

Morgan McGuire

Curriculum Vitae

Associate Professor
Department of Computer Science
Williams College
Williamstown, MA 01267
<http://graphics.cs.williams.edu>
morgan@cs.williams.edu

Education

- Ph.D.** Computer Science, Brown University, May 2006.
Thesis: **Computational Videography with a Single-Axis, Multi-Parameter Lens Camera**
Advisor: John F. Hughes
- Sc. M.** Computer Science, Brown University, May 2003.
Thesis: **Fast Shadow Volumes on Graphics Hardware**
Advisor: John F. Hughes
- M.Eng.** Computer Science and Electrical Engineering, MIT, May 2000.
Thesis: **The Curl 2D Immediate Mode Graphics API**
Advisor: Stephen S. Ward
- B.S.** Electrical Engineering and Computer Science, MIT, May 2000.

Professional Positions

2012-Present	Associate Professor of Computer Science	Williams College
2010-Present	Visiting Researcher	NVIDIA Research
2012-2015	Editor-in-Chief	Journal of Computer Graphics Techniques

2006-2012 **Assistant Professor of Computer Science** Williams College

1996-Present **Industry Consulting** through my company, Casual Effects

Clients include:

Activision: Skylanders, Call of Duty, Marvel Ultimate Alliance, Guitar Hero

NVIDIA: Fermi, Maxwell, Pascal and unannounced series GPUs

Unity: Motion blur, depth of field, ambient occlusion, and screen space ray tracing

Iron Lore Entertainment: Networking and UI for Titan Quest game and expansions

PeakStream: GPU computing infrastructure acquired by Google

E Ink: Hardware emulator used to design the display for the Amazon Kindle

and BAE Systems, LightSpace Technologies, Mitsubishi Electric Research Laboratory, ROBLOX, Oculus Technology Corporation, Curl Corporation, Valora Technologies, Pfizer Pharmaceuticals, PixBlitz

2000-2002 **Senior Architect at Oculus Technology Corporation**, Boston, MA

I designed and implemented client-side and plug-in APIs in Java for peer-to-peer connectivity software for major 3D engineering tools like AutoCAD, SolidWorks, ProEngineer, and PTC. I created a visual programming environment for a networked compiler.

1998-2000 **Senior Graphics Architect at Curl Corporation**, Cambridge, MA

I designed the graphics systems and parts of the compiler for Curl, a web-based language for interactive content. I helped grow the company from 13 to over 100 employees and \$500M valuation by hiring engineers, performing sales support, designing and implementing major APIs, and managing groups of 15 engineers.

Semester Courses

Computational Graphics (CSCI 371) 2007, 2008, 2010, 2012, 2014, 2016	Williams College
Film and Media Studies: An Introduction (COMP258) 2016	Williams College
Cinematography in the Digital Age (CSCI205 + ARTH205 + ENGL203) 2016	Williams College
Visual Media Revolution (CSCI 372T) 2015	Williams College
Creating Games (CSCI 107 + ARTS 107) 2007, 2011, 2012, 2013, 2015, 2017	Williams College
Digital Computation and Communication (CSCI 134) (Introduction to Computer Science) 2006, 2007, 2011	Williams College
Data Structures and Advanced Programming (CSCI 136) 2008, 2011x2, 2012, 2014, 2015, 2016, 2017	Williams College
Principles of Programming Languages (CSCI 334) 2009	Williams College
Interactive Computer Graphics (CS 224) 2004	Brown University

Independent Study Courses Advised

2014 Bidirectional Reflectance Distribution Functions (Physics)	Williams College
2008 Computational Game Design (CS)	Williams College
2007 Computational Game Design (CS)	Williams College
2006 Engagement and Interaction (CS)	Williams College
2003 Game Development (CS)	Brown University

Short Courses

2016 Open Problems in Real-Time	SIGGRAPH 2016
2016 Master Class on Virtual Reality	Activision
2012 Advances in Real-Time Rendering for 3D Graphics and Games	SIGGRAPH 2012
2011 Filtering Approaches for Real-Time Antialiasing	SIGGRAPH 2011
2010 Stylized Rendering in Games	SIGGRAPH 2010

Students Advised

Thesis, Independent study, RA and advisee undergraduates at Williams, project and job placement:

Jamie Lesser '17	Light scattering, ACM Student Research Winner, CRA Undergraduate Runner Up → Apple
Melanie Subbiah '17	Apple
Alexander Majercik '17	Version control
Kelly Wang '16	Cinematography
Sam Donow '16	Computational graphics → Hudson River Trading Company
Guedis Cardenas '15	Scientific rendering benchmarks
Daniel Evangelakos '15	Real-time light field rendering → Google VR
Michael Mara '12	Cloud graphics → NVIDIA → Stanford Ph.D. → Oculus
Chuan Ji '12	Mobile graphics → Google

Zina Cignolle '11	Geometry compression → Amazon Research
Kefei Lei '10	Undergrad graphics thesis → Brown M.Sc. → Activision
Kyle Whitson '09	Graphics RA → Microsoft
Danny Huang '11	Graphics RA → UCSD Ph.D.
Alena Allegretti '11	Suki LLC web development
Bartholemew Tablante '07	Graphics RA → The Hartford
Jeff Marsceill '08	Computational Game Design
Sara Carian '08	Computational Game Design
Sean Hayes '08	Engagement and Interaction
Eric Muller '09	Real-Time Rendering
Sean Barker '09	Collaborative editing → UMass Ph.D. → Wellesley Prof.
Kathleen Creel '10	Intelligent Energy Conservation
Daniel Fast '10	3D Modeling

Yu Sheng (RPI Ph.D. 2010) thesis committee, advisor Barbara Cutler.

George Stathis (Harvard M.Sc, 2005), co-advised with Hanspeter Pfister. His thesis on “Aspect Oriented Shading” won the best thesis award for all departments at Harvard.

Research undergraduates at Brown (2003-2006), and job placement:

Andrea Fein, Microsoft DirectX Group
Pawel Wrotek, Electronic Arts
Colin Hartnett, face2face Animation → CMU graduate program
Kevin Egan, Rhythm & Hues → NYU graduate program
Ethan Bromberg, Brown University/NIH graduate program
Alex Rice, Demiurge Studios
Hari Khalsa

Journal Papers

Phenomenological Transparency

M. McGuire and M. Mara

IEEE Transactions on Vision and Computer Graphics, *in review*

An early version of this work appeared in Proc. of I3D 2016

Fast Ray-Box Intersection

M. McGuire and P. Shirley

Journal of Computer Graphics Techniques, in preparation

Aggregate G-Buffer Anti-Aliasing

C. Crassin, M. McGuire, K. Fatahalian, and A. Lefohn

IEEE Transactions on Vision and Computer Graphics, 2016

An early version of this work appeared in Proc. of I3D 2015

Efficient GPU Screen-Space Ray Tracing

M. McGuire and M. Mara

The Journal of Computer Graphics Techniques, 3(4), 2014

A Survey of Efficient Representations for Independent Unit Vectors

Z. Cigolle*, S. Donow*, D. Evangelakos*, M. Mara, M. McGuire, and Q. Meyer

The Journal of Computer Graphics Techniques, 3(2), 2014

* Undergraduate coauthor

Order-Independent Blended Transparency

M. McGuire and L. Bavoil

The Journal of Computer Graphics Techniques, 2(2), 2013

GPU Ray Tracing

S. G. Parker, H. Friedrich, D. Luebke, K. Morley, J. Bigler, J. Hoberock, D. McAllister, A.

Robison, A. Dietrich, G. Humphreys, M. McGuire, and M. Stich

Communications of the ACM, 56(5), 2013

2D Polyhedral Bounds of a Clipped, Perspective-Projected Sphere

M. Mara* and M. McGuire

The Journal of Computer Graphics Techniques, 2(2), 2013

Efficient Triangle and Quadrilateral Clipping in Shaders

M. McGuire

The Journal of Graphics Tools, Taylor and Francis, 15(4), 2011

OptiX: A General Purpose Ray Tracing Engine

S. G. Parker, J. Bigler, A. Dietrich, H. Friedrich, J. Hoberock, D. Luebke, D. McAllister,

M. McGuire, K. Morley, A. Robison, M. Stich

ACM Transactions on Graphics (Proceedings of SIGGRAPH 2010), 29(4):13, August 2010

An Inexpensive Light Stage Dome

M. McGuire

The Journal of Graphics Tools, 14(9):23-29, A K Peters, 2009

Fast, High-Quality Bayer Demosaicing on GPUs

M. McGuire

Journal of Graphics, Game, and GPU Tools, 13(4):1-16, A K Peters, 2008

Optical Splitting Trees for High-Precision Monocular Imaging

M. McGuire, B. Chen, W. Matusik, H. Pfister, S. Nayar, and J. F. Hughes

IEEE Computer Graphics and Applications, 27(2):32-42, March 2007

Real-Time Bump Map Deformations using Graphics Hardware

P. Wrotek*, A. Rice*, and M. McGuire

Journal of Graphics Tools, 10(4):1-22, A K Peters, 2005

Defocus Video Matting

M. McGuire, W. Matusik, H. Pfister, J. F. Hughes, and F. Durand.

ACM Transactions on Graphics (Proceedings of SIGGRAPH '05), 24(3): 567-576, August 2005

Observations on Silhouette Sizes

Journal of Graphics Tools, 9(1):1-12, August, 2004

Analysis of Image Registration Noise Due to Rotationally Dependent Aliasing

H. S. Stone, B. Tao, and M. McGuire

Journal of Visual Communication and Image Representation 14: 114-135, 2003

Techniques for Multiresolution Image Registration in the Presence of Occlusions

M. McGuire and H.S. Stone

IEEE Transactions on Geoscience and Remote Sensing, 38(3):1476-1479, May 2000

An early version of this work appeared in Proc. of the 26th AIPR Workshop in 1997

The Translation Sensitivity of Wavelet-Based Registration

H. S. Stone, J. Le Moigne, and M. McGuire

IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), 21(10):1074-1081, 1999

An early version of this work appeared in Proc. of Image Registration Workshop in 1997

Peer-Reviewed Conference Papers

Real-Time Global Illumination using Precomputed Light Field Probes

M. McGuire, M. Mara, D. Nowrouzezahrai, and D. Luebke

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) 2017

Hashed Alpha Testing

C. Wyman and M. McGuire

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D) 2017

A Phenomenological Scattering Model for Order-Independent Transparency

M. McGuire and M. Mara

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), February, 2016

Aggregate G-Buffer Anti-Aliasing

C. Crassin, M. McGuire, K. Fatahalian, and A. Lefohn

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), March, 2015

I3D'15 Best Presentation Awards 2 nd Place
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A Fast and Stable Feature-Aware Motion Blur Filter

J. Guertin, M. McGuire, and D. Nowrouzezahrai

ACM SIGGRAPH / Eurographics High Performance Graphics, June, 2014

Toward Practical Real-Time Photon Mapping: Efficient GPU Density Estimation

M. Mara*, D. Luebke, and M. McGuire

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), March, 2013

Scalable Ambient Obscurance

M. McGuire, M. Mara*, and D. Luebke

ACM SIGGRAPH / Eurographics High Performance Graphics, June, 2012

A Reconstruction Algorithm for Plausible Motion Blur

M. McGuire, P. Hennessy, M. Bukowski, and B. Osman

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), Feb. 2012

The Alchemy Screen-Space Ambient Obscurance Algorithm

M. McGuire, B. Osman, M. Bukowski, and P. Hennessy

ACM SIGGRAPH / EuroGraphics High-Performance Graphics, 8, August 5, 2011

Colored Stochastic Shadow Maps

M. McGuire and E. Enderton

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 89-96, Feb. 2011

A Local Image Reconstruction Algorithm For Stochastic Rendering

P. Shirley, T. Aila, J. Cohen, E. Enderton, S. Laine, D. Luebke and M. McGuire

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 9-14, Feb. 2011

Subpixel-Reconstruction Antialiasing

M. Chajdas, M. McGuire and D. Luebke

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 15-22, Feb. 2011

Ambient Occlusion Volumes

M. McGuire

ACM SIGGRAPH /EuroGraphics High Performance Graphics, 47-56, 2010

HPG'10 Best Paper Awards 1 st Place

**Real-Time Stochastic Rasterization
on Conventional GPU Architectures**

M. McGuire, E. Enderton, P. Shirley, and D. Luebke
ACM SIGGRAPH/EuroGraphics High Performance Graphics, 173-182, 2010

HPG'10 Best Paper Awards
2nd Place

Hardware-Accelerated Global Illumination by Image Space Photon Mapping

M. McGuire and D. Luebke
ACM SIGGRAPH/EuroGraphics High-Performance Graphics 2009, 77-89, Aug., 2009

HPG'09 Best Paper
Awards
2nd Place

Indirection Mapping for Quasi-Conformal Relief Texturing

M. McGuire and K. Whitson*
ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 191-198, Feb. 2008

Huff(man)ing and Puffing

M. McGuire and T. Murtagh
ACM SIGCSE conference "Nifty Assignment" track, March 12, 2008
<http://nifty.stanford.edu/2008/mcguire-murtagh-huffman-image/>

Dynamic Humanoid Balance through Inertial Control

O. C. Jenkins, P. Wrotek*, and M. McGuire
IEEE-RAS International Conference on Humanoid Robots, 501-506, December 29, 2007
*An earlier version of this work appeared as *Dynamo: Dynamic, Data-Driven Character Control with Adjustable Balance* at the SIGGRAPH Symposium on Video Games.*

Mapping the Mental Space of Game Genres

J. P. Lewis, P. Fox*, and M. McGuire
ACM SIGGRAPH Symposium on Video Games (Sandbox), 103-108, August 4, 2007

Dynamo: Dynamic, Data-Driven Character Control with Adjustable Balance

P. Wrotek*, O. C. Jenkins, and M. McGuire
ACM SIGGRAPH Symposium on Video Games (Sandbox), 61-70, July 29, 2006

Dual-Imager Matting

M. McGuire and W. Matusik
EuroGraphics Symposium on Rendering (EGSR), June 30, 2006

Real-Time Rendering of Cartoon Smoke and Clouds

M. McGuire and A. Fein*
ACM SIGGRAPH International Symposium on Non-photorealistic Animation and Rendering (NPAR), Annecy, Fr., June 4, 2006

Abstract Shade Trees

M. McGuire, G. Stathis, H. Pfister, and S. Krishnamurthi
ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, Redwood City, CA.
March 14-17, 2006

Stathis received the Best Thesis Award at
Harvard Extension School in 2005 for this work

Hardware Contour Rendering

M. McGuire and J. F. Hughes
ACM SIGGRAPH International Symposium on Non-photorealistic Animation and Rendering (NPAR). 21-26, Annecy, France. June 2004

Programming Languages for Image Compression

M. McGuire, S. Krishnamurthi, and J. F. Hughes
European Symposium on Programming Languages (ESOP). 68-82, Grenoble, France. June 2002

Image Registration Using Wavelet Techniques

H. S. Stone, J. Le Moigne, and M. McGuire

Proc. of the 26th AIPR Workshop, Proc. of the SPIE, Exploiting New Image Sources and Sensors
3240:116-125, 1997

Techniques for Multi-Resolution Image Registration in the Presence of Occlusions

M. McGuire and H.S. Stone

Proc. of Image Registration Workshop, pp.101-122, 1997

Peer-Reviewed Presentations, Posters, and Abstracts

Experimental Validation of Computer Graphics Microfacet Theory

J. Lesser*, M. McGuire, and W. Lopes

Poster ACM GHC 2015

Lesser received 1st place in the
ACM/GHC Undergraduate
Research Competition for this work

Join the Digital Text Revolution

M. McGuire

Talk at ACM SIGGRAPH 2013

Interactive Indirect Lighting Computed in the Cloud

C. Crassin, D. Luebke, M. Mara*, M. McGuire, B. Oster, P. Shirley, P. Sloan, and C. Wyman

Talk at ACM SIGGRAPH 2013

Stochastic Rasterization

E. Enderton and M. McGuire

GPU Technology Conference. San Jose, CA. May 15, 2012

Ambient Occlusion Volumes

M. McGuire

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games 2010 Poster, Washington,
D.C., February 2010

Best Poster Award

GUIs for Real-time Programs using Universal Pointers

M. McGuire

ACM SIGGRAPH 2008 Poster, Los Angeles, CA, August 2008

Yang Fan is Born

D. Huang* and M. McGuire

Extended Abstract in *Proceedings of the International Symposium on Non-photorealistic
Animation and Rendering (NPAR)*, Annecy, Fr., June 11, 2008

Sketching Line Animation in the Presence of Physics

M. McGuire

Poster at International Symposium on Non-photorealistic Animation and Rendering (NPAR),
Annecy, Fr., June 11, 2008

Last Diminisher Improves Balance in *Settlers of Catan*

S. Carian* and M. McGuire

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), February 15, 2008

Single-Pass Shadow Volumes for Arbitrary Meshes

ACM SIGGRAPH 2007 Poster Abstract, San Diego, CA. 2007

World-Space Servoing for Character Animation Under Simulation

P. Wrotek*, O. C. Jenkins, and M. McGuire

ACM SIGGRAPH Sketch. Boston, MA. Aug, 2006

Real-time Triangulation Matting Using Passive Polarization

M. McGuire and W. Matusik
ACM SIGGRAPH Sketch. Boston, MA. Aug, 2006

Defocus Difference Matting

M. McGuire and W. Matusik
ACM SIGGRAPH Sketch. Los Angeles, CA. Aug, 2005

Cave Writing: Toward a Platform for Literary Immersive VR

S. Becker*, S. Greenlee, D. Lemmerman, M. McGuire, N. Musurca, and N. Wardrip-Fruin
ACM SIGGRAPH Sketch. Los Angeles, CA. Aug, 2005

The G3D Engine as a Platform for Research and Education

ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, Redwood City, CA, 2005

A Configurable Single-Axis, Multi-Parameter Lens Camera

M. McGuire, J. F. Hughes, W. Matusik, H. Pfister, F. Durand, and S. Nayar
Poster at the Symposium on Computational Photography and Video, MIT, May 24, 2005

Steep Parallax Mapping

Morgan McGuire and Max McGuire
ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, Washington D.C. 2005

Real-Time Cartoon Smoke Rendering

M. McGuire, A. Fein*, and C. Hartnett*,
ACM SIGGRAPH 2004 Poster, Extended Abstract and Talk, Los Angeles, CA. 2004

1st place 2004 ACM
SIGGRAPH Student
Research Competition

Real-Time Bump Map Deformations using Graphics Hardware

P. Wrotek*, A. Rice*, and M. McGuire
ACM SIGGRAPH 2004 Poster, Extended Abstract and Talk. Los Angeles, CA. 2004

2nd place 2004 ACM
SIGGRAPH Student
Research Competition

A Heightfield on an Isometric Grid

M. McGuire and P. Sibley
ACM SIGGRAPH Sketch. Los Angeles, CA. Aug, 2004
Details published in Tech Report CS-05-14, Brown University, Providence, RI. Oct 2005

Hybrid Billboard Clouds for Model Simplification

E. Bromberg-Martin*, A. Jonsson*, G. E. Marai, and M. McGuire
ACM SIGGRAPH 2004 Poster and Extended Abstract, Los Angeles, CA. 2004

Books and Chapters

The Graphics Codex

M. McGuire
Electronic textbook for iOS and Web, 2012, revised editions 2013-2016

Computer Graphics: Principles and Practice, 3rd Edition

J. F. Hughes, A. van Dam, M. McGuire, D. Sklar, K. Akeley, J. Foley, S. Feiner
Addison-Wesley, 2013

The Skylanders SWAP Force Depth of Field Shader

M. Bukowski, P. Hennessy, B. Osman, and M. McGuire
Chapter 11, GPU Pro 4, W. Engel, editor, CRC Press, 2013

Special Section on Computational Photography

M. McGuire and J. Hayes, editors
ACM Queue
The Association for Computing Machinery, June 2012

Proceedings of NPAR 2010: ACM SIGGRAPH Symposium on Non-Photorealistic Animation and Rendering

M. McGuire and J. Collomosse, editors
The Association for Computing Machinery, June 2010

Special Section on the Symposium on Interactive 3D Graphics and Games

M. McGuire and E. Haines, editors
IEEE Transactions on Visualization and Computer Graphics
Volume 16, no. 5, Sept/Oct 2010

Proceedings of I3D 2009: ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games

E. Haines and M. McGuire, editors
The Association for Computing Machinery, February 2009

Creating Games: Technology, Mechanics, and Content

M. McGuire and O. C. Jenkins
A K Peters, Newton, MA, December 2008
Chapter 5: Design Document, Excerpt republished in Game Career Guide, June 4, 2009
Appendix: The Games Canon, Excerpt republished on Gameshelf Blog, Sept 15, 2009

A Fast, Small-Radius GPU Median Filter

M. McGuire. in *ShaderX⁶*, W. Engel ed. Delmar Thomson Learning, February 2008

The SuperShader

M. McGuire. in *ShaderX⁴*, W. Engel ed. Delmar Thomson Learning, 2006

Effective Shadow Volume Rendering

M. McGuire. in *GPU Gems: Programming Techniques, Tips and Tricks for Real-Time Graphics*, R. Fernando ed. Addison Wesley, 2004, ISBN: 0-321-22832-4

2004 Game Developer Magazine "Front Line Award" for Books

Other Publications

LabelTalk 2009: Memory Rendering, Times Square

M. McGuire
Essay in exhibition brochure
Williams College Museum of Art, January 17, 2009

A Real-Time, Controllable Simulator for Plausible Smoke

Tech Report, Brown University, Providence, RI. March 2006

Computational Videography with a Single-Axis, Multi-Parameter Lens Camera

Tech Report, Brown University, Providence, RI. March 2006

The G3D 3D Engine

Software 2.0, Sept. 2005

A Game Developer's Review of SIGGRAPH 2005/Technical Event Wrap-Up

Gamasutra, http://www.gamasutra.com/features/200508111/mcguire_01.shtml, Aug. 2005

Test sequence for the MPEG multi-view working group

A. Vetro, M. McGuire, W. Matusik, A. Behrens, J. Lee, and H. Pfister
ISO/IEC JTC1/SC29/WG11 Document m12077, Busan, Korea, Apr. 2005

The G3D Graphics Engine: Advanced language features for simplicity and safety in a graphics API
C/C++ Users Journal, Dec. 2004

A Game Developer's Review of SIGGRAPH 2004/Event Wrap-Up

Gamasutra, http://www.gamasutra.com/features/20040830/mcguire_01.shtml, Aug. 2004

Reprinted by ACM SIGGRAPH Vancouver, http://vancouver.siggraph.org/12_archive_2004-08.html, Oct. 2004

A Game Developer's Review of SIGGRAPH 2003

Flipcode, July 2003, <http://www.flipcode.com/misc/siggraph2003.shtml>

Fast, Practical and Robust Shadows

M. McGuire, J. F. Hughes, K. Egan, M. J. Kilgard, and C. Everitt

Tech Report. NVIDIA Corporation, Austin, TX. Nov. 2003

A Game Developer's Review of SIGGRAPH 2002: San Antonio

Flipcode, <http://www.flipcode.com/misc/siggraph2002.shtml>, July 2002

A Game Developer's Perspective of SIGGRAPH 2001

Flipcode, <http://www.flipcode.com/misc/siggraph2001.shtml>, July 2001

A Game Developer's Review of SIGGRAPH 2000: New Orleans

Flipcode, <http://www.flipcode.com/misc/siggraph2000.shtml>, July 2000

The Curl 2D Immediate Mode Graphics API

Masters Thesis, MIT, May 21, 2000

An image registration technique for recovering rotation, scale and translation parameters

NEC Tech Report, Feb. 1998

Patents

(Two additional patents currently pending)

McGuire, Mara, Luebke, and Pantaleoni, **System, method, and computer program product for tiled deferred shading**, April 15, 2016 [NVIDIA]

Shirley, Aila, Cohen, Enderton, Laine, McGuire, and Luebke, **System, method, and computer program product for reducing noise in an image using depth-based sweeping over image samples**, US20120213450 A1, August 23, 2012 [NVIDIA]

McGuire, Demetriou, Grant, and Papakipos, **Application Program Interface of a Parallel-Processing Computer System that Supports Multiple Programming Languages**, US App 20070294663 A1, December 20, 2007 [Google]

Papakipos, Grant, McGuire and Demetriou, **Systems and Methods for Determining Compute Kernels for an Application in a Parallel-Processing Computer System**, US20120144158 A1, June 7, 2012 [Google]

Papakipos, Grant, Demetriou and McGuire, **Systems and Methods for Compiling an Application for a Parallel-Processing Computer System**, US8136104 B2, March 13, 2012 [Google]

Durand, Hughes, Matusik, McGuire, and Pfister, **Method for image matting**, US759955 B2, October 6, 2009 [MERL]

Matusik, McGuire, and Pfister, **Apparatus and method for acquiring and combining images of a scene with multiple optical characteristics at multiple resolutions**, US20060221209 A1, October 5, 2006 [MERL]

Matusik and McGuire, **System and method for defocus difference matting**, US 7408591 B2, August 5, 2008 [MERL]

McGuire and Hotstetter, **System and method for compile-time checking of units**, US 6598186 B1, July 22, 2003 [Curl]

McGuire, **Image Registration Method**, US 6266452 B2, July 24, 2001 [NEC]

Games & Engines

3D Graphics for **Skylanders: Superchargers**
Xbox360, XboxOne, PS3, PS4
Vicarious Visions, published by Activision in 2015

Project Rocket Golfing
Casual Effects, iPhone, iPod Touch, and iPad, April 2015

Shown in competition at the Boston Festival of Indie Games

Lighting and camera effects for **Unity 5.x**
XboxOne, PlayStation 4, Xbox360, PlayStation 3, Wii U, Wii, 3DS, Web, Windows, OS X
Unity Corporation, 2015

3D Graphics for **Skylanders: SWAP Force**
XboxOne, PlayStation 4, Xbox360, PlayStation 3, Wii U, Wii, 3DS
Vicarious Visions, published by Activision in 2013

2013 Best-selling children's game

Developer and designer for **Tracewords**
HTML5 word game
Softgames.de, 2013

Special effects on **Call of Duty: Black Ops II**
Windows PC
Treyarch, published by Activision, 2012

2012 Best-selling adult game

3D Graphics and design consulting on **Marvel Ultimate Alliance 2**
Vicarious Visions, published by Activision, 2009

Software design consulting on **Titan Quest: Immortal Throne**
[uncredited]
Iron Lore Entertainment, published by THQ Interactive, 2007

Software design consulting on **Titan Quest**
Iron Lore Entertainment, published by THQ Interactive, 2006

Graphics and level design on **ROBLOX**
ROBLOX Corporation, 2005

2011 PC Magazine 100 Best Games of All Time (#65)

2006 Academy of Interactive Arts and Sciences "RPG of the Year" finalist.

2005 PC Magazine Top 5 Games of the Year award.

Short Films

The Skylanders Short Cuts series, Five 90-second short films by Vicarious Visions published by Activision in 2013, <http://bit.ly/1yVi2Fc>

Images and Animations

Limbo, Video game exhibit curated for the Williams College Museum of Art, 2011

Photons, Cover of the Williams Report on Science 2009

Pony Matte, Front cover of *Proceedings of EGSR 2006*

Cow Atlas, Front cover of *jgt* 10(4), 2005

Shadow Volume Visualization, in Giles Simon, *3D Integration*, 2006

Matting Collage, on the back cover of *Proceedings of SIGGRAPH 2005* and *Millimeter*, June 2005

Anime Robot, Front cover of the *C/C++ Users Journal*, Dec 2004

Isometric Terrain, Front cover of *Brown CS: The Undergraduate Experience*, Sept. 2004

Teapot and Robot, on the back cover of *Proceedings of NPAR 2004*

Invited Talks, Panels, and Lectures

Phenomenological Transparency

Dartmouth College, October 5, 2016

University of Pennsylvania, November 30, 2016

CS + X: Cross-campus Collaborations

SIGGRAPH 2016, July 24

Film and Media Studies

Taylor University, April 19, 2016

Ex Machina

(With Shawn Rosenheim) Images Cinema, May 28, 2015

Elegance in Video Game Design

Union College, April 29, 2015

Vicarious Visions' Making of Skylanders: SWAP Force

Williams College, July 2014

Brown University, April 30, 2014

University of Montreal, February 27, 2014

Union College, February 19, 2014

Efficient Parallel Simulation of Indirect Illumination

University of Montreal, February 26, 2014

The Augmented Artist: Computation & Content Creation

Banquet Talk at the ACM SIGGRAPH Symposium on Interactive 3D

Graphics and Games (I3D'13), March 22, 2013

Ambient Occlusion & Digital Publishing

Inria Saclay – Île-de-France at École Polytechnique, Orsay, France, June 29, 2012

Estimating Ambient Obscurance in Real Time & Reimagining the Textbook in the Age of the Tablet

Tufts University, Medford MA, March 29, 2012

Gaudino Forum on Danger: Safe Games and Human Computation

Williams College, Williamstown MA, February 21, 2012

Final Scattering

Cornell University, Ithaca NY, August 2, 2011

The Big Picture: The Science of Computation for Visual Communication

Harvard University, Cambridge MA, December 1, 2010

A New Analytic Solution for the Ambient Occlusion Problem

University of Toronto, Toronto, Ontario, Canada, July 15, 2010

University of Iowa, Iowa City, IA, November 19, 2010

Real-Time Stochastic Rasterization

University of Waterloo, Waterloo, Ontario, Canada, July 13, 2010
Dartmouth College, Hanover, NH, TBD, 2011

Image Space Photon Mapping

Rensselaer Polytechnic Institute, Troy, NY, Dec. 3, 2009
University of Massachusetts at Amherst, Amherst, MA, Nov. 17, 2009
University of Pittsburgh, Pittsburgh, PA, Feb. 16, 2010
University of Maryland-Baltimore County, Baltimore, MD, Feb. 18, 2010
University of Maryland, College Park, MD, Feb. 22, 2010

Indirection Mapping

Brown University, Providence, RI, April 25, 2008

Open Source Toolchains

ACM SIGGRAPH Video Game Symposium (Sandbox) Panel, 2007

Efficient Content Creation

Vicarious Visions, Albany, NY, June 11, 2007

Real-Time Rendering of Cartoon Smoke and Clouds

Union College, Schenectady, NY, May 24, 2007

Innovative Computer Input Devices

Bennington College, Bennington VT, May 14, 2007

Hardware-Accelerated Machine Vision

BAE Systems, Burlington, MA, Feb. 16, 2007

Scalable Technology for the Ultimate Virtual Construction Toy

With D. Baszucki and E. Cassel
Stanford University, Stanford, CA, May. 18, 2006

Mechanism Design for Fun and Profit

Stanford University, Stanford, CA, Apr. 18, 2006

Methods for Multi-Sensor Matting

Ricoh, Palo Alto, CA March 28, 2006
Hewlett-Packard, Palo Alto, CA, March 27, 2006

Separating Foreground from Background and Other Applications of a Multi-Sensor Camera

Williams College, Williamstown, MA, Feb. 13, 2006
Northeastern University, Boston, MA, Feb. 17, 2006
University of California at Santa Cruz, Santa Cruz, CA, Feb. 24, 2006

New Results in Video Game Research

University of Massachusetts at Dartmouth, North Dartmouth, MA, Sept 24, 2004

Contours and Constants: Bounding NPR Rendering Time and Making it Fast on Graphics Hardware

MIT, Cambridge, MA, Aug 2004

NPR and Terrain Rendering

Harvard Extension School, Cambridge, MA, May 2004

MacVicar Panel on Education

MIT, Cambridge, MA, Feb 10, 1998

The LASER Computer Graphics Language

NEC USA, Princeton, NJ, Aug 1996

Principles of User Interface Design
NEC USA, Princeton, NJ, Aug 1995

Grants

Google Cardboard grant of 50 VR displays in 2016

Oculus VR grant of four DK2 head-mounted VR displays in 2015

NVIDIA grant of \$1,500 for undergraduate research in 2014

NVIDIA 3D Vision grant in 2010

NVIDIA Computer Lab Upgrade grant for 28 high-end graphics cards for Williams labs in 2008

FlatWorld Knowledge, Inc. grant of \$60,000 for research on collaborative content systems in 2007

Open Source Projects

I am the project manager for four Open Source projects:

G3D Innovation Engine (<http://g3d.sf.net/>) is a C++ library for high-performance 3D graphics on Windows, Linux, and OS X used by students and researchers at many schools and labs. G3D has been downloaded over one million times in the last ten years.

Markdeep (<http://casual-effects.com/markdeep>) is a technology for beautifying plain-text documents and diagrams in a web browser. It is in wide use for software engineers to maintain specifications and manuals.

iCompile (<http://ice.sf.net/>) is a build system for Linux, FreeBSD and OS X. It is an expert system that can compile most projects without per-project configuration (i.e., no Makefiles) and is intended to help students who are new to programming in Unix environments.

Codeheart.js (<http://codeheartjs.com>) is a framework for mobile and web game app development. I'm also using a modified, LOGO-like version called TurtleScript for teaching programming in elementary schools.

Honors and Service

Awards and Fellowships (best paper awards were listed above with publications)

2008	ACM Recognition of Service Award
2006	Brown University Sigma Xi Outstanding Graduate Student Award
2004	1 st place ACM SIGGRAPH Student Research Competition
2004	NVIDIA International Ph.D. Fellowship
2003	NVIDIA International Ph.D. Fellowship
2002	Andy van Dam Fellowship
1994	Hitachi America Scholarship
1994	U.S. Department of the Navy Science Award

Committee, Editorial, and Chairperson Positions

HPG 2017 Co-chair (with Anjul Patney)

JCGT Advisory Board (2015-)

JCGT founding Editor-in-chief (2012-2015)

Graphics Expert for the 2013 ACM/IEEE Computing Curricula Steering Committee

jgt Editor-in-chief (2011-2012)

TVCG Special section co-editor (with Eric Haines) 2010

NPAR 2010 Co-chair (with John Collomosse)

I3D 2009 Papers Co-chair (with Eric Haines)

Member of the Journal of Graphics, GPU, and Game Tools Editorial Board since 2008
HPG 2009 Keynote Session Chair
I3D 2008 General Program Co-chair (with Eric Haines)
I3D 2007 Publicity Chair
I3D 2006 Local Arrangements Chair
I3D 2005 Poster Session Co-chair (with Jason Lawrence)

Reviewing and Program Committees

ACM SIGGRAPH Unified Jury 2016
ACM Transactions on Graphics, SIGGRAPH, & SIGGRAPH Asia (annually since 2003)
ACM I3D papers committee & reviewer (annually since 2003, except 2010)
Eurographics (annually since 2005, except 2007)
Eurographics Symposium on Rendering (intermittently since 2005)
ACM SIGGRAPH NPAR (2002-2010)
ACM SIGGRAPH/Eurographics High Performance Graphics (annually since 2009)
Graphics Interface 2007
Discrete and Computational Geometry 2007
High Performance Graphics (2010-11)
IEEE Transactions on Broadcasting (2011)
IEEE Visualization (2011)
IEEE Transactions on Visualization and Computer Graphics (intermittently since 2003)
IEEE Transactions on Image Processing (intermittently since 2000)
jgt (intermittently 2005-2010)
A K Peters books
ICIG 2004
IJIG 2009

Service to Williams College

2016	Ad-hoc Intellectual Property Committee
2015,2016	Center Series Programming Committee for Theatre and Dance
2015,2016	Faculty Interview Committee
2012,2014	Faculty Lecture Series Committee
2011	Williams College Museum of Art interview committee
2010-2012	Committee on Priorities and Resources
2008-2012	Williams College Museum of Art advisory committee
2008	Bookstore Committee
2007	Chapin Rare Books Library Committee

Citizen of the United States of America

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