# Frédo Durand

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## EXPERIENCE

**MIT, EECS department and CSAIL, Assistant Professor, 2002-present**

Research on Computational Photography, Realistic Rendering, Real-time Rendering and Non-Photorealistic Rendering.

**MIT Lab for Computer Science, Post-Doctoral Associate, 1999-2002**

With Julie Dorsey. Research on realistic rendering, image-based modeling and photo editing, perceptually based graphics, real-time rendering and non-photorealistic rendering. Created and taught a multidisciplinary course "the art and science of depiction."

**University of Grenoble, France, PhD student, 1995-99**

*3D Visibility: Analytical study and applications.* My thesis focused on both theoretical analytical tools, and the development of practical visibility techniques for lighting simulation and real-time rendering. Advisors: Prof. Claude Puech and Dr. George Drettakis, iMAGIS - GRAVIR / INRIA.

**Stanford University, Invited graduate student, August 1998**

Work on visibility with Leo Guibas and Mark de Berg.

## EDUCATION

Ph.D. 1999, University of Grenoble, France, with honors.

DEA (Masters), 1995, Polytechnic Institute of Grenoble.

École Normale Supérieure of Paris.

## TEACHING EXPERIENCE

**Introduction to Computer Graphics, MIT Fall 02-04**

Junior-level introduction of fundamental graphics algorithms: ray tracing, rasterization, curves and surfaces, animation.

**Advanced Computer Graphics, MIT Spring 04**

Graduate level advanced course co-created with Jovan Popovic. The course puts the emphasis on the underlying mathematical fundamental, as motivated by graphics problems. Mesh data structures, subdivision surfaces, finite elements, Monte-Carlo integration, optimization, PDE integration.

**Structure and Interpretation of Computer Programs, MIT, Spring 03**

Recitation instructor for this freshman-level introduction to computer science (in Lisp).

**Creation and full teaching responsibility of a graduate multi-disciplinary class**
*The Art and Science of Depiction.* **MIT, Spring 2001**

For computer science, architecture, media arts and science, and cognitive science students. Explores the scientific, perceptual and artistic principles behind picture production. http://gfx.lcs.mit.edu/~fredo/Depiction

**Full teaching responsibility for a freshman class, University of Grenoble, France, 1997-1999.**

*Introduction to computer science.* Includes Pascal programming with an introduction to Unix.

**Teaching Assistant, Grenoble, France, 1996-99**

**ACM SIGGRAPH course**

Organizer of a full-day course for SIGGRAPH 2002: *Perceptual and artistic principles for effective computer depiction.*

## AWARDS AND RECOGNITION

**EUROGRAPHICS Young Researcher Award 2004**

## PROFESSIONAL ACTIVITIES

**Advisory board of Image and Meaning $_2$**
Conference organized by Felice Frankel at the Getty museum. The conference will gather scientists, artists, psychologists around the theme of images and science.

**Co-organizer of a Symposium on Computational Photography and Video**

with Marc Levoy (Stanford) and Rick Szeliski (Micorsoft). The symposium will take place at MIT in May 2005. The symposium will be a 3-day event with about 15 invited speakers.

**Journal board**

ACM Transactions on Graphics
Foundations & Trends in Computer Vision & Graphics
Guest editor special issue of CG&A on smart depiction for visual communication

**Program committee**

SIGGRAPH 2003-04
NPAR 2004
Eurographics 2004
Symposium on Point-Based Graphics 2004
ACM Symposium on Computational Geometry video review 2003
Eurographics Symposium (former Workshop) on Rendering 2002, 2003
Graphics Interface '2000

**Invited talks:**

3DPVT 2004, MIT department of architecture 2004, Renssaer Polytechnic 2004, University of Michigan 2004, Chalmers University 2003, Endnote MIT Student Oxygen Workshop, 2003, Dagstuhl seminar 2003, University of Utah 2003, Brown University 2003, University of Illinois at Urbana Champaign 2003, New York University 2003, University of Montreal 2003, IBM T.J. Watson Center 2003, Trinity College Dublin 2002, University of North Carolina 2002, MERL 2002, Boston SIGGRAPH local chapter 2002, Ecole Polytechnique Paris 2002, MIT 2002, University of Toronto 2002, University of British Columbia 2002, UC Sand Diego 2002, Columbia University 2002, University of Southern California 2002, Harvard 2002, University of Illinois at Urbana Champaign 2002, INRIA Sophia 2001, Realviz corp. 2001, NYU Media Research Lab 2001, MIT brain and cognitive science material seminar 2001, Adobe corp. 2001, UC Berkeley image and video processing lunch 2001, UC Berkeley graphics lunch 2001, Stanford University 2001, University College of London 2001, Eurographics/SIGGRAPH Campfire on perceptually adaptive graphics 2001, Boston SIGGRAPH local chapter 2001, Princeton 2001, École des Mines de Paris 2001, University of Washington 2000, Microsoft Research 2000, Introductory talk at the Workshop on Visibility 2000, TU Vienna 2000, Dagstuhl seminar 2000, Boston SIGGRAPH local chapter 2000, iMAGIS-INRIA seminar 2000, INRIA Sophia 1999, Hewlett Packard Lab. 1998, Intel Corp. 1998, University of Barcelona 1998, University of Girona 1998, University of Montreal 1997, MIT Graphics Group 1997.

## PUBLICATIONS

**Book in preparation**

*Visibility and Occlusion: Rendering Acceleration and Shadow Computation.*
Yiorgos Chrysanthou, Daniel Cohen-Or, Frédo Durand, Claudio Silva, Pierre Poulin and Andrew Woo
Proposal accepted by Morgan Kaufman publishers.

**SIGGRAPH**

Flash Photography Enhancement Via Intrinsic Relighting
Elmar Eisemann and Frédo Durand
SIGGRAPH 2004

Billboard Clouds for Extreme Model Simplification
Xavier Décoret, Frédo Durand, Francois Sillion and Julie Dorsey
In ACM SIGGRAPH 2003, Conference Proceedings Annual Conference Series, July 2003.

Non-Iterative Feature-Preserving Mesh Filtering
Thouis Ray Jones, Frédo Durand and Mathieu Desbrun
In ACM SIGGRAPH 2003, Conference Proceedings Annual Conference Series, July 2003.

Fast Bilateral Filtering for the Display of High-Dynamic-Range Images
Frédo Durand and Julie Dorsey
In ACM SIGGRAPH 2002, Conference Proceedings Annual Conference Series, July 2002.

Image-Based Modeling and Photo Editing.
Byong Mok Oh, Max Chen, Julie Dorsey and Frédo Durand
In ACM SIGGRAPH 2001, Conference Proceedings Annual Conference Series, August 2001.

A Physically-Based Night Sky Model.
Henrik Wann Jensen, Frédo Durand, Michael Stark, Simon Premoze, Julie Dorsey and Peter Shirley.
In ACM SIGGRAPH 2001, Conference Proceedings Annual Conference Series, August 2001.

Conservative Visibility Preprocessing using Extended Projections.
Frédo Durand, George Drettakis, Joëlle Thollot and Claude Puech.
In ACM SIGGRAPH 2000, Conference Proceedings Annual Conference Series, July 2000.

The Visibility Skeleton: A Powerful and Efficient Multipurpose Global Visibility Tool.
Frédo Durand, George Drettakis, and Claude Puech.
In ACM SIGGRAPH 97 Conference Proceedings Annual Conference Series, August 1997.

**Journal**

Defining Pictorial Style: Lessons from Linguistics and Computer Graphics
John Willats and Frédo Durand
to appear in Axiomathes

Normal Improvement for Point Rendering
Thouis Jones, Frédo Durand, Matthias Zwicker
IEEE Computer Graphics & Applications, July/August 2004, pages 53-56.

The 3D Visibility Complex.
Frédo Durand, George Drettakis, and Claude Puech.
ACM Transactions on Graphics, accepted for publication.

A Survey of Visibility for Walkthrough Applications.
Daniel Cohen-Or, Yiorgos Chrysanthou, Claudio Silva and Frédo Durand.
IEEE Transactions on Visualization and Computer Graphics, accepted for publication.

Fast and Accurate Hierarchical Radiosity Using Global Visibility.
Frédo Durand, George Drettakis, and Claude Puech.
ACM Transactions on Graphics Volume 18, No. 2, April 1999.

**International refereed conferences or workshops**

An Efficient Hybrid Shadow Rendering Algorithm
Eric Chan and Frédo Durand
Eurographics Symposium on Rendering 2004

Spherical Harmonic Gradients for Mid-Range Illumination
T. Annen, J. Kautz, F. Durand, H.-P. Seidel
Eurographics Symposium on Rendering, 2004

An Interactive Artificial Ant Approach to Non-Photorealistic Rendering
Yann Semet, Una-May O'Reilly, Frédo Durand
GECCO'04: Genetic and Evolutionary COmputation Conference

Density Measure for Line-Drawing Simplification
Stéphane Grabli, Frédo Durand, François Sillion
Proceedings of Pacific Graphics – 2004

Programmable Style for NPR Line Drawing
Stéphane Grabli, Emmanuel Turquin, Frédo Durand, François Sillion
Eurographics Symposium on Rendering 2004

Rendering Fake Soft Shadows with Smoothies
Eric Chan and Frédo Durand
Eurographics Symposium on Rendering, June 2003

Dynamic Canvas for Non-Photorealistic Walkthroughs
Matthieu Cunzi, Joelle Thollot, Sylvain Paris, Gilles Debunne, Jean Dominique Gascuel and Frédo Durand
In Proceedings of Graphics Interface'03, June 2003 (best student paper award).

An Invitation to Discuss Computer Depiction.
Frédo Durand.
ACM/Eurographics Symposium on Non-Photorealistic Animation and Rendering, June 2002.

Decoupling Strokes and High-Level Attributes for Interactive Traditional Drawing.
Frédo Durand, Victor Ostromoukhov, Mathieu Miller, François Duranleau, and Julie Dorsey.
In 12$^{th}$ Eurographics Workshop on Rendering, London (UK), June 2001.

Interactive Tone Mapping.
Frédo Durand and Julie Dorsey.
In 11$^{th}$ Eurographics Workshop on Rendering, Brno (Czech Republic), June 2000.

The 3D Visibility Complex: a unified data-structure for global visibility of scenes of polygons and smooth objects.
Frédo Durand, George Drettakis, and Claude Puech.
In 9$^{th}$ Canadian Conference on Computational Geometry Kingston (Canada), August 1997.

The 3D Visibility Complex, a new approach to the problems of accurate visibility.
Frédo Durand, George Drettakis, and Claude Puech.
In 7$^{th}$ Eurographics Workshop on Rendering Porto (Portugal), June 1996.

Using the Visibility Complex for Radiosity Computation.
Rachel Orti, Frédo Durand, Stéphane Rivière, and Claude Puech.
In Proceedings ACM Workshop on Applied Computational Geometry Philadelphia (USA), May 1996.

Radiosity for Dynamic Scenes in Flatland with the Visibility Complex.
Rachel Orti, Stéphane Rivière, Frédo Durand, and Claude Puech.
In Proceedings Eurographics Poitier (France), August 1996.

**SIGGRAPH Course Notes**

A Multidisciplinary Survey of Visibility.
Frédo Durand.
ACM SIGGRAPH course notes, Visibility, Problems, Techniques, and Applications, July 2000 and August 2001.

**Videos**

Billboard Clouds for Extreme Model Simplification.
Xavier Décoret, Frédo Durand and Julie Dorsey.
In Video Proceedings, 19th ACM Symposium on Computational Geometry San Diego (USA), June 2003.

3D Visibility made Visibly Simple.
Frédo Durand, George Drettakis, and Claude Puech.
In Video Proceedings, 13th ACM Symposium on Computational Geometry Nice (France), June 1997.

Radiosity in Flatland made Visibly Simple.
Frédo Durand, Rachel Orti, Stéphane Rivière, and Claude Puech.
In Video Proceedings, 12th ACM Symposium on Computational Geometry, Philadelphia (USA), May 1996.

The Visibility Complex made Visibly Simple.
Frédo Durand, and Claude Puech.
In Video Proceedings, 11th ACM Symposium on Computational Geometry, Vancouver (Canada), June 1995.

**In preparation and under submission**

A Computational Model of Visual Adaptation for Time-Dependent Tone Mapping.
Frédo Durand and Julie Dorsey.
To be submitted to ACM Transactions on Graphics.

Structure-Preserving Clone Brushing.
Byong Mok Oh, Frédo Durand and Julie Dorsey.
To be submitted to IEEE Computer Graphics and Applications.