailed voxel rendering**. Cyril Crassin. In *Massachusetts Institute of Technology (MIT) - CSAIL graphics group. Boston, MA*, February 2009.

[Cra09b] **GigaVoxels: Voxels come into play**. Cyril Crassin. In *Crytek Conference Talk. Crytek GmbH. Frankfurt, Germany*, November 2009. http://artis.imag.fr/Publications/2009/Cra09.

[Cra09a] **GigaVoxels: Efficient rendering of highly detailed voxel scenes**. Cyril Crassin. In *Groupe de Travail Rendu et Visualisation, Telecom ParisTech, Paris, France*, February 2009.

[Cra09d] **From video games to tomography: Real-time visualization of large and detailed volumes on the gpu**. Cyril Crassin. In *Chapitre Francais de l'ACM Siggraph, Paris, France*, March 2009.

[Cra08] **Real-time visualization of large detailed volumes on the gpu**. Cyril Crassin. In *Fraunhofer Institute - ITWM group, Competence Center for HPC. Kaiserslautern, Germany*, September 2008.

[CNE09] **Building with bricks: Cuda-based gigavoxel rendering**. Cyril Crassin, Fabrice Neyret, and Elmar Eisemann. In *Intel Visual Computing Research Conference*, 2009. http://artis.imag.fr/Publications/2009/CNE09.

TECHNICAL SKILLS

Main skills	Computer graphics, graphics hardware programming, real-time rendering, GPGPU, scientific visualization, parallel computing, software design.
Languages	C/C++ *(8 years experience, design patterns, template meta-programming)*, Java, ADA95, x86 assembly, Visual Basic, Pascal, LISP, PROLOG, PHP, SQL, Javascript.
GPU	8 years experience in OpenGL. 4.5 years experience in CUDA. Shading languages (GLSL,Cg,ASM,...). OptiX. Debugging tools: gDEBugger, AgPerfMon, Parallel NSight.
Libs/API	STL, Boost, QT. Software design: UML. Source control: SVN, CVS, Perforce. Doxygen.
Modeling soft.	3D Studio MAX, 3D-Coat, Blender.
Sec. skills	Image processing, embedded systems, artificial intelligence, multi-agents systems.

LANGUAGES

French	Native language
English	Fluent. TOEIC score: 850/990 (2005)