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Short Bio

Roger Crawfis is CEO/CIO for Games That Move You, Pbc. He is also an Associate Professor with tenure at The Ohio State University in the Department of Computer Science and Engineering. He holds adjunct positions in the Biomedical Engineering Department, and the Advanced Computing Center for Art and Design (ACCAD). Dr. Crawfis received his BS degree in computer science, as well as a BS degree in Applied Mathematics from Purdue University in 1984. He received his MS and PhD in Computer Science from the University of California, Davis in 1989 and 1995, respectively. From 1984 to 1996, he was a researcher at the Lawrence Livermore National Laboratories, where he developed complex simulation codes and associated visualizations. He later led the research efforts in scientific visualization, with over \$2 million in funding. His research interests lie in the areas of computer graphics, game technologies, serious games, games for health, real-time rendering, scientific visualization and medical imaging. He serves or has previously served on the Editorial Board for the IEEE Transactions on Visualization and Computer Graphics, the IEEE Visualization conference series, the Eurographics/ACM visualization conference series and many smaller workshops. Roger has authored over 100 scientific publications, and is actively involved in the graphics community. He is a member of the IEEE Computer Society. Through his own consulting company, Crawfis Software, LLC, Dr. Crawfis also regularly consults on legal cases including patents and copyrights, general programming issues, and .NET technologies.

Education:

Ph.D. Computer Science. September 1995, University of California, Davis, CA.
M.S. Computer Science. June 1989, University of California, Davis, CA.
B.S. Computer Science. May 1984, Purdue University, West Lafayette, IN.
B.S. Applied Mathematics. May 1984, Purdue University, West Lafayette, IN.

Professional Experience:

February 2015 – *present*: CEO, Games That Move You, PBC.
September 2001 – *present*, Associate Professor, The Ohio State University.
November 2014 – *present*: CTO, Games That Move You, PBC.
March 2014 – *present*: President and Founder, Crawfis Software, LLC.
June 2012 – August 2012, Electronic Arts, Inc. NBA Live product
Adjunct Professor, The Advanced Computing Center for the Arts and Design (ACCAD), Sept.
1997 – present.
December 2004 – 2011, Chief Architect, VISION platform, DSCI, Inc.
Adjunct Graduate Faculty, Biomedical Engineering, The Ohio State University, September 2001 – present.
September 1996 - 2001: Assistant Professor, The Ohio State University.
May 1993 - September 1996: Graphics Technology Group Leader, Lawrence Livermore National Lab.
June 1984 - May 1993: Computer Scientist, Lawrence Livermore National Lab.
May 1983 - June 1984: Research Assistant, Purdue University.

Publications

Books

1. Ramnath, Rajiv, **Roger Crawfis** and Paolo Sivilotti, [Android 3 SDK Programming for Dummies](#), 2011, John Wiley & Sons, Inc., Hoboken, NJ

Chapters in Edited Books

2. Lining Yang and **Roger Crawfis**, *A Practical System for Constrained Interactive Walkthroughs of Arbitrarily Complex Scenes*, in *Scientific Visualization: The Visual Extraction of Knowledge from Data*. G.-P. Bonneau, T. Ertl, G. Nielson editors, Springer 2006, pp. 345-366.
3. **Crawfis, Roger**, Daqing Xue, Caixia Zhang, *Volume Rendering Using Splatting*, *Visualization Handbook*, eds. Charles Hansen, Christopher Johnson, Elsevier Academic Press, 2004, pp. 175-188.
4. **Crawfis, Roger**, Jian Huang, *High-Quality Splatting and Volume Synthesis*, in *Data Visualization: The State of the Art*, eds. Frits H. Post, Gregory M. Nielson, Georges-Pierre Bonneau, Kluwer Academic Publishers (Boston), 2003. pp. 127-140.
5. Huang, Jian, Roger Crawfis, *Adaptively Represented Complete Distance Fields*, in *Geometric Modelling for Scientific Visualization*, Guido Brunnet, Bernd Hamann, Heinrich Mueller eds., Springer
6. King, Scott A., **Roger A. Crawfis**, and Wayland Reid, *Fast Volume Rendering and Animation of Amorphous Phenomena*, in *Volume Graphics*, Ch. 13, Editors Arie Kaufman, Roni Yagel and Min Chen. Springer-Verlag (London) 1999.
7. **Crawfis, Roger** and Nelson Max, *Vector Field Visualization Techniques*, in *Data Visualization*, edited by C. Bajaj, Wiley and Sons, Ltd, 1999, pp. 75-86.
8. Max, Nelson, **Roger Crawfis** and Barry Becker, *Applications of Texture Mapping to Volume and Flow Visualization*, in *Data Visualization*, edited by C. Bajaj, Wiley and Sons, Ltd, 1999, pp. 87-105.
9. **Crawfis, Roger** and Michael Allison, *Multiple visualization techniques allow correlation of three scalar fields, one vector field and mesh topology*, in *Visual Cues*, edited by Peter Keller and Mary Keller, IEEE CS Press, 1993, p. 59-59.
10. **Crawfis, Roger**, Nelson Max and Dean Williams, *Depth cues and position correlate 3-D to 2-D*, in *Visual Cues*, edited by Peter Keller and Mary Keller, IEEE CS Press, 1993, p. 93-93.
11. **Crawfis, Roger** and Michael Allison, *Color and textures correlate variables*, in *Visual Cues*, edited by Peter Keller and Mary Keller, IEEE CS Press, 1993, p. 85-85.

Bulletins and Technical Reports

12. Matt Boggus and Roger Crawfis, "Procedural Creation of 3D Solution Cave Models," 6 pp. OSU-CISRC-5/09-TR19. Electronic report under TR19.pdf [OSU-CISRC-5/09--TR19](#).
13. Matt Boggus and Roger Crawfis, "Explicit Generation of 3D Models of Solution Caves for Virtual Environments," 6 pp. OSU-CISRC-5/09-TR18. Electronic report under TR18.pdf [OSU-CISRC-5/09--TR18](#).
14. Matt Boggus and Roger Crawfis, "Modeling Dynamic 3D Caves," 7 pp. OSU-CISRC-8/08-TR43. Electronic report under 2008/TR43.pdf [OSU-CISRC-08/08--TR43](#).
15. Oleg Mischenko, Sundaresan Raman and Roger Crawfis, "Distributed Visualization Framework Architecture," 8 pp. OSU-CISRC-5/08-TR20. Electronic report under 2008/TR20.pdf [OSU-CISRC-05/08--TR20](#).
16. Crawfis, Roger, "Dynamic Code Integration with CodeDom", posted on The Code Project, May 23, 2008, <http://www.codeproject.com/KB/dotnet/CodeDomDelegates.aspx>.

17. Sundaresan Raman, Oleg Mishchenko, and Roger Crawfis, "Layers for Effective Volume Rendering," 6 pp. OSU-CISRC-4/07-TR25. Electronic report under 2007/TR25.pdf [OSU-CISRC-4/07--TR25](#).
18. Roger Crawfis, Eric Noble, Michael Ford, Frederic Kuck, and Eric Wagner, "Clipmapping on the GPU," 9 pp. OSU-CISRC-4/07-TR24. Electronic report under 2007/TR24.pdf [OSU-CISRC-4/07--TR24](#).
19. Caixia Zhang, Daqing Xue, Roger Crawfis and Rephael Wenger, "Extending Interval Volumes into Four Dimensions," 9 pp. OSU-CISRC-1/05-TR06. Electronic report under 2005/TR06.pdf [OSU-CISRC-1/05--TR06](#).
20. Daqing Xue, Darrell Wallace, **Roger Crawfis**, *Tile-Based 3D Display Using A Reconfigurable Display Matrix*, Technical Report, OSU-CISRC-12/04-TR70, The Ohio State University, 2004.
21. Zhang, Caixia, **Roger Crawfis**, *Light transport for mixed polygonal and volumetric data using splatting*, OSU Technical Report OSU-CISRC-10/04-TR53, October 2004.
22. Ming Jiang, Naeem Shareef, Caixia Zhang, Roger Crawfis, Raghu Machiraju and Han-Wei Shen, "Visualization Fusion: Hurricane Isabel Dataset," 2 pp. OSU-CISRC-10/04-TR59. Electronic report under 2004/TR59.pdf [OSU-CISRC-10/04--TR59](#).
23. Caixia Zhang and Roger Crawfis, "Light Propagation for Mixed Polygonal and Volumetric Data Using Splatting," 8 pp. OSU-CISRC-10/4-TR53. Electronic report under 2004/TR53.pdf [OSU-CISRC-10/04--TR53](#).
24. Ramakrishnan Kazhiyur-Mannar, Rephael Wenger, Roger Crawfis, and Tamal K. Dey, "Adaptive Resolution Isosurface Construction in Three and Four Dimensions," 8 pp. OSU-CISRC-7/03-TR38. Electronic report under 2003/TR38.pdf [OSU-CISRC-7/03--TR38](#).
25. **Crawfis, Roger**, *Report on the DOE Workshop on Tera-Scale Visualization*, LLNL Tech Report, UCRL-JC-123623, (March 1998)
26. **Crawfis, Roger**, and Nelson Max, *Multivariate Volume Rendering*, LLNL Tech Report, UCRL-JC-123623, 1996.
27. **Crawfis, Roger**, *Vector Field Visualization Course Notes*, LLNL Tech Report, UCRL-MI-120622, 1994.
28. **Crawfis, Roger A.**, *Futures: MPP Visualization*, Lawrence Livermore National Laboratory UCRL-MI-120642, 1994, presented at the DOE Graphics Forum, Aspen, CO, April 26, 1997.

Peer Reviewed Journal Articles

29. Alexandra Borstad; **Roger Crawfis**, PhD; Kala Phillips, MS; Linda Pax Lowes, PhD; Lise Worthen-Chaudhari, MFA; David Maung, MS; Ryan McPherson, PhD; Amelia Siles, MS, DPT; Lynne V Gauthier, PhD; "In-home delivery of constraint induced movement therapy via virtual reality gaming is safe and feasible: a pilot study", in *Archives of Physical Medicine and Rehabilitation* (in press).
30. Gauthier, LV, Borstad, A, Luong, E, Phillips, K, Lowes, L, Worthen-Chaudhari, L, **Crawfis, R**, Maung, D. Upper extremity recovery following gamified Constraint-Induced Movement therapy: a case study in dense amnesic TBI. *Brain Injury Professional*. Vol. 12, No. 4.
31. Linda P Lowes, Lindsay N Alfano, Roger Crawfis, Katherine Berry, Han Yin, Igor Dvorchik, Kevin M Flanigan, Jerry R Mendell. Reliability and validity of ACTIVE-seated: An outcome in dystrophinopathy. *Muscle & Nerve*, 2014; DOI: [10.1002/mus.24557](#)

32. Oleg Mishchenko, **Roger Crawfis**, On Perception of Semi-Transparent Streamlines for Three Dimensional Flow Visualization, Computer Graphics Forum, to appear.
33. Praveen Bhaniramka, R. Wenger and **Roger Crawfis**, *Isosurface Construction in Any Dimension Using Convex Hulls*, IEEE Transactions on Visualization and Computer Graphics, Volume 10, Number 2 (March/April 2004), pp. 130-141.
34. Daqing Xue and **Roger Crawfis**, *A Modern Implementation of Textured Splats*, Journal of Graphics Tools, ACM Press, Volume 8, Number 3, pp. 1-21.
35. Caixia Zhang and **Roger Crawfis**, *Shadows and Soft Shadows with Participating Media Using Splatting*, IEEE Transactions on Visualization and Computer Graphics, Volume 9, Number 2 (April-June 2003), pp. 139-149.
36. Klaus Mueller, Jian Huang, Naeem Shareef, and **Roger Crawfis**, *High-Quality Splatting on Rectilinear Grids With Efficient Culling of Occluded Voxels*, IEEE Transactions on Visualization and Computer Graphics, Volume 5, Number 2, (June 1999), pp. 116-143.
37. Rudman, David T., Don Stredney, Dennis Sessanna, Roni Yagel, **Roger Crawfis**, David Heskamp, Charles V. Edmond, Jr., and Gregory J. Wiet, *Functional Endoscopic Sinus Surgery Training Simulator*, The Laryngoscope Journal, Volume 108, November 1998, pp. 1643-1647.
38. Mueller, Klaus, Torsten Moeller, Swan, J. Edward II, **Roger Crawfis**, Naeem Shareef and Roni Yagel, *Splatting Errors and Anti-Aliasing*, IEEE Transactions on Visualization and Computer Graphics, Volume 4, Number 2, (June 1998), pp. 178-191. (Winner of Naval Notable Achievement Award).
39. **Crawfis, Roger**, Nelson Max and Barry Becker, *Vector Field Visualization*, IEEE Computer Graphics & Applications (September 1994) pp. 50-56.
40. Max, Nelson, **Roger Crawfis** and Dean Williams, *Visualization for Climate Modeling*, IEEE Computer Graphics and Applications (July 1993), pp. 34-40.
41. Max, Nelson, Pat Hanrahan and **Roger Crawfis**, *Area and Volume Coherence for Efficient Visualization of 3D Scalar Functions*, Computer Graphics Vol. 24 No. 5, pp. 27-33.

Reviews and Abstracts

42. **Crawfis, Roger**, *Looking Forward: Procedural Content for Games and Lessons Learned From Visualization*, Keynote talk, CGVCVIP 2012, Lisbon, Portugal, July 21, 2012 (**Keynote Talk**) (http://iadisportal.org/previouseditions/CGV_2012.pdf) .
43. Bhaniramka, P., **Crawfis, R.**, Kang, H.S., Liang, D., Wenger R., Yao, Z. (1999). Marching Cubes in Four and Higher Dimensions: Extended Abstract. 4th CGC Workshop on Computational Geometry.
44. **Crawfis, Roger**, *Parallel Rendering and Image-based Rendering*, Large Data Visualization Workshop 1999, Salt Lake City, Utah.

Papers in Proceedings

45. Jiongqian Liang, David Fuhry, David Maung, Alexandra Borstad, **Roger Crawfis**, Lynne Gauthier, Arnab Nandi, and Srinivasan Parthasarathy. "Data Analytics Framework for A Game-based Rehabilitation System." In *Proceedings of the 6th International Conference on Digital Health Conference 2016 (DH '16)*, pp. 67-76. ACM, 2016.
46. Fuhry, D, Maung, D, **Crawfis, R**, Gauthier, L, Nandi, A, Parthasarathy, S. (2015) Data Analytics Framework for A Game-based Rehabilitation System. *Proceedings of 2015 SDM Workshop on Data Mining for Medicine and Healthcare*. Vancouver, British Columbia.

47. Yinxuan Shi, Erin Ferlet, **Roger Crawfis**, Patricia Phillis, and Karen Durano, 3D Hospital: Design and Implement Quest-Based Game Framework for Transitional Training, in Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES), 2015, Louisville, KY, USA, July 2015.
48. Quan Yu and **Roger Crawfis**, Gameplay-driven Terrain Generation in Scorched Earth, in Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES), 2015, Louisville, KY, USA, July 2015.
49. Paul Kim and **Roger Crawfis**, Quest for the Perfect Perfect Maze, in Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES), 2015, Louisville, KY, USA, July 2015.
50. David Maung and **Roger Crawfis**, Applying Formal Picture Languages to Procedural Content Generation, in Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES), 2015, Louisville, KY, USA, July 2015. (**Best paper award**).
51. Jaffe J, Lowes L, Borstad A, Worthen-Chaudhari L, **Crawfis R**, Phillips K, Maung D, Adams J, Siles A, Marlin A, McPherson R, Gauthier L. Gaming for the brain: video game based arm rehabilitation. Poster session present at: International Research Congress on Integrative Medicine and Health; 2014 May 13-16; Miami, FL.
52. Shi, Yinxuan and **Roger Crawfis**, Group Tactics Utilizing Suppression and Shelter, in Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES), 2014, Louisville, KY, USA, July 2014, pp.1-8.
53. Maung, D., **Crawfis, R.**, Gauthier, L.V., Worthen-Chaudhari, L., Lowes, L.P., Borstad, A., McPherson, R., Grealy, J., and Adams, J. Development of Recovery Rapids - A Game For Cost Effective Stroke Therapy. in Foundations of Digital Games (FDG 2014), April 2014, Ft. Lauderdale, FL, USA.
54. Jaffe, J., Lowes, L., Borstad, A., Worthen-Chaudhari, L., **Crawfis, R.**, Maung, D., Adams, J., Siles, A., McPherson, R., & Gauthier, L. Delivery of Constraint-Induced Movement therapy through a video game for individuals with hemiparesis post-stroke. Poster presented at: The Personalized Health Care Conference of The Ohio State University Wexner Medical Center; 2013 Oct 2-3; Columbus, OH.
55. Shi, Y., **R. Crawfis**, Optimal Cover Placement against Static Enemy Positions, Foundations of Digital Games, May 2013, Crete, Greece (**Best Paper**).
56. Maung, D., **R. Crawfis**, Lynne Gauthier, Lise Worthen-Chaudhari, Linda Lowes, Alex Borstad, Ryan McPherson. *Games for Therapy: Defining a Grammar and Implementation for the Recognition of Therapeutic Gestures*, Foundations of Digital Games, May 2013, Crete, Greece.
57. Michael Andereck, Alan Price and **Roger Crawfis**, *Procedural Terrain Generation for Medical Rehabilitation*, Procedural Content Generation Workshop, Crete, Greece, May 2013.
58. Maung, D.; Shi, Y.; **Crawfis, R.**; *Procedural Textures Using Tilings With Perlin Noise*, Computer Games (CGAMES), 2012 17th International Conference on, 30 July-2 Aug 2012 (Nominated for Best Paper).
59. Oleg Mishchenko and **Roger Crawfis**, *Effective Texture Models for Three Dimensional Flow Visualization*, In Proceedings of SCCG 2012, May 2012, Smolenice castle, Slovakia, pp. 45-52. (Best paper award).
60. Teng-Yok Lee, Oleg Mishchenko, Han-Wei Shen, and **Roger Crawfis**, *View Point Evaluation and Streamline Filtering for Flow Visualization*, In Proceedings of the IEEE Pacific Visualization Symposium 2011, March 2011, Hong Kong, pp. 83-90

61. Matt Boggus and **Roger Crawfis**, *Distance Field Illumination: a Rendering Method to Aid in Navigation of Virtual Environments*, In Proceedings of the 6th International Symposium on Visual Communication, November 2010, 501-510.
62. Matt Boggus and **Roger Crawfis**, *Prismfields: A Framework for Interactive Modeling of Three Dimensional Caves*, In Proceedings of the 6th International Symposium on Visual Communication, November 2010, 213-221.
63. Boggus, M. and **Crawfis, R.** 2010. *Distance based illumination as a navigational aid*. In Proceedings of the 2010 ACM SIGGRAPH Symposium on interactive 3D Graphics and Games (Washington, D.C., February 19 - 21, 2010). I3D '10. ACM, New York, NY, 1-1. DOI=<http://doi.acm.org/10.1145/1730971.1730979>
64. Oleg Mishchenko, Sundaresan Raman, and **Roger Crawfis**, *Distributed Visualization Framework Architecture*, Visualization and Data Analysis 2010, edited by Jinah Park, Ming C. Hao, Pak Chung Wong, Chaomei Chen, Proceedings of SPIE-IS&T Electronic Imaging, SPIE Vol. 7530, 75300K, pp. 75300K-1 - 75300K-12. doi: 10.1117/12.838702
65. Matt Boggus and **Roger Crawfis**, *Explicit Generation of 3D Models of Solution Caves for Virtual Environments*, In Proc. of the 2009 International Conference on Computer Graphics and Virtual Reality, Las Vegas, NV, July 2009, 85-90.
66. Matt Boggus and **Roger Crawfis**, *Procedural Creation of 3D Solution Cave Models*, In the 20th IASTED International Conference on Modelling and Simulation, Banff, Alberta, July 2009, 180-186.
67. Sundaresan Raman, Oleg Mishchenko, and **Roger Crawfis**, *Layers for Effective Volume Rendering*, IEEE/EG International Symposium on Volume Graphics, 10-11 August, 2008, pp. 1-88, Los Angeles, CA, USA.
68. **Crawfis, Roger**, Frederic Kuck, Eric Wagner, Asynchronous Continuous Level-Of-Detail and Texture-Mapping for Large-Scale Terrain Rendering Systems, Proceedings IMAGE 2006.
69. Zhang, Caixia, Daqing Xue, **Roger Crawfis**, Rephael Wenger, *Time Varying Interval Volumes*, Volume Graphics 2005, Stony Brook, NY (July 2005), pp. 99-108 (color plate on page 232).
70. Zhang, Caixia, **Roger Crawfis**, *Light Propagation for Mixed Polygonal and Volumetric Data*, Computer Graphics International (CGI 2005), Stony Brook, NY (July 2005).
71. Xue, Daqing, Caixia Zhang, **Roger Crawfis**, *iSBVR: Isosurface-aided Hardware Acceleration Techniques for 3D Slice-Based Volume Rendering*, Volume Graphics 2005, Stony Brook, NY (July 2005).
72. Xue, Daqing, Darrell Wallace, **Roger Crawfis**, *A New 3D Display Using a Dynamically Reconfigurable Display Matrix Surface*, Computer Graphics International (CGI 2005), Stony Brook, NY (July 2005).
73. Xue, Daqing, Caixia Zhang, **Roger Crawfis**, *Rendering Implicit Flow Volumes*, IEEE Visualization 2004, October, 20004, pp. 99-106.
74. Bhaniramka, Praveen, Caixia Zhang, Daqing Xue, **Roger Crawfis**, Rephael Wenger, *Volume Interval Segmentation and Rendering*, IEEE/SIGGRAPH Symposium on Volume Visualization, October 2004, pp. 55-62. (best paper)
75. Daqing Xue, **Roger Crawfis**, *A Tile-Based 3D Frame Using Reconfigurable Display Matrix*, SIGGRAPH 2003 Sketches.
76. Daqing Xue and Roger Crawfis, *Fast Dynamic Flow Volume Rendering Using Textured Splats*

on Modern Graphics Hardware, Proceedings SPIE EI 2004, San Jose, CA.

77. Yang, Lining, **Roger Crawfis**, *A Panoramic Walk-through System with Occlusion Culling*, Ninth Eurographics Workshop on Virtual Environments, Zurich, Switzerland (May 2003).
78. Caixia Zhang, **Roger Crawfis**, *Volumetric Shadows Using Splatting*, Proceedings IEEE Visualization 2002, pp. 85-92.
79. Yang, Lining, **Roger Crawfis**, *Railtrack Viewer – An Image-Based Virtual Walkthrough System*, Eighth Eurographics Workshop on Virtual Environments, Barcelona, Spain (May 2002).
80. Shareef, Naeem, **Roger Crawfis**, *A View-dependent Approach to MIP for Very Large Data*, Proceedings SPIE EI '02, Vol. 4665, 2002, pp. 13-21.
81. Huang, J., **R. Crawfis**, S, Lu, C. Shu, *A Complete Distance Specification*, IEEE Visualization 2001, pp. 247-254.
82. Bhaniramka, P., Wenger R., **Crawfis, R.** *Iso-Contouring in Higher Dimensions*, IEEE Visualization 2000, pp. 267-273.
83. Huang, Jian, Naeem Shareef, Klaus Mueller, **Crawfis, Roger**, *Optimized Software Splatting*, IEEE Visualization 2000, pp. 219-226.
84. Meissner, Micheal, Jian Haung, Dirk Bartz, Klaus Mueller, **Roger Crawfis**, *Comparison of the Four Predominant Volume Rendering Techniques*, Volume Visualization 2000 Symposium, pp. 81-90.
85. Jian Huang, Naeem Shareef, Klaus Mueller, **Roger Crawfis**, Ponnuswamy Sadayappan, *Efficient Data Redistribution With Occlusion Acceleration For Parallel Image-Aligned Sheet-Based Splatting*, Eurographics Workshop on Parallel Graphics and Visualization, Girona, Spain.
86. **Crawfis, Roger**, Han-Wei Shen, Nelson Max, *Flow Visualization Techniques for CFD Using Volume Rendering*, Ninth International Symposium on Flow Visualization.
87. Camuto, Matt, Barry Becker and **Roger Crawfis**, *Approximating Scatterplots of Large Datasets Using Distribution Splats*, Proceedings IS&T/SPIE Electronic Imaging 2000, Visual Data Exploration and Analysis VII, pp. 144-154.
88. Mueller, Klaus, Torsten Moeller, **Roger Crawfis**, *Splatting without the Blur*, Proceedings IEEE Visualization '99, pp. 363-370.
89. Mueller, K., Shareef, N., Huang, J., and **Crawfis, R.**, *IBR-Assisted Volume Rendering*, IEEE Visualization '99 LBHT, San Francisco, CA, pp. 5-8, 1999. **(Best Hot Topics paper)**.
90. Jian Huang, Klaus Mueller, Naeem Shareef and **Roger Crawfis**, *VOXBLT: An Efficient and High-Quality Splat Primitive*, IEEE Visualization '99 LBHT, San Francisco, CA, pp. 1-4, 1999.
91. King, Scott A., **Roger A. Crawfis** and Wayland Reid, *Fast Animation of Amorphous and Gaseous Volumes*, Volume Graphics '99, Swansea, UK, pp. 336-346.
92. Stredney D, **Crawfis R**, Wiet GJ, Sessanna D, Shareef N and J Bryan, *Interactive Volume Visualizations for Synchronous and Asynchronous Remote Collaboration*, Proceedings of Medicine Meets Virtual Reality 7, JS Westwood et al, (Eds.) IOS Press Amsterdam, 1999, pp 344-350.
93. Mueller, Klaus, and **Roger Crawfis**, *Eliminating Popping in Sheet Buffer-Based Splatting*, IEEE Visualization '98.

94. Huang, Jian, **Roger Crawfis** and Don Stredney, *Edge Preservation in Volume Rendering Using Splatting*, Volume Visualization '98.
95. Hazard, Chris, Jian Huang and **Roger Crawfis**, *2D Image Reconstruction with Simultaneous Edge Preservation and Blur*, Proceedings ISAS'98, Vol. 2, IIS Press, pp. 420-426.
96. Albertelli, Guy, and **Roger Crawfis**, *Efficient Subdivision of Finite-Element Datasets into Consistent Tetrahedra*, Proceedings IEEE Visualization '97 (Oct. 1997) Phoenix, AZ, pp. 213-220.
97. Swan, J. Edward II, Klaus Mueller, Torsten Moeller, Naeem Shareef, **Roger Crawfis** and Roni Yagel, *An Anti-Aliasing Technique for Splatting*, Proceedings IEEE Visualization '97 (Oct. 1997) Phoenix, AZ, pp. 197-204.
98. **Crawfis, Roger**, *Real-time Slicing of Data Space*, Proceedings Visualization '96 (October 1996), IEEE CS Press, Los Alamitos, pp. 271-277.
99. Max, Nelson, **Crawfis, Roger** and Barry Becker, *Applications of Texture Mapping to Volume and Flow Visualization*. in Graphicon '95. 1995. St. Petersburg: Springer-Verlag.
100. Max, Nelson, and **Roger Crawfis**, *Advances in Scientific Visualization*, IS&T/SPIE Symposium on Electronic Imaging: Science and Technology (February 1995), Vol 2410.
101. Max, Nelson, **Roger Crawfis** and Barry Becker, *Visualizing 3D Velocity Fields Near Contour Surfaces*, Proceedings Visualization '94 (October 1994), IEEE CS Press, Los Alamitos, pp. 248-255.
102. **Crawfis, Roger**, Nelson Max, Barry Becker and Brain Cabral, *Volume Rendering of 3D Scalar and Vector Fields at LLNL*, Proceedings Supercomputing '93 (November 1993).
103. **Crawfis, Roger** and Nelson Max, *Texture Splats for 3D Vector and Scalar Field Visualization*, Proceedings Visualization '93 (October 1993), IEEE CS Press, Los Alamitos, pp. 261-266.
104. Max, Nelson, Barry Becker and **Roger Crawfis**, *Flow Volumes For Interactive Vector Field Visualization*, Proceedings Visualization '93 (October 1993), IEEE CS Press, Los Alamitos, pp. 19-24.
105. Max, Nelson, **Roger Crawfis** and Barry Becker, *New Techniques in 3D Scalar and Vector Field Visualization*, Pacific Graphics '93 Seoul, Korea (August 1993).
106. **Crawfis, Roger** and Nelson Max, *Direct Volume Visualization of Three-Dimensional Vector Fields*, Proceedings of the 1992 Workshop on Volume Visualization, Kaufman and Lorenson (eds.), ACM SIGGRAPH, NY pp. 55-60.
107. Max, Nelson and **Roger Crawfis**, *Visualizing Wind Velocities by Advecting Cloud Textures*, Proceedings of Visualization '92 (October 1992), IEEE Los Alamitos, CA. pp. 179-184.
108. **Crawfis, Roger** and Michael Allison, *A Scientific Visualization Synthesizer*, *Proceedings Visualization '91* (October 1991), IEEE Los Alamitos, CA. pp. 262-267.
109. **Crawfis, Roger**, *Phigs-PLUS for Scientific Graphics*, NCGA '91 conference proceedings, April 22-25, 1991 pp 648-652.

Unpublished Scholarly Presentations

110. Worthen-Chaudhari, Lise, **Roger Crawfis**, Startup Snapshot, VC pitch, March 2014, Tech Columbus.
111. **Crawfis, Roger**, Startup Snapshot, demo of Recovery Rapids: A gamified CI Therapy, March 2014, Tech Columbus.

112. Demo, Ohio Game Developer Expo, <http://www.ohiogamedevexpo.com/>, December 7th, 2013, The Ohio State University, Columbus, OH.
113. Panel on Games Research, " **International Games Day @ Thompson Library**, Thursday, November 7th, 10:30am – 11:45am, Room 165 Thompson Library.
114. Maung, David, **Roger Crawfis**, Canyon Run, demo at FDG 2013, Crete, Greece, May 2013.
115. **Crawfis, Roger**, LOOKING FORWARD: PROCEDURAL CONTENT FOR GAMES AND LESSONS LEARNED FROM VISUALIZATION, Keynote talk, CGVCVIP 2012, Lisbon, Portugal, July 21, 2012.
116. **Crawfis, Roger**, *Visualization of Three-Dimensional Vector Fields*, The University of Akron, April 26, 2005.
117. **Crawfis, Roger**, *Visualization Activities at Ohio State*, OSC/WCI Workshop on Visualization, December 3, 2004. (not peer-reviewed)
118. *Volumetric Shadows and Soft Shadows*, by Caixia Zhang, **Roger Crawfis**, Ohio Supercomputer Center, December, 2004. (poster)
119. *Hardware Accelerated Volume Rendering: Splatting on Modern Graphics Hardware*, by Daqing Xue, **Roger Crawfis**, Ohio Supercomputer Center, December, 2004. (poster)
120. *Tile-Based 3D Display Using A Reconfigurable Display Matrix*, by Daqing Xue, Darrell Wallace, **Roger Crawfis**, Ohio Supercomputer Center, December, 2004. (poster)
121. *Construction and Rendering of Implicit Flow Fields*, by Caixia Zhang, Daqing Xue, **Roger Crawfis**, Ohio Supercomputer Center, December, 2004. (poster)
122. *Remote User-Driven Exploration of Large Scale Volume Data*, by Naeem Shareef, **Roger Crawfis**, Ohio Supercomputer Center, December, 2004. (poster)
123. **Crawfis, Roger**, *Bone Hunting (active tense)*, panel presentation at the IEEE Visualization 2003 conference for the panel entitled *Do I Really see a Bone?* (best panel). (the panel was peer-reviewed, my individual talk was not)
124. **Crawfis, Roger**, *Rail-track Viewer, An Image-Based Virtual Walkthrough System*, 2003 Dagstuhl Workshop on Visualization (June 2003) (not peer-reviewed).
125. **Crawfis, Roger** and Daqing Xue, *Hardware Accelerated Volume Rendering: splatting on modern graphics hardware*, US Army workshop on Visualization, Tallahassee, FL (July 2003).
126. **Crawfis, Roger**, *Volume Synthesis using Splatting*, 2000 Dagstuhl Workshop on Visualization.
127. **Crawfis, Roger**, *Parallel Rendering and Image-based Rendering*, Large Data Visualization Workshop 1999, Salt Lake City, Utah.
128. **Crawfis, Roger**, Naeem Shareef and Po-Wen Shih, *Rendering Multiple Vector Fields*, Vector Field Visualization Symposium, Chapel Hill, NC, October 1998.
129. **Crawfis, Roger** and Carol Hunter (Panel organizers), *Terascale Visualization: Approaches, Pitfalls, and Issues* at Visualization '97 conference, with panelists James Ahrens (LANL), Michael Cox (NASA) Bernd Hamann (UC Davis), Charles Hansen (Univ. of Utah), and Mark Miller (LLNL).
130. **Crawfis, Roger**, Nelson Max and William Schroeder, *Scientific Visualization*, IEEE Visualization 95 Course Notes (October 1995), Atlanta, GA.
131. **Crawfis, Roger**, *New Techniques for the Scientific Visualization of Three-Dimensional Multi-*

variate and Vector Fields, PhD Dissertation, University of California, Davis (September 1995).

132. **Crawfis, Roger**, Charles Hansen, Nelson Max, Greg Nielson, and William Schroeder, *Advanced Techniques for Scientific Visualization*, SIGGRAPH '95 Course Notes CD (August 1995), Los Angeles, CA. (peer reviewed)
133. **Crawfis, Roger**, Nelson Max and William Schroeder, *Scientific Visualization*, CG International 95 Course Notes (June 1995), Leeds, UK. (peer reviewed)
134. **Crawfis, Roger**, John Zych and Barry Becker, *Scientific Visualization*, WWW pages - <http://www.llnl.gov/graphics>.
135. **Crawfis, Roger**, Charles Hansen, Nelson Max, Greg Nielson, and William Schroeder, *Advanced Techniques for Scientific Visualization*, SIGGRAPH '94 Course Notes CD (July 1994) Orlando, FL.
136. **Crawfis, Roger A.**, *Futures: MPP Visualization*, Lawrence Livermore National Laboratory UCRL-MI-120642, 1994, presented at the DOE Graphics Forum, Estes Park, CO, April 26, 1997.

Potential Publications in progress

110. DeLaubenfels, Evan, David Maung, and **Roger Crawfis**, *Maze construction for Games: Minimizing Dead-Ends and Optimizing Path Enjoyment*. 2012.
111. Mishchenko, Oleg and **Roger Crawfis**, *Effective Texture Models for Three Dimensional Flow Visualization*, 2012.

Creative Works

Patents

1. Crawfis, Roger, F. C. Kuck, E. Noble, E. Wagner, Patent # 7626591 (2009) for *Obelisk Textures: A Multi-texturing Approach to Clip-maps*.
2. Becker, Barry and Roger Crawfis, Patent #6,373,483 (2002) for *Method System and Computer Program for Visually Approximating Data Using Color to Represent Values of a Categorical Variable*.

Software

3. Programmer's Distributed Visualization Framework – A graphics and visualization framework in C# complete with user interface controls and asset management and remoting capabilities. Open sourced at <http://www.codeplex.com/OSUvolumeRenderer>.
4. Tornado Data set generator – A simple C function to generate vector fields used for comparison in the visualization and flow visualization communities. Open-sourced at www.cse.ohio-state.edu/~crawfis/Data/Tornado.
5. Textured Splats – C++ software for texture splatting. Open-sourced at www.llnl.gov/graphics.
6. Volume Renderer for IRIS Explorer. Open-sourced at www.llnl.gov/graphics.

Films / Videos

7. *A Scientific Visualization Synthesizer*, Lawrence Livermore National Laboratory R&R-25, 3:55 min, silent, 10-17-91.
8. *Visualization Research for Global Climate Modeling*, Lawrence Livermore National Laboratory CS-5644, 8:29 min, silent, 2-12-92.
9. *Global Climate Visualization*, SIGGRAPH '92 Film and Video Show, July 26-31, 1992 (Chicago), HDTV format, 1:34 min, silent, 6-11-92.
10. *Global Climate Visualization*, NICOGRAPH '92 Film and Video Show (Japan), 5:25 min, music and narration, 8-28-92.
11. *Texture Splats for 3-D Vector and Scalar Field Visualization*, Lawrence Livermore National Laboratory, 5:28 min, silent, 3-29-93.

12. *New Techniques in 3D Scalar and Vector Field Visualization*, Lawrence Livermore National Laboratory, 5:00 min, silent, 8-23-93.
13. *FY '94 LDRD Visualization Proposal*, Lawrence Livermore National Laboratory PR-16558, 8:58 min, narration and music, 5-15-94.

Cover Images

14. Front Cover Image, IEEE Transactions on Visualization and Computer Graphics, Volume 10, Number 2.
15. Front Cover, IEEE Transactions on Visualization and Computer Graphics (April-June 1998)
16. Back Cover Image, Proceedings of Visualization '93
17. Cover Image, Proceedings of Visualization '93
18. Cover Image, Energy & Technology Review (August 1993)
19. Centerpiece Image, Computation's 40th Anniversary Poster (1992)
20. Cover Image, Proceedings of the 1992 Workshop on Volume Visualization
21. Back Cover Image, Proceedings of Visualization '91

Research Funding

Principal Investigator

- Microsoft, \$6000, Azure credits for research and class projects.
- Microsoft, \$1600, gift of MS Surface Pro.
- Microsoft, \$1250, gift, Educator's Summit on Game Design travel grant (2005).
- Microsoft, \$1250, gift, Web-based Applications travel grant (2005).
- Microsoft, \$4000, gift, Visual Studio Team Project (2004-2007).
- NEC, \$80K, 9-1-2000, 1 year, Flat panel equipment request for large video wall, matching grant.
- NSF CAREER, \$216K, 1/1999 – 1/2003, 100%. *Three-dimensional volume visualization of multivariate data*
- Microsoft, \$4000, gift, Visual Studio Enterprise and MSDN (2001-2004).
- NSF/ACI, \$250K, 10/2002 – 9/2005, Han-Wei Shen, Raghu Machiraju, *Effective Visualizations for Complex 3- and 4-Dimensional Flow Fields*.
- Ford Motor Company, \$103K, 12/1998-12/1999, R. Yagel (99%), Accurate Voxelization and Analysis Techniques for Diecasting Applications, Contract
- DOE ASCI, \$726K, 1/1999-10/2001, W. Feng, R. Yagel, D. Stredney (70%), An Image-based Approach to Scientific Visualization, Grant
- Microsoft, \$4000, gift, Visual Studio Enterprise and MSDN.
- Silicon Graphics, \$8K (equip), 5/1998-5/1999, 100%, SGI MineSet Sponsored Research, Contract
- OSU (Seed), \$17K, 5/1997-12/1998, 100%, An Image-based Approach to Scientific Grant Visualization, Grant
- OSU, \$65K, 5/1997-12/1998, D. Stredney, G. Weit, (70%), Employing Detailed Texture for Increased Realism in Volume Rendering of Medical Data for Virtual Surgery, Grant
- DOE (HPPC), \$292K, 5/1992-10/1993, N. Max, J. Potter (60%), Visualization for Global Climate Modeling, Grant
- LLNL (LDRD), \$950K, 10/1993-10/1995, N. Max (60%), Multivariate and Vector Field Visualization, Grant

Co-Principal Investigator

- Patient Centered Outcomes Research Institute (PCORI), \$50K, 9/2015-1/2016, *Dissemination of Recovery Rapids*, with Lynne Gauthier.
- Patient Centered Outcomes Research Institute (PCORI), \$2M, 9/2015-10/2018, *Clinical trial to compare Recovery Rapids to CI-therapy*, with Lynne Gauthier (PI), and others.
- National Multiple Sclerosis Society, \$44K, Effectiveness of Recovery Rapids to MS rehab., with Lynne Gauthier and Alex Borstad.

- Microsoft, \$1200, award with Mathew Boggus, Course Development grant (2013).
- Patient Centered Outcomes Research Institute (PCORI) Pilot Grants, \$653,014.00, 8/2012-7/2013, A *low-cost virtual reality gaming platform for neurorehabilitation of hemiparesis*, with Lynne Gauthier (PI), and Lise Worthen-Chaudhari.
- NSF (equip), \$350K, 2/2000-2/20002, D. Panda, P. Sadayappan, W. Feng (15%), Network Computing Testbed for Interactive Visualization, Multimedia, and Metacomputing, Grant.
- OSU Comprehensive Cancer Center Seed Grant, \$17K, 9/1999-8/2000, Christoph Plass, Fred Wright, Rick Parent, Rephael Wenger (20%), *Computer Assisted Analysis of DNA Methylation Patterns in Human Cancer*, Grant
- DOE, \$736K, 7/1999-7/2002, W. Fend, B. Weide (20%), Stackable Middleware Services for Multimedia Applications, Grant
- NSF (equip), \$273K, 12/1998-12/2001, W. Feng, R. Jain (25%), A Video-Based Testbed for Scientific Visualization and Networking, Grant
- NLM (planning), \$100K, 10/1998-6/1999, D. Stredney, W. Feng, P. Saday, D. Panda, J. Hou, Image-Based Warehouse Across Heterogeneous Environments, Grant
- Loral Defense, \$13K, 11/1997-10/1998, D. Stredney, G. Weit (50%), Patient visual model development for Contract virtual simulation of Endoscopic sinus surgery, Contract
- Ford Motor, \$64K, 10/1997-10/1998, R. Yagel (80%), Interactive Reasoning and Visualization System for Diecasting Applications, Contract

Prizes and Awards

- Best paper award for *Effective Texture Models for Three Dimensional Flow Visualization*, SCCG 2012.
- Best paper award for *Volume Interval Segmentation and Rendering* at the IEEE Volume Visualization 2004 Workshop.
- Best panel award for the panel *Do I Really See a Bone?* at the IEEE Visualization 2003 conference.
- 2000 College of Engineering Lumley Award.
- Best Hot Topics Paper, IEEE Visualization '99.
- 1999 College of Engineering Annual Research Accomplishment Award
- Naval Notable Achievement Award for IEEE Transactions on Visualization and Computer Graphics paper, *Splatting Errors and Anti-Aliasing*, (June 1998)
- Best panel award for *Terascale Visualization: Approaches, Pitfalls, and Issues* at the IEEE Visualization '97 conference.
- Best paper award for *An Anti-Aliasing Technique for Splatting* at the IEEE Visualization '97 conference.
- Best paper award for *Texture Splats for 3D Vector and Scalar Field Visualization* at the IEEE Visualization '93 conference.
- Grand Prix in the category of Scientific Visualization for the video *Global Climate Visualization* at the NICCOGRAPH '92 conference.

Editorship

IEEE Transactions on Visualization and Computer Graphics, 2000-2004

Other Service

Faculty Senate, The Ohio State University, 2012-2015.

Faculty Search, Computer Science and Engineering, The Ohio State University, 2002-2013.

Computer Committee, Chair, Computer Science and Engineering, The Ohio State University, 2007-2009.

ANSI PHIGS+ committee member (1989-1991).

Invited lectures

- *Defining Fun*, Keynote Speech, CGVCVIP, Lisbon, Portugal, July 21 - 23, 2012.
- *Visualization of Three-Dimensional Vector Fields*, Keynote Speech Computer Graphics and Visualization, May 2006
- *Visualization of Three-Dimensional Vector Fields*, The University of Akron, April 2005.
- *Volume Models for Engineering Design and Analysis*, Umea University, Umea Sweden, January 2002.
- *Virtual Surgical Simulators*, Umea University, Umea Sweden, January 2002.
- *Interactive Visualization of Large Datasets*, Umea University, Umea Sweden, January 2002.
- *Volume Synthesis using Splatting*, Dagstuhl Workshop on Visualization, 2000
- *Parallel Rendering and Image-Based Rendering*, MERL, 1999
- *Merging Computer Graphics and Imaging*, Center for Mapping Seminar Series, OSU, Autumn 1998
- *Volume Reconstruction*, Applied Mathematics Seminar, OSU, Spring 1997
- *Textured Splats for Flow Visualization*, Purdue Distinguished Lecture Series, Autumn 1996
- *Towards Interactive Visualization*, DOE Graphics Forum, 1993

Students Supervised

- Doctoral Students (dissertation advisor)
 - T. Möller, 1999, *Spatial Domain Filter Design*.
 - J. Huang, 2001, *A Prototype High-Quality Latency Hiding Remote Volume Visualization System*.
 - L. Yang, 2003, *A Complete and Practical System for Interactive Walkthroughs of Arbitrarily*.
 - N. Shareef, 2005, *Remote User-Driven Exploration of Large Scale Volume Data*.
 - C. Zhang, 2006, *Advanced Volume Rendering on Shadows, Flows and High-Dimensional Rendering*.
 - D. Xue, 2008, *Volume Visualization Using Advanced Graphics Hardware Shaders*.
 - M. Boggus, 2012, *Modeling, Editing, and Illumination of Three Dimensional Caves for Computer Games*
 - O. Mischenko, 2013, *Texture Models for Effective Flow Visualization*
- Masters Students Plan A (thesis advisor)
 - J. Huang (BME), 1998, *Fast and Realistic Rendering of Intermixed Datasets*
 - P. Bhaniramka, Spring 2000, *Contouring in Higher Dimensions*
 - J. Bryant, Spring 2001, *A Virtual Temporal Bone Dissection Simulator*
 - C. Zhang, Spring 2002, *Shadows Using Splatting*

Extension and Continuing Education Instruction

- I developed and coordinated a 2-week condensed course on Scientific Visualization for the National Universities of Sweden at Umea, Sweden. This course consisted of four hour lectures every morning, with homework and lab assignments each evening and on the weekend. I conducted about 70% of these lectures, with an assistant conducting the remaining 30%. This was a graduate level course comprised of 22 students with several additional colleagues auditing the course. I was invited back to teach this course again in the summers of 1999 and 2000, and the Winter of 2002.
- I organized SIGGRAPH '94 and '95 one-day tutorials on Advanced Scientific Visualization.
- I organized a half-day tutorial for IEEE Visualization '95 on Scientific Visualization.
- I organized a half-day tutorial for Computer Graphics International '95 on Scientific Visualization.

Curriculum Development

- I created a new Junior Project course, CSE 3902, that teaches many concepts in professional software development, including Agile methods, code reviews, teamwork, testing and Design patterns.

- I developed a new course on Procedural World Creation for Games. The goal of the course is to look at higher-level reasoning for the creation of massive worlds with minimal user intervention.
- I developed a new course on Programming in C# and piloted it for the second time. This course is mainly an on-line course with viewable lectures and notes. Class time is spent using tools and working through problems.
- I reworked the course content in CSE 781 to introduce new modern GPU programming and algorithms associated with these.
- I developed a new course on Advanced Game Design. This has been a model for other capstone courses. It has students work in a group on designing and implementing a game using Agile Programming paradigm, while splitting students in a cross-pollinated team focused on a particular aspect of game technology (e.g., sound, AI, GPU's, controllers, etc.).
- I refined the CSE 581 course to include elements of user interfaces and the ability to use the .NET framework.
- I developed and piloted a new course on Scientific Visualization, CIS 694L.
- I am currently chartered with redesigning the CIS 781 curriculum and the CIS 782 curriculum.
- As a member of the graphics group faculty, I have participated in discussions on new courses (581 and 682) and the graphics curriculum.
- CIS 788.14K Advanced Scientific Visualization: This course examines the leading research and techniques in scientific visualization, with a heavy emphasis on volume rendering and flow visualization. This is a seminar course, which I designed to meet the needs of the department as well as other scientific departments in the university.
- CIS 788.14I Volume Graphics and Scientific Visualization: This course covers volume rendering, voxelization and medical visualization techniques resulting from the latest research. This course was reworked from Dr. Yagel's original design. I reworked it as a merger between Dr. Yagel's original 788 and my 788.14K, that was to be team taught yearly.
- CIS 681 Introduction to Computer Graphics: During the summer and autumn of 1998, I worked with a student to rework the laboratory assignments and course software. We developed new C++ infrastructure and an X-windows/OpenGL interface to make the labs more up-to-date, interactive and enjoyable. We added issues, such as event-loop programming, callbacks, menus and OpenGL programming.

Consultation

Litigation

Summary

- Depositions: 3
- Testimonies: 1
- Expert Reports: 5
- IPRs: 1
- Theft of trade secrets: 1
- Advanced Silicon Technologies (AST) vs. Renesas, ITC Case No. 337-TA-984.
Representing Renesas. In-progress.
Timeframe: Feb 2016-August 2016
Firm: Foley & Lardner LLP
(primary contact Kevin Malaney, Milwaukee, WI)

- Client: Renesas
 - Adverse: Advanced Silicon Technologies (AST)
 - Venue: International Trade Commission
 - Roles: expert report, ongoing
- Samsung vs. nVidia, Inter Partes Review (IPR) of U.S. Patent No. 6,690,372. Representing Samsung. Deposed. In progress.
 - Timeframe: Mar 2015-present
 - Firm: Kirkland & Ellis LLP
(primary contact Katherine Burke, Washington, D.C.)
 - Client: Samsung
 - Adverse: nVidia
 - Venue: International Trade Commission
 - Roles: expert report, deposition
- nVidia vs. Samsung, US District Court of Delaware. Representing Samsung. In progress.
 - Timeframe: Mar 2015-present
 - Firm: Kirkland & Ellis LLP
(primary contact Katherine Burke, Washington, D.C.)
 - Client: Samsung
 - Adverse: nVidia
 - Venue: US District Court of Delaware
 - Roles: on-going
- nVidia vs. Qualcomm, ITC Case No. 337-TA-932. Representing Qualcomm. Deposed. Testified at trial June 2015. Won.
 - Timeframe: Mar 2015-Jun 2015
 - Firm: Norton Rose Fulbright US LLP
(primary contact Richard Zembek, Houston, TX)
 - Client: Qualcomm
 - Adverse: nVidia
 - Venue: International Trade Commission
 - Roles: expert report, declaration, deposition, testimony
- nVidia vs. Samsung, ITC Case No. 337-TA-932. Representing Samsung. Deposed. Testified at trial June 2015. Won.
 - Timeframe: Mar 2015-Jun 2015
 - Firm: Kirkland & Ellis LLP
(primary contact Katherine Burke, Washington, D.C.)
 - Client: Samsung
 - Adverse: nVidia
 - Venue: International Trade Commission
 - Roles: expert report, declaration, deposition, testimony
- Flairdocs. Expert witness on trade secret case: Flairsoft Ltd. v. Yogesh Khandelwal, et al., Delaware, OH. Settled.
 - Timeframe: Jun 2013-Aug 2015
 - Firm: Standley Law Group LLP
(primary contact Michael Speed, Jr., Dublin, OH)
 - Client: Flairsoft Ltd.

Adverse: Yogesh Khandelwal, et al.
Venue: COURT OF COMMON PLEAS, DELAWARE COUNTY, OHIO
Roles: declaration

- AMD, Inc., Expert witness on GPU's and texture compression: *S3 Graphics Co., Ltd v. ATI Technologies ULC, ATI International SRL and Advanced Micro Devices, Inc.*, United States International Trade Commission Investigations No. 337-TA-724, No. 337-TA-812, and No. 337-TA-813.

Timeframe: Jan 2012-Mar 2014
Firm: King & Spalding LLP
(primary contact Jeffrey D. Mills, Austin, TX)
Client: AMD
Adverse: S3G
Venue: International Trade Commission
Roles: software/hardware forensics, report

- AMD, Inc., Expert witness on GPU's and texture compression: *S3 Graphics Co., Ltd v. ATI Technologies ULC, ATI International SRL and Advanced Micro Devices, Inc.*, filed on December 28, 2011 in the United States District Court of Delaware.

Timeframe: Jan 2012-Mar 2014
Firm: King & Spalding LLP
(primary contact Jeffrey D. Mills, Austin, TX)
Client: AMD
Adverse: S3G
Venue: United States District Court of Delaware
Roles: software/hardware forensics, report

Software Design and Development

- Neukinetics, development of prototype exercise game for Parkinsons.
- Nationwide Children's Hospital, Development of Active-Seated.
- Nationwide Children's Hospital, Development of Active-mini.
- Nationwide Children's Hospital, Development of ReachVolume.
- Hardcard, Inc., Technical support for creating RFID tag reading software in support of Motorcross and other racing applications. December 2010-present.
- DSCI, Inc., Technical support for virtual reality simulation software. December 2004 – 2011.
- Lawrence Livermore National Laboratory, Visualization support for Arbitrary Polyhedra, 10/1996 thru 8/1998.
- Silicon Graphics, Inc., Visualization techniques for nominal data values, 6/1/998 thru 6/30/1998.

Other Professional/Public Service

Referee

- IEEE Transactions on Visualization and Computer Graphics

- IEEE Computer Graphics and Applications
- ACM Transactions on Graphics
- IEEE Visualization conference
- IEEE Symposium on Volume Visualization
- Volume Graphics '99
- Joint Eurographics-IEEE Symposium on Visualization 2001
- Joint Eurographics-IEEE Symposium on Visualization 2002
- Winter School of Computer Graphics
- ISAS / SCI '99
- ISAS 2000
- SCI 2002
- VisSym 2002
- VisSym 2001
- The Visual Computer

Proposal reviewer

- National Science Foundation CAREER award program
- National Science Foundation's Advanced Computing Program
- American Institute of Biological Sciences – U.S. Army Medical Research and Material Command.
- Department of Energy, Energy Sciences

Service as organizer or program committee member of conferences, meetings, etc.

- Program Committee member 5th International Symposium on Visual Computing (ISVC09)
- 2008 Program Committee for IEEE/EG International Symposium on Volume Graphics.
- 2008 Program Co-Chair for IEEE Visualization 2008.
- Program Committee member 4th International Symposium on Visual Computing (ISVC08)
- 2007 Program Committee member for the Volume Graphics 2007 workshop.
- 2007 Program Committee member for the IEEE Visualization 2007 workshop.
- 2005 Program Committee member for the Volume Graphics 2005 workshop.
- 2004 Program Committee member for the IEEE Visualization 2004 conference.
- 2004 Program Committee member for the 2004 Symposium on Volume Visualization
- 2002 Program Co-Chair for the 2002 Symposium on Volume Visualization
- 2002 Program Committee member for VisSym'02 – joint Eurographics - IEEE TCVG Symposium on Visualization
- 2000 Papers Co-Chair for the 2000 Symposium on Volume Visualization
- 2001 Program Committee member joint Eurographics - IEEE TCVG Symposium on Visualization (VisSym '01)
- 2001 Program Committee member for the International Workshop on Volume Graphics.
- 1999 Program Committee member for the Joint Eurographics-IEEE Symposium on Visualization
- 1999 Program Committee member for the Volume Graphics '99 conference
- 1999 Program Committee member for the Large Data Visualization Workshop, Salt Lake City, Utah.
- 1998 Program Committee member for the 1998 Workshop on Volume Visualization
- 1997 SIGGRAPH Application Sketches Chair
- 1996 Workshop on Volume Visualization Co-chair (November 1996)
- External Reviewer for Lawrence Livermore National Laboratory's Data Visualization SuperCorridor design, June 18, 1998.