

## CURRICULUM VITAE

# MARC OLANO

Associate Professor  
Computer Science and Electrical Engineering  
University of Maryland, Baltimore County  
1000 Hilltop Circle  
Baltimore, MD 21250

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410-455-3094  
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## EDUCATION

Ph.D. 1998 University of North Carolina, Computer Science  
Dissertation: *A Shading Language on Graphics Hardware* (Advisor: Anselmo Lastra)  
B.S. 1990 University of Illinois, Electrical Engineering

## EXPERIENCE IN HIGHER EDUCATION

2008–present University of Maryland, Baltimore County, Associate Professor,  
Computer Science and Electrical Engineering  
2002–2008 University of Maryland, Baltimore County, Assistant Professor,  
Computer Science and Electrical Engineering  
2000 Stanford University, Adjunct Assistant Professor, Computer Science

## EXPERIENCE IN OTHER THAN HIGHER EDUCATION

2014, 2015 Oxide Games, Graphics Consultant  
2006–2015 NIST, Faculty Appointee, Scientific Applications and Visualization  
Group  
2013 2K Games, Graphics Consultant  
2011–2013 Activision, Visiting Faculty, Graphics Consultant  
2009–2010 Firaxis Games, Visiting Faculty  
1998–2002 SGI, Member of Technical Staff / Technical Lead, OpenGL Shader  
1988–1991 Eastman Kodak Company, Research Programmer, Visualization  
1987–1988 Rhino Robotics, Inc, Programmer, CNC Lathe Simulator

## HONORS RECEIVED

2009 DOE OASCR visualization award, W.L. George, N.S. Martys, S.G. Satterfield, J. Hagedorn, M. Olano and J. Terris, *Simulation of Non-Newtonian Suspensions: Shear Thinning Case*, SciDAC 2009 Electronic Visualizations and Posters  
2008 DOE OASCR visualization award, W.L. George, N.S. Martys, J. Lancien, S.G. Satterfield, M. Olano, E. Garboczi and J. Terrill, *Simulation of a Dense Suspension with Interactive Controls*, SciDAC 2008 Electronic Visualizations and Posters.  
2006–2008 Invited Expert, Khronos Group, OpenGL Steering Group  
2003 Invited to write foreword for Randi Rost, *OpenGL Shading Language*, Addison-Wesley, 2004.

## RESEARCH SUPPORT AND FELLOWSHIPS

### Funded

- 2014 – 2016 *MRI: Acquisition of a 3D object and motion capture system* (\$175,195, NSF, PI)
- 2015 – 2016 *Calibration of a Projection Virtual Reality System* (\$51,368, Howard Huges Medical Institute, PI)
- 2012 – 2016 *ABI Development: Ecosynth: An Advanced Open-Source 3D Toolkit for Forest Ecology* (\$879,800, NSF, Co-PI)
- 2014 – 2015 *SimTheater: A Social Media Game for Audience Development* (\$10,000, NEA / Signature Theatre, PI)
- 2014 – 2015 *Re-Playing the Past: Building a Digital Game for the History Classroom* (\$23,931, UMBC Habrowski Fund, Co-PI)
- 2014 – 2015 *Supplemental Request: Teaching Information Assurance Concepts through a Multiplayer Computer Game* (\$152,078, NSF, Investigator)
- 2013 – 2014 *SecurityEmpire: Teaching Information Assurance Concepts through a New Social Media Game* (\$271,463, NSF, Co-PI)
- 2012 – 2015 *MRI: Acquisition of Hybrid CPU/GPU Nodes for the Interdisciplinary UMBC High Performance Computing Facility* (\$487,304, NSF, Co-PI)
- 2012 *UMBC CUDA Teaching Center* (\$5,500, NVIDIA, PI)
- 2011 – 2013 *Teaching Information Assurance Concepts to High School Students Through a New Social Media Game* (\$168,743, DoD IASP, Co-PI)
- 2009 – 2011 *Video Processor for Panoramic Head-Mounted Display, Phase II* (\$68,879, Maryland Industrial Partnerships / Sensics, PI)
- 2008 – 2011 *MRI: Acquisition of an Interdisciplinary Facility for High-Performance Computing* (\$200,000, NSF, Co-PI)
- 2009 *GPU Hybrid Rendering* (\$3500 Equipment Donation, NVIDIA Professor Partnership, PI)
- 2008 – 2009 *Video Processor for Panoramic Head-Mounted Display* (\$70,069, Maryland Industrial Partnerships / Sensics, PI)
- 2007 – 2008 *UMBC XNA GAIM Laboratory* (\$20,000 + \$10,000 UMBC match, Microsoft XNA Lab, PI)
- 2007 *UMBC Cell-Processor Virtual Computing Laboratory* (amount confidential, IBM VCL, Co-PI)
- 2006 *Websphere S/W Applications for Service Oriented Science, Engineering and Multi Core Cell Data Intensive Visualization* (\$72,133, IBM SUR, Co-PI)
- 2002–2008 Equipment donations, (\$3,000, ATI/AMD)
- 2005 *Programmable Layered Architecture with Artistic Rendering* (\$18,720, NIH, Lister Hill National Center for Biomedical Communications at the National Library of Medicine, Medical Informatics Visiting Faculty Fellowship).
- 2003–2004 *Visualization API Enablers for a High-End Fine-Grained Parallel Processor* (\$83,048, NSF STTR / XMTT Inc., Co-PI)

- 2002–2003      *Automatic Simplification of Procedural Shaders* (\$16,000, UMBC DRIF, PI)
- 2003            *Programmable Layered Architecture with Artistic Rendering* (\$20,000, NIH, Lister Hill National Center for Biomedical Communications at the National Library of Medicine, Medical Informatics Visiting Faculty Fellowship)

**PH.D. STUDENTS**

- |   |                   |       |
|---|-------------------|-------|
| Yu Wang   | 2015              | chair |
| <i>The Modeling Equation: Solving the Physically-Based Modeling and Animation Problem with a Unified Solution</i> |                   |       |
| Mark Bolstad  | prelim 10/15/2007 | chair |
| <i>Rendering Massive Models</i>   |                   |       |
| Wesley Griffin  | prelim 4/30/2012  | chair |
| <i>Quality Guided Variable Bit Rate Texture Compression</i>   |                   |       |
| Ari Blenkhorn   | prelim 6/10/2015  | chair |
| <i>Rendering Atmospheric Effects</i>  |                   |       |
| Donna Thomas  | pre-proposal      | chair |
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- |   |      |                  |
|---|------|------------------|
| Eleanor Chlan-Boyle   | 2005 | committee member |
| <i>A Botanically Inspired Information Visualization of Hierarchical Data Sets</i>                       |      |                  |
| Alark Joshi   | 2007 | committee member |
| <i>Effective Visualization of Time-varying Data Using Cognition-based Principles</i>                    |      |                  |
| Philippe Robert   | 2007 | committee member |
| <i>Real-Time Rendering on a Stream Architecture using Hybrid Scalability Techniques</i>                 |      |                  |
| University of Bern, Switzerland   |      |                  |
| Jesus Caban   | 2009 | committee member |
| <i>Generation and Visualization of Hierarchical Statistical Volumes</i>                                 |      |                  |
| David Trimm   | 2012 | committee member |
| <i>Analyzing Path Populations and Associated Data Through Automation, Visualization and Interaction</i> |      |                  |
| Christopher Morris  | 2014 | reader           |
| <i>A Non-Photorealistic Rendering Framework for Integrating Separate Graphics Streams</i>               |      |                  |
| Dana Wortman  | 2014 | committee member |
| <i>Visualizing Sequential Patterns in Large Datasets Using Levels of Abstraction</i>                    |      |                  |
| Fahad Zafar   | 2014 | committee member |
| <i>Medical Image Quality Assessment for Stereoscopic Display Devices Using Computational Observers</i>  |      |                  |
| Jonathan Dandois  | 2015 | reader           |
| <i>Remote sensing of vegetation structure and composition using computer vision</i>                     |      |                  |

## MASTER'S STUDENTS

|                   |      |  |
|-------------------|------|--|
| Daniel Hood       | 2003 | MS project chair   |
|                   |      | <i>Analogy Based Segmentation of Volumetric Data</i>   |
| Joshua Barczak    | 2005 | MS thesis chair  |
|                   |      | <i>Interactive Illumination Using Large Sets of Point Lights</i>   |
| Aimee Joshua      | 2005 | MS thesis chair  |
|                   |      | <i>Modeling and Rendering of Mold on Cut Wood</i>  |
| Hanli Ni          | 2005 | MS thesis chair  |
|                   |      | <i>Hybrid 3D-model Representation Through Quadric Metrics and Hardware Accelerated Point-based Rendering</i> |
| Yi Wang           | 2005 | MS thesis chair  |
|                   |      | <i>GPU Based Cloth Simulation on Moving Avatars</i>  |
| Pat Gillespie     | 2006 | MS thesis chair  |
|                   |      | <i>Perceptually Oriented Patch Based Texture Synthesis</i>   |
| Kristian Kuhn     | 2006 | MS project chair   |
|                   |      | <i>Using RTP and RTSP for Real-time 3D Interaction</i>   |
| Jonathan Decker   | 2007 | MS thesis chair  |
|                   |      | <i>System of Bound Particles for Interactive Flow Visualization</i>  |
| Stephen Ingram    | 2007 | MS thesis co-chair with Tamara Munzner   |
|                   |      | <i>Glimmer: Multilevel MDS on the GPU</i>  |
|                   |      | (University of British Columbia, Canada)   |
| Jeremy Shopf      | 2007 | MS thesis chair  |
|                   |      | <i>Interactive Rendering of Heterogeneous Translucent Objects</i>  |
| John Kloetzli     | 2008 | MS thesis chair  |
|                   |      | <i>Real-Time High Quality Volume Isosurface Rendering</i>  |
| Pankaj Chaudhari  | 2008 | MS thesis chair  |
|                   |      | <i>Real-Time Multiple Refractions through Deformable Objects</i>   |
| Aaron Curtis      | 2009 | MS thesis chair  |
|                   |      | <i>Real-Time Soft Shadows on the GPU via Monte-Carlo Sampling</i>  |
| Brian Strege      | 2009 | MS project chair   |
|                   |      | <i>Using Tiled Head-Mounted Displays with a Single Video Source</i>  |
| Sean Dukehart     | 2009 | MS thesis chair  |
|                   |      | <i>GPU Random Walkers for Image Segmentation</i>   |
| Wesley Griffin    | 2010 | MS thesis chair  |
|                   |      | <i>Real-Time GPU Surface Curvature Estimation</i>  |
| Fahad Zafar       | 2010 | MS thesis chair  |
|                   |      | <i>Tiny Encryption Algorithm for Cryptographic Gradient Noise</i>  |
| Yu Wang           | 2011 | MS thesis chair  |
|                   |      | <i>A Framework for GPU 3D Model Reconstruction Using Structure-from-Motion</i>                               |
| Ravikiran Dighade | 2012 | MS thesis chair  |
|                   |      | <i>Approach to Unwrap a 3D Fingerprint to a 2D Equivalent Fingerprint</i>                                    |
| Preeti Bindu      | 2012 | MS thesis chair  |
|                   |      | <i>Numerical Integration Techniques for Volume Rendering</i>   |
| Taekyu Shin       | 2014 | MS thesis chair  |

|                      |  |                      |
|----------------------|--|----------------------|
|                      | <i>Visualization of Smoke and Fire</i>   |                      |
| Yuping Zhang         | 2015   | MS thesis chair      |
|                      | <i>Real-time Realistic Rendering of Sunrise and Sunset</i>   |                      |
| <hr/>                |  |                      |
| Namita Parab         | 2003   | MS thesis committee  |
|                      | <i>Refining Implicit Models</i>  |                      |
| Jay Patel            | 2003   | MS project committee |
|                      | <i>Multivariate Data Visualization of Gait Ataxia</i>  |                      |
| Utkarsch Ayachit     | 2004   | MS thesis committee  |
|                      | <i>Flow Visualization: A Level-of-detail Approach</i>  |                      |
| Srinivas Bhagavatula | 2004   | MS thesis committee  |
|                      | <i>Exploring the Volume Illustration Parameter Space</i>   |                      |
| Poonam Shanbhag      | 2004   | MS thesis committee  |
|                      | <i>Temporal Visualization of Planning Polygons for Efficient Partitioning of Geo-spatial Data</i>    |                      |
| Simone Thomas        | 2005   | MS thesis committee  |
|                      | <i>Morphing Materials: Capturing Tangible Material Properties in Pen-and-Ink Style Rendering</i>     |                      |
| Mithila Patwardhan   | 2006   | MS thesis committee  |
|                      | <i>Motion-based Visualization for Deep Exploration of Relational, Spatio-temporal Data</i>           |                      |
| Bryan Pass           | 2007   | MS project committee |
|                      | <i>A Virtual Security Coprocessor Design Using Hardware VMM Instructions</i>                         |                      |
| Jason Pearlman       | 2007   | MS thesis committee  |
|                      | <i>Visualizing Network Security Events Using Compound Glyphs from a Service-Oriented Perspective</i> |                      |
| Alex Feldman         | 2008   | MS thesis committee  |
|                      | <i>Swarm Robotics: Parallelized Line Formation</i>   |                      |
| Jonathan Bronson     | 2008   | MS thesis committee  |
|                      | <i>Statistically Weighted Visualization Hierarchies</i>  |                      |
| Ryan Bergeron        | 2008   | MS thesis committee  |
|                      | <i>Visualizing Team Performance Dynamics</i>   |                      |
| Guohao Zhang         | 2014   | MS thesis committee  |
|                      | <i>Visual Marks for Functional Magnetic Resonance Imaging Visualization: A Ranking Study</i>         |                      |

## UNDERGRADUATE STUDENTS

|                |   |                           |
|----------------|---|---------------------------|
| Joshua Barczak | 2002  | Independent study advisor |
|                | <i>Ray Tracing Using Programmable Fragment Shading Hardware</i><br>(published in UMBC Review) |                           |
| John Kloetzli  | 2005  | Honors thesis advisor     |
|                | <i>Interactive Fur Rendering</i>  |                           |
| Tim Murray     | 2005  | Independent study advisor |
|                | <i>Source Code Visualization</i>  |                           |
| Bryan Pass     | 2005  | Independent study advisor |

|   |           |                                   |
|---|-----------|-----------------------------------|
| <i>Distributed Collision Detection</i>  |           |                                   |
| Paul Oliver   | 2008      | Independent study advisor         |
| <i>Graphical Design of Programmable Shaders</i>   |           |                                   |
| Wallace Brown   | 2010      | Independent study advisor         |
| <i>Cloth rendering</i>  |           |                                   |
| Brendan Farrington  | 2010      | Independent study advisor         |
| <i>GPU Path Finding</i>   |           |                                   |
| Thomas Hervey, Aneep Bindra and Zachary Hullihen  |           |                                   |
|   | 2012-2013 | Undergraduate research co-advisor |
| <i>Lights, Camera, Motion, Action: The Dance Application of Microsoft's Kinect and Intelligent Stage Lighting</i> |           |                                   |
| Kevin Jones   | 2015      | Independent study advisor         |
| <i>GPU Path Tracing with Optix</i>  |           |                                   |

## PUBLICATIONS

### Peer Reviewed Works

#### Books and Edited Proceedings

Marc Olano and Miguel Otuduy (editors), *Proceedings of I3D 2014: The 18<sup>th</sup> ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games* (San Francisco, CA, March 14–16, 2014). ACM Press 2014.

Marc Olano and Philipp Slusallek (editors), *Proceedings of Graphics Hardware 2006: The 21st ACM / Eurographics Symposium on Graphics Hardware* (Vienna, Austria, September 3–4, 2006). ACM Press 2006. 126 pages.

Carlo Séquin and Marc Olano (editors), *Proceedings of I3D 2006: The 10<sup>th</sup> ACM Symposium on Interactive 3D Graphics and Games* (Redwood City, CA, March 14–17, 2006). ACM Press 2006. 216 pages.

Marc Olano, John Hart, Wolfgang Heidrich, Michael McCool, *Real-time Shading*. AK Peters, 2002. 368 pages.

#### Edited Juried Course Notes

Marc Olano (editor), David Blythe, Larry Gritz, Mark Kilgard, Michael McCool, Fabio Pellacini and Thorsten Scheuermann. “GPU Shading and Rendering: Course 3.” ACM SIGGRAPH 2006 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2006. 285 pages.

Marc Olano (editor), Avi Bleiweiss, Larry Gritz, John C. Hart, Mark Kilgard, Michael McCool and Pedro Sander. “GPU Shading and Rendering: Course 37.” ACM SIGGRAPH 2005 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2005. 283 pages.

Marc Olano (editor), Kurt Akeley, John C. Hart, Wolfgang Heidrich, Micheal McCool, Jason L. Mitchell and Randi Rost. “Real-Time Shading: Course 1.” ACM SIGGRAPH 2004 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, August 2004. 226 pages.

Marc Olano (editor), Kurt Akeley, John C. Hart, Wolfgang Heidrich, Bill Mark, Jason L. Mitchell and Randi Rost. "Real-Time Shading: Course 7." ACM SIGGRAPH 2003 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2003. 243 pages.

Marc Olano (editor), Chas Boyd, Bill Mark, Michael McCool, Jason L. Mitchell and Randi Rost. "State of the Art in Hardware Shading: Course 17." ACM SIGGRAPH 2002 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2002. 502 pages.

Marc Olano (editor), John C. Hart, Wolfgang Heidrich, Bill Mark and Ken Perlin. "Real-Time Shading Languages: Course 36." ACM SIGGRAPH 2002 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2002. 379 pages.

Marc Olano (editor), John C. Hart, Wolfgang Heidrich, Erik Lindholm, Bill Mark, Michael McCool and Ken Perlin. "Real-Time Shading: Course 24." ACM SIGGRAPH 2001 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, August 2001. 353 pages.

Marc Olano (editor), John C. Hart, Wolfgang Heidrich, Michael McCool, Bill Mark, Kekoa Proudfoot. "Approaches to Procedural Shading on Graphics Hardware: Course 27." ACM SIGGRAPH 2000 Courses, Proceedings of the International Conference on Computer Graphics and Interactive Techniques, ACM, July 2000. 139 pages.

## Patents

Brian Kieth Cabral, Marc Olano and Philip Nemeč, "Reflection Space Image Based Rendering at an Interactive Frame Rate," US7268789 granted September 2007.

Brian Kieth Cabral, Marc Olano and Philip Nemeč, "Reflection Space Image Based Rendering," US7123259 granted October 2006.

Marc Olano and Mark Peercy, "Method and System for Executing SIMD Instructions using Graphics Technology," US6943798 granted September 2005.

Marc Olano and Mark Peercy, "Method and System for Accelerating Noise," US6747660 granted June 2004.

Marc Olano, "Method, System, and Computer Program Product for Implementing Derivative Operators with Graphics Hardware," US6717599 granted April 2004.

Mark Peercy, Marc Olano and John Airey, "Method and System for Implementing Graphics Control Constructs," US6707462 granted March 2004.

Brian Kieth Cabral, Marc Olano and Philip Nemeč, "Reflection Space Image Based Rendering," US6697062 granted February 2004.

Marc Olano, "System, Method, and Computer Program Product for Real-time Shading of Computer Generated Images," US6657624 granted June 2003; WO03060638 granted July 2003.

Richard Ellson, Lawrence Ray and Marc Olano for Eastman Kodak Company, "Method and Apparatus for Performing Real-Time Computer Animation," US5455902 granted October 1995.

## SIGGRAPH Publications

(ACM SIGGRAPH became a regular issue of ACM Transactions on Graphics in 2003)

Mark Peercy, Marc Olano, John Airey and P. Jeffery Ungar, "Interactive Multi-Pass Programmable Shading," Proceedings of ACM SIGGRAPH 2000 (New Orleans, Louisiana, July 23-28, 2000). In *Computer Graphics Proceedings, Annual Conference Series*, 2000. pp. 425–432 (acceptance rate: 19.4%).

Brian Cabral, Marc Olano and Philip Nemecek, "Reflection Space Image Based Rendering," Proceedings of ACM SIGGRAPH 99 (Los Angeles, California, August 8-13, 1999). In *Computer Graphics Proceedings, Annual Conference Series*, 1999. pp. 165–170 (acceptance rate: 16.3%).

Marc Olano and Anselmo Lastra, "A Shading Language on Graphics Hardware: The PixelFlow Shading System," Proceedings of ACM SIGGRAPH 98 (Orlando, Florida, July 19-24, 1998). In *Computer Graphics Proceedings, Annual Conference Series*, 1998. pp. 159–168 (acceptance rate: 14.9%).

Jon Cohen, Marc Olano and Dinesh Manocha, "Appearance Preserving Simplification," Proceedings of ACM SIGGRAPH 98 (Orlando, Florida, July 19-24, 1998). In *Computer Graphics Proceedings, Annual Conference Series*, 1998. pp. 115–122 (acceptance rate: 14.9%).

## Journal Articles and Book Chapters

Wesley Griffin and Marc Olano, "Evaluating Texture Compression Masking Effects using Objective Image Quality Assessment Metrics" *IEEE Transactions on Visualization and Computer Graphics*, vol 21(8), August 2015. pp 970–979.

Yu Wang, Marc Olano, Matthias Gobbert and Wesley Griffin, "Parallel Computing for Long-Time Simulations of Calcium Waves in a Heart Cell", *PAMM*, vol 12(1). December 2012. Wiley-VCH Verlag, pp. 637–638.

Wesley Griffin, Yu Wang, David Berrios and Marc Olano, "Real-Time GPU Surface Curvature Estimation on Deforming Meshes and Volumetric Data Sets," *IEEE Transactions on Graphics*, vol 18(10). October 2012. pp. 1603–1613.

Marc Olano, Dan Baker, Wesley Griffin and Joshua Barczak, "Variable bit rate GPU Texture Decompression," *Computer Graphics Forum*, vol 30(4) (Proceedings of EGSR 2011). pp. 1299–1308.

Stephan Ingram, Tamara Munzner and Marc Olano, "Glimmer: Multilevel MDS on the GPU," *IEEE Transactions on Visualization and Computer Graphics*, vol 15(2). March-April 2009. pp. 249–261.

James S. Sims, William L. George, Tere Griffin, John G. Hagedorn, Howard K. Hung, John T. Kelso, Marc Olano, Adele P. Peskin, Steven G. Satterfield, Judith Devaney Terrill, Garnett W. Bryant and Jose G. Diaz, "Accelerating Scientific Discovery through Computation and Visualization III. Tight-binding Wave Functions for Quantum Dots," *Journal of Research of the National Institute of Standards*, vol 113(3). May-June 2008. (cover image).

Judith Terrill, William George, Terence Griffin, John Hagedorn, John Kelso, Marc Olano, Adele Peskin, Steve Saterfield, James Simms, Jeffery Bullard, Joy Dunkers and Nicos Martyris, "Extending Measurement Science to Interactive Visualization Environments," Book Chapter, *Trends in Interactive Visualization*, Elena Zudilova-Seinstra, Tony Adriaansen and Robert van Liere, Editors, Springer, 2009.

Jonathan Cohen, Dinesh Manocha and Marc Olano, "Successive Mappings: An Approach to Polygonal Mesh Simplification with Guaranteed Error Bounds," *International Journal of Computational Geometry & Applications*, vol. 13(1). February 2003. pp. 61–94.

**Conference Proceedings (full paper refereed)**

*Wesley Griffin* and Marc Olano, "Objective Image Quality Assessment of Texture Compression." Proceedings of I3D 2014: The 18<sup>th</sup> ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (San Francisco, CA, March 14-16, 2014). 8 pp (acceptance rate: 40.4%)

*Wesley Griffin, Yu Wang, David Berrios* and Marc Olano, "GPU curvature estimation on deformable meshes," Proceedings of I3D 2011: The 15<sup>th</sup> ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (San Francisco, CA, February 18-20, 2011). pp. 159-166 (acceptance rate: 37.5%)

*Fahad Zafar, Aaron Curtis* and Marc Olano, "GPU Random Numbers via the Thin Encryption Algorithm," Proceedings of HPG 2010: The 2<sup>nd</sup> ACM SIGGRAPH/Eurographics Symposium on High Performance Graphics (Saarbrücken, Germany, June 25-27, 2010). pp. 133-142 (acceptance rate: 31.7%).

Marc Olano and Dan Baker, "LEAN Mapping," Proceedings of I3D 2010: The 14<sup>th</sup> ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (Washington, DC, February 19-21, 2010). pp. 181-188 (acceptance rate: 32.4%).

*Tom DuBois, Bryant Lee, Yi Wang,* Marc Olano and Uzi Vishkin, "XMT-GPU: A PRAM Architecture for Graphics Computation," Proceedings of ICPP-08: the 37<sup>th</sup> IACC International Conference on Parallel Processing (Portland, Oregon, September 8-12, 2008). pp. 364-372 (acceptance rate: 30.8%).

*Jonathan Bronson, Penny Rheingans* and Marc Olano, "Semi-automatic Stencil Creation through Constrained Error Minimization," Proceedings of NPAR 2008: the 6<sup>th</sup> ACM SIGGRAPH Symposium on Non-Photorealistic Animation and Rendering (Annecy, France, June 9-11, 2008). pp. 31-38 + back cover image (acceptance rate: 40.7%).

*John Kloetzli, Brian Strege, Johnathan Decker* and Marc Olano, "Parallel Longest Common Subsequence using Graphics Hardware," Proceedings of EGPGV 2008: the 8<sup>th</sup> Eurographics Symposium on Parallel Graphics and Visualization (Crete, Greece, April 14-15, 2008). pp. 57-64 (acceptance rate: 55.7%).

*John Kloetzli,* Marc Olano and Penny Rheingans, "Interactive Volume Isosurface Rendering using BT Volumes," Proceedings of I3D 2008: the 12<sup>th</sup> ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (Redwood City, CA, February 15-17, 2008). pp. 45-52 (acceptance rate: 42.1%).

*Jeremy Shopf* and Marc Olano, "Procedural Haptic Texture," Proceedings of UIST 2006: the 19<sup>th</sup> ACM Symposium on User Interface Software and Technology (Montreaux, Switzerland, October 2006). pp. 179-186 (acceptance rate: 23.0%).

Marc Olano, "Modified Noise for Evaluation on Graphics Hardware," Proceedings of Graphics Hardware 2005: the 20<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, July 2005). pp. 105-110 (acceptance rate: 39.3%).

Marc Olano, Bob Kuehne and Maryann Simmons, "Automatic Shader Level of Detail," Proceedings of Graphics Hardware 2003: the 18<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, July 2003). pp. 7-14 (acceptance rate: 33.3%)

Marc Olano, Shrijeet Mukherjee and Angus Dorbie, "Vertex-based Anisotropic Texturing," Proceedings of Graphics Hardware 2001: the 16<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, August 12-13, 2001). pp. 95-98 + back cover image (acceptance rate: 48.3%).

*Marc Olano* and Trey Greer, "Triangle Scan Conversion Using 2D Homogeneous Coordinates," Proceedings of Graphics Hardware 1997: the 10<sup>th</sup> ACM/Eurographics Workshop on Graphics Hardware (Los Angeles, CA, August 2-4, 1997). pp. 89–95.

*Jon Cohen*, Dinesh Manocha and *Marc Olano*, "Simplifying Polygonal Models using Successive Mappings," Proceedings of IEEE Visualization '97: the 8<sup>th</sup> conference on Visualization (Phoenix, AZ, October 18-24, 1997). pp. 395–404 (acceptance rate: 25.9%).

Anselmo Lastra, Steve Molnar, *Marc Olano* and *Yulan Wang*, "Real-Time Programmable Shading," Proceedings of I3D 1995: the 4<sup>th</sup> ACM Symposium on Interactive 3D Graphics (Monterey, CA, April 9-12, 1995). pp. 59–67 (acceptance rate: 34.4%).

*Marc Olano*, *Jon Cohen*, *Mark Mine* and Gary Bishop, "Combating Rendering Latency," Proceedings of I3D 1995: the 4<sup>th</sup> ACM Symposium on Interactive 3D Graphics (Monterey, CA, April 9-12, 1995). pp. 19–24 (acceptance rate: 34.4%).

### Other Articles

*Joshua Barczak*, Advisor: *Marc Olano*, "Ray Tracing Using Programmable Fragment Shading Hardware," UMBC Review, 2004, pp. 76–97.

### Conference Proceedings (abstract refereed)

*Kishalay Kundu* and *Marc Olano*, "Tissue Resection Using Delayed Updates in a Tetrahedral Mesh," *MMVR15: Medicine Meets Virtual Reality* (Long Beach, CA, February 6-9, 2007).

*Jeff Butterworth*, *Andrew Davidson*, *Stephen Hench* and *Marc Olano*, "3DM: A Three Dimensional Modeler Using a Head-Mounted Display," Proceedings of I3D 1992: the 3<sup>rd</sup> ACM Symposium on Interactive 3D Graphics (Cambridge, MA, March 29 - April 1, 1992). pp. 135–138 (acceptance rate 43.5%).

### Non-Peer-Reviewed Works

*Yu Wang*, *Marc Olano*, *Matthias K. Gobbert*, and *Wesley Griffin*. "A GPU memory system comparison for an elliptic test problem," Technical Report HPCF–2012–1, UMBC High Performance Computing Facility, University of Maryland, Baltimore County, 2012.

*Stephen Ingram*, *Tamara Munzner* and *Marc Olano*, "Glimmer: Multilevel MDS on the GPU," *UBC CS TR-2007-15*, Department of Computer Science, University of British Columbia, Vancouver, Canada, 2007. 8 pages.

*Josh Barczak* and *Marc Olano*, "Interactive Shadowed Caustics Using Hierarchical Light Volumes," *UMBC Department of Computer Science and Electrical Engineering Technical Report*, 2005. 8 pages.

*Marc Olano*, Invited foreword for *Randi Rost*, *OpenGL Shading Language*, Addison-Wesley, 2004.

*Marc Olano* and *Bob Kuehne*, "SGI OpenGL Shader™ Level-of-Detail White Paper," *SGI Document 007-4555-001*, SGI, 2002. 22 pages.

*Olano, Marc* and *Michael North*, "Normal Distribution Mapping," *UNC Computer Science Technical Report 97-041*, 1997. 7 pages.

*Marc Olano*, *Anselmo Lastra* and *Jon Leech*, "Procedural Primitives in a High Performance, Hardware Accelerated, Z-Buffer Renderer," *UNC Computer Science Technical Report 97-040*, 1997. 10 pages.

*Jon Cohen*, Dinesh Manocha and *Marc Olano*, "Simplifying Polygonal Models using Successive Mappings," *UNC Computer Science Technical Report 97-011*, 1997. 19 pages.

*Jon Cohen* and *Marc Olano*, "Low Latency Rendering on Pixel-Planes 5," *UNC Computer Science Technical Report 94-028*, 1994. 24 pages.

*Terry S. Yoo* and *T. Marc Olano*, "Instant Hole (Windows onto Reality)," *UNC Computer Science Technical Report 93-027*, 1993. 13 pages.

*Marc Olano* and *Terry S. Yoo*, "Precision Normals (Beyond Phong)," *UNC Computer Science Technical Report 93-021*, 1993. 4 pages.

Richard Ellson and *T. Marc Olano*, "Injection Molding: Supercomputing and Supergraphics," *Cray Channels*, v11n3, Fall 1989, Cray Research, 1989. pp. 2–5.

## PRESENTATIONS

### Conference Papers (Juried/Refereed)

"Modified Noise for Evaluation on Graphics Hardware," Proceedings of Graphics Hardware 2005: the 20<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, July 2005). Full paper peer review.

"Automatic Shader Level of Detail," Proceedings of Graphics Hardware 2003: the 18<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, July 2003). Full paper peer review.

"Vertex-based Anisotropic Texturing," Proceedings of Graphics Hardware 2001: the 16<sup>th</sup> ACM/Eurographics Symposium on Graphics Hardware (Los Angeles, CA, August 12-13, 2001). Full paper peer review.

"Interactive Multi-Pass Programmable Shading," Proceedings of ACM SIGGRAPH 2000 (New Orleans, Louisiana, July 23-28, 2000). Full paper peer review.

"Reflection Space Image Based Rendering," Proceedings of ACM SIGGRAPH 99 (Los Angeles, California, August 8-13, 1999). Full paper peer review.

"A Shading Language on Graphics Hardware: The PixelFlow Shading System," Proceedings of ACM SIGGRAPH 98 (Orlando, Florida, July 19-24, 1998). Full paper peer review.

"Triangle Scan Conversion Using 2D Homogeneous Coordinates," Proceedings of Graphics Hardware 1997: the 10<sup>th</sup> ACM/Eurographics Workshop on Graphics Hardware (Los Angeles, CA, August 2-4, 1997). Full paper peer review.

"Real-Time Programmable Shading," Proceedings of I3D 1995: the 4<sup>th</sup> ACM Symposium on Interactive 3D Graphics (Monterey, CA, April 9-12, 1995). Full paper peer review.

### Other Professional Presentations

#### Conference Courses and Tutorials

Marc Olano (organizer/lecturer), David Blythe, Larry Gritz, Mark Kilgard, Michael McCool, Fabio Pellacini, Pedro Sander (lecturers), *GPU Shading and Rendering*, Full-day course, SIGGRAPH 2006, Boston, MA, August 2006. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), Avi Bleiweiss, Larry Gritz, John C. Hart, Mark Kilgard, Michael McCool, Pedro Sander (lecturers), *GPU Shading and Rendering*, Full-day course, SIGGRAPH 2005, Los Angeles, CA, August 2005. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), Kurt Akeley, John C. Hart, Wolfgang Heidrich, Michael McCool, Jason L. Mitchell and Randi Rost (lecturers), *Real-Time Shading*, Full-day course, SIGGRAPH 2004, Los Angeles, CA, August 2004. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), Kurt Akeley, John C. Hart, Wolfgang Heidrich, Bill Mark, Jason L. Mitchell and Randi Rost (lecturers), *Real-Time Shading*, Full-day course, SIGGRAPH 2003, San Diego, CA, July 2003. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), John C. Hart, Wolfgang Heidrich, Bill Mark and Ken Perlin (lecturers), *Real-Time Shading Languages*, Full-day course, SIGGRAPH 2002, San Antonio, TX, July 2002. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), Chas Boyd, Bill Mark, Michael McCool, Jason L. Mitchell and Randi Rost (lecturers), *State of the Art in Shading Hardware*, Full-day course, SIGGRAPH 2002, San Antonio, TX, July 2002. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), John C. Hart, Wolfgang Heidrich, Erik Lindholm, Michael McCool, Bill Mark and Ken Perlin (lecturers), *Real-Time Shading*, Full-day course, SIGGRAPH 2001, Los Angeles, CA, August 2001. Juried: Proposal selection by course committee.

Marc Olano (organizer/lecturer), John C. Hart, Wolfgang Heidrich, Michael McCool, Bill Mark and Kekoa Proudfoot (lecturers), *Approaches for Procedural Shading on Graphics Hardware*, Full-day course, SIGGRAPH 2000, New Orleans, LA, July 2000. Juried: Proposal selection by course committee.

### Conference Presentations (Invited)

Marc Olano (moderator), Mike Acton, Mark DeLoura, Stephen Hill, Naty Hoffman, Peter-Pike Sloan, Natalya Tatarchuk, *Panel: Sharing technical ideas in the games industry*, ACM SIGGRAPH Symposium on Interactive 3D graphics and Games, March 2012.

Mark Segal (moderator), Marc Olano, Dave Luebke, Mike Doggett, Bill Mark, *Panel: whither graphics hardware and Graphics Hardware*, ACM SIGGRAPH/Eurographics Symposium on Graphics Hardware, August 2007.

Marc Olano, *Programming Graphics Hardware*, UMBC CSEE Research Review, May 2007.

Marc Olano, *Interactive Realism with Multi-Pass Rendering*, NIST Workshop on Metrology and Modeling of Color and Appearance, National Institute of Standards and Technology, Gaithersburg, MD, March 2000.

### Other Invited Presentations

Marc Olano, *LEAN Mapping: Research experience at a game company*, Bowie State University, Bowie, MD, June 2014.

Marc Olano, *LEAN Mapping and Related Techniques*, Blizzard Entertainment, Irvine, CA, October 2013.

Marc Olano, *LEAN Mapping: research experience at a game company*, IMPA – Instituto Nacional de Matemática Pura e Aplicada, Rio de Janeiro, Brazil, July 2012.

Marc Olano, *LEAN Mapping: research experience at a game company*, University of Iowa, November, 2010.

Marc Olano, *UMBC Games, Animation and Interactive Media*, International Game Developers Association, Washington DC Chapter, September 2007.

Marc Olano, *Real-Time Shading*, NIST, Gaithersburg, MD, June 2006.

Marc Olano, *The Future of Shading Language Compilation*, NYU, New York, NY, October 2004.

Marc Olano, *The Future of Shading Language Compilation*, ATI, Santa Clara, CA, August 2003.

Marc Olano, *Interactive Procedural Shading*, University of Maryland, College Park, MD, November 2002.

## PRESS

Daniel Leaderman, "Immersive, 3D scanner comes to UMBC," The Daily Record, 12/23/2015.

Stephen Babcock, "A crazy 3D-scanning room was recently delivered to UMBC," Technical.ly Baltimore, 12/14/2015.

Daniel Leaderman, "Full Steam ahead: UMBC students take video game to market," The Daily Record, 9/14/2015.

Stephen Babcock, "HueBots, a video game created by UMBC students, is now on Steam," Technical.ly Baltimore, 9/12/2015.

Stephen Babcock, "This UMBC class just launched 2 new games (and presented them to clients)," Technical.ly Baltimore, 5/20/2015.

Daniel Leaderman, "At UMBC, a taste of professional life for game designers," The Daily Record, 5/19/2015.

Stephanie Botelho, "Gaming: Serious Business at University of Maryland, Baltimore County," University Business, 5/2015.

Freeman Hrabowski, III, "Commentary: Video Games in the Classroom? Welcome to the future of learning," CNBC, 3/31/2015.

BMore Media, "Video: Gaming at UMBC", 5/26/2011.

Gus Sentementes, "The new frontier: online social games," Baltimore Sun, 9/26/2010

Terri Hogan, "Sherwood students pit gaming skills against international teams," Maryland Business Gazette, 3/17/2010.

Kevin Rector, "Global Game Jam features a packed weekend at UMBC," Catonsville Times, 2/4/2009.

Matt Vensel, "Weird 101: Baltimore's unusual college courses," B Daily, 10/1/2008.

Tricia Bishop, "Gamer Making a Career of it: Student develops games, gets Microsoft's attention," Baltimore Sun, 7/24/2008 (Lead article, Business section).

Chris Emery, "Serious About Games," ACM Tech News, 4/23/2008.

Chris Emery, "Video Games, from Scratch," Baltimore Sun, 4/20/2008 (Front page article, Sunday paper).

Staff, "Concrete Flow Researchers to use Argonne Supercomputer," Science Daily, 1/24/2008.

Michael E. Newman, "Concrete Flow Researchers to use Argonne Supercomputer," NIST Tech Beat, 1/23/2008 (appeared on www.nist.gov front page).

Steve Berberich, "Video Games Starting to get Serious: Producers Target Military, Medical, Education Clients," Maryland Business Gazette, 8/31/2007

## **SERVICE TO THE DEPARTMENT, UNIVERSITY, COMMUNITY AND PROFESSION**

### **Department**

#### **Curriculum Development**

|              |  |
|--------------|--|
| 2007–present | Director, UMBC CMSC BS Game Development Track                |
| 2007         | Lead design and creation of UMBC CMSC Game Development Track |

#### **Committees**

|                |  |
|----------------|--|
| 2011–2014      | Computer Science Undergraduate Program Director        |
| 2002–2011      | Member, Graduate Committee, Computer Science           |
| 2004–2006,2011 | Chair, Graduate Admissions Committee, Computer Science |
| 2004–2005      | Member, Publicity Committee                            |
| 2003–2004      | Member, Equipment Committee                            |
| 2002–2004      | Member, CS Graduate Admissions Subcommittee            |
| 2003           | Chair, Departmental Image Working Group                |

### **University**

|              |  |
|--------------|--|
| 2015–present | Member, IT Steering Committee                                    |
| 2007–present | Member, High Performance Computing Facility Governance Committee |
| 2007–present | Faculty advisor, UMBC Game Development Club                      |

### **Community**

|           |                                       |
|-----------|---------------------------------------|
| 2006–2008 | Treasurer, Hill East Community Garden |
|-----------|---------------------------------------|

### **Profession**

#### **Standards Organizations**

|           |                    |  |
|-----------|--------------------|--|
| 2002–2009 | Participant        | OpenGL Shading Language Working Group                      |
|           | Active participant | defining OpenGL's Shading Language                         |
| 2006–2009 | Invited Expert     | Khronos Group  |
|           |                    | OpenGL Architecture Review Board Steering Group            |
| 2002–2006 | Individual Member  | OpenGL Architecture Review Board                           |
|           |                    | Graphics Standards Organization, merged with Khronos Group |

### Conference Organization

- |      |   |
|------|---|
| 2014 | Student Research Competition Chair, ACM SIGGRAPH 2014, Vancouver, Canada, August 2014   |
| 2014 | Papers Co-Chair, I3D 2014: ACM SIGGRAPH 2014 Symposium on Interactive 3D Graphics and Games, San Francisco, CA, March 2014.     |
| 2013 | Student Research Competition Chair, ACM SIGGRAPH 2013, Anaheim, CA, July 2013   |
| 2013 | General Co-Chair, I3D 2013: ACM SIGGRAPH 2013 Symposium on Interactive 3D Graphics and Games, Orlando, FL, March 2013.          |
| 2011 | Industry Co-Chair, I3D 2011: ACM SIGGRAPH 2011 Symposium on Interactive 3D Graphics and Games, San Francisco, CA, February 2011 |
| 2006 | Papers Co-Chair, Eurographics/ACM SIGGRAPH 2006 Symposium on Graphics Hardware, Vienna, Austria, September 2006.                |
| 2006 | Papers Co-Chair, I3D 2006: ACM SIGGRAPH 2006 Symposium on Interactive 3D Graphics and Games, Redwood City, CA, April 2006.      |
| 2005 | General Co-Chair, I3D 2005: ACM SIGGRAPH 2005 Symposium on Interactive 3D Graphics and Games, Washington, DC, April 2005.       |

### Program Committees and Editorial Boards

- |              |   |
|--------------|---|
| 2015–present | Editor in Chief, Journal of Computer Graphics Techniques  |
| 2013–2015    | Editorial Board, Journal of Computer Graphics Techniques  |
| 2013, 2014   | General Submission Jury, ACM SIGGRAPH   |
| 2014         | Program Committee, ACM SIGGRAPH/Eurographics High Performance Graphics  |
| 2008 – 2009  | Papers Program Committee, ACM SIGGRAPH  |
| 2008         | Editorial Board, Journal of Scientific Programming, Special Issue on High Performance Computing on the Cell BE Processor. |
| 2005 – 2013  | Program Committee, I3D: ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (includes years as chair)             |
| 2006 – 2012  | Program Committee, SIBGRAPI: The Brazilian Symposium on Computer Graphics and Image Processing                            |
| 2005 – 2012  | Program Committee, GRAPP: International Conference on Computer Graphics Theory and Applications                           |
| 2009 – 2012  | Program Committee, ACM SIGGRAPH/Eurographics High Performance Graphics  |
| 2000 – 2008  | Program Committee, ACM SIGGRAPH/Eurographics Graphics Hardware (includes year as chair)                                   |

### Reviews

- |          |   |
|----------|---|
| Books    | Addison-Wesley, AK Peters, CRC Press, Elsevier.   |
| Journals | Computers and Graphics, ACM Transactions on Graphics, IEEE Transactions on Visualization and Computer Graphics, IEEE Computer Graphics and Applications, Visual Computer, ACM Journal of Graphics Tools, International Journal of Computers and |

Applications, Optical Engineering, Progress in Electromagnetics Research

Conferences

ACM SIGGRAPH papers, courses and sketches, ACM SIGGRAPH Asia, Eurographics, Eurographics Workshop on Rendering, IEEE Visualization, IEEE InfoVis, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, SIGGRAPH/Eurographics Graphics Hardware, Pacific Graphics, ACM SIGGRAPH Symposium on Real-time Ray Tracing, VINCI.

Funding

NSF CPA, NSF ITR, NSF VEC, Maryland Industrial Partnerships

**Memberships**

2008–present

IGDA (International Game Developers Association)

2006–present

Eurographics (European Association for Graphics)

1989–present

ACM (Association for Computing Machinery)

ACM SIGGRAPH (Special Interest Group for Graphics)

1987–present

IEEE (Institute of Electrical and Electronics Engineers)

IEEE Computer Society