Michael Zyda

Work Address:
Director, USC GamePipe Laboratory
Department of Computer Science
746 West Adams Blvd, EGG Building
Los Angeles, California 90089-7725
(310) 463-5774

Home Address:
610 S Main St, Apt 435
Los Angeles, CA 90014-2073
(310) 463-5774

E-mail: zyda@usc.edu

Web: http://gamepipe.usc.edu/~zyda

Research Interests: computer graphics, large-scale, networked 3D virtual environments, agent-based simulation, modeling human and organizational behavior, interactive computer-generated story, computer-generated characters, video production, entertainment/defense collaboration, serious and entertainment games, and modeling and simulation.

Pioneer in the following fields: computer graphics, networked virtual reality, modeling and simulation, serious and entertainment games.

Education

Washington Unversity - St. Louis, Missouri 1978-1984
D.Sc. Computer Science - Awarded January, 1984
School of Engineering and Applied Science
"Algorithm Directed Architectures for Real-Time Surface Display Generation"

University of Massachusetts, Amherst - Amherst, MA
1976-1978
M.S. Computer and Information Science Awarded September 1978

University of California, San Diego, Revelle College - La Jolla, California 1972-1976
B.A. Applied Mechanics and Engineering Sciences/Bioengineering - Awarded 1976
Minor in Spanish Literature

Languages – Spanish (6 years), Japanese (2.5 years), Mandarin (<1 year).

Academic Positions

University of Southern California – Los Angeles
Founder & Director of the USC GamePipe Laboratory &
Viterbi School's Games degree programs.
Founder USC's Joint Games Program, now part of USC Games October 2004 – present
Professor of Engineering Practice, USC Department of Computer Science March 2006 – present
Research Staff, USC, Information Sciences Institute January 2005 – March 2006
Visiting Research Scholar, USC, Information Sciences Institute February 2004 – December 2004

Naval Postgraduate School - Monterey, CA
Founder & Director, The MOVES Institute November 2000 – November 2004
Professor of Computer Science July 93 – January 2005
Founding Chair, Modeling, Virtual Environments and Simulation Academic Group April 96 – April 01
Academic Associate Chair for the Modeling, Virtual Environments and Simulation Curriculum March 97 - April 99
Academic Associate Chair for the Department of Computer Science July 92 - March 97
Granted tenure in the Department of Computer Science July 90
Associate Chair for Research, Department of Computer Science April 90 - June 91

Associate Chair for Instruction, Department of Computer Science	July 88 - June 89
Associate Chair for Administrative Affairs, Department of Computer Science	May 87 - June 88
Associate Professor of Computer Science	July 87 - June 93
Assistant Professor of Computer Science	Feb. 84 - June 87

Washington University - St. Louis, MO

Research Associate, Department of Computer Science	August 83 - January 84
Research Associate, Department of Computer Science and Department of Biological Chemistry Washington University and Washington University School of Medicine, St. Louis.	March 83 - August 83
Research Associate, Department of Computer Science	September 81 - March 83
Research Assistant, Department of Computer Science	September 78 - August 81

University of Massachusetts, Amherst - Amherst, MA

Teaching Associate/Teaching Assistant Department of Computer and Information Science	September 76 - August 78

University of California, San Diego - La Jolla, CA

Research Assistant, Department of Chemistry	June 73 - July 76

Complete Publications List
Books

1. "America's Army PC Game - Vision and Realization," published by the MOVES Institute and the US Army, February 2004, 40 pages.
2. Singhal, Sandeep and Zyda, Michael Networked Virtual Environments - Design and Implementation, ACM Press Books, SIGGRAPH Series, 23 July 1999, ISBN 0-201-32557-8, 315 pages. This book has become the key reference for many network infrastructure builders of scalable online games and defense simulations. It provides practical distributed state architectures that work in real time. Citations: 1,244 (Google Scholar).
3. Cockayne, William and Zyda, Michael J., Mobile Agents, Manning Press/Prentice-Hall, August 1997, ISBN: 1-884777-36-8.

NRC Reports – Member or Chair of Committee

4. Opportunities for the Employment of Simulation in US Air Force Training Environments, Air Force Studies Board, Division on Engineering & Physical Sciences, National Research Council, National Academies Press, Washington, DC, December 2014, 65 pages. Member of the NRC Committee.
5. Future U.S. Workforce for Geospatial Intelligence, Board of Earth Sciences and Resources and Board on Higher Education and Workforce, Committee on the Future U.S. Workforce for Geospatial Intelligence, National Research Council, National Academies Press, Washington, DC January 2013, ISBN 0-309-xxx. Member of the NRC Committee.
6. The Rise of Games and High-Performance Computing for Modeling and Simulation," Division of Engineering & Physical Sciences Tiger Standing Committee, National Research Council, National Academies Press, Washington, DC, 2009, ISBN 0-309-14777-8-X, 129 pages. Member of the NRC committee. This report detailed the importance of games to the future of high performance computing. Citations: 10 (Google Scholar).
7. Behavioral Modeling and Simulation: from Individuals to Societies, Committee on Human Factors, Division of Behavioral and Social Sciences and Education, National Research Council, National Academies Press, Washington, DC, 2008, ISBN 0-309-11862-X. Member of the NRC committee.
8. Defense Modeling, Simulation, and Analysis, Committee on Defense, Modeling, Simulation and Analysis, Mathematical Sciences and Their Application Board, National Research Council, National Academies Press, Washington, DC, 2006, ISBN 0309103037, 96 pages, member of the NRC committee.
9. FORCEnet Implementation Strategy, Committee on the FORCEnet Implementation Strategy, Naval Studies Board, Division on Engineering and Physical Sciences, National Research Council, National Academies Press, Washington, DC, July 2005, ISBN 0309100259, 260 pages, member of the NRC committee.
10. Embracing Change - the Way Ahead for NASA's Computing and Communications Technology, Editor: Michael Zyda as Chair of the Potomac Institute's NASA Computing and Communications Technology Advisory Group, 23 December 2004, 81 pages.
11. An Assessment of NASA's Aeronautics Technology Programs, Committee for the Review of NASA'S Revolutionaize Aviation Program, Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences, National Research Council, National Academy Press, Washington, DC, January 2004, ISBN-0-309-09119-5, 195 pages, member of the Panel on the Vehicle Systems Program.
12. An Assessment of NASA's Pioneering Revolutionary Technology Program, Committee for the Review of NASA's Pioneering Revolutionary Technology (PRT) Program, Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences, National Research Council, National Academy Press, Washington, D.C., October 2003, ISBN 0-309-09080-6, 189 pages. Chair of the CICT Panel of this Committee.
13. Advanced Engineering Environments Phase 2 – Design in the New Millennium, National Academy Press, September 2000, ISBN 0-309-07125-9, 67 pages. Member of NRC committee.
14. Advanced Engineering Environments - Achieving the Vision, Phase 1, National Academy Press, June 1999, ISBN 0-309-06541-0, 48 pages. Member of NRC committee.

15. Zyda, Michael and Sheehan, Jerry (eds.), Modeling and Simulation: Linking Entertainment & Defense, National Academy Press, September 1997, ISBN 0-309-05842-2, 181 pages. Chaired this NRC Committee. Chaired this NRC Committee. This NRC report changed the entire Department of Defense towards the usage of games and entertainment technology for its future modeling and simulation systems, an economic impact and savings in the hundreds of billions of dollars for the Department of Defense. Citations: 36 (Google Scholar).
16. Durlach, Nathaniel and Mavor, Anne (eds.), Virtual Reality: Scientific and Technological Challenges, Committee on Virtual Reality Research and Development, National Academy Press, Washington, DC, 1995. Sections written or with major contributions: Chapters - "Executive Summary", "Overview", "Computer Hardware and Software for the Generation of Virtual Environments", and "Networking and Communications", ISBN 0-309- 05135-5. This report provided virtual reality research funding guidance for the United States Government. Citations: 858 (Google Scholar).

Book Chapters

17. Kay M. Stanney, Kelly S. Hale & Michael Zyda, "Virtual Environments in the 21stst Century," introduction to the Second Edition of the Virtual Environments Handbook, 2014, pp 1-18.
18. Michael Zyda, Alex Mayberry, Jesse McCree, and Margaret Davis "From Viz-Sim to VR to Games: How We Built a Hit Game-Based Simulation," in W.B. Rouse and K.R. Boff (Eds.) Organizational Simulation: From Modeling & Simulation to Games & Entertainment, New York: Wiley Press, 2005,pp., ISBN 0471681636. This paper described how we built the America's Army Game, the game that created the serious games field. Citations: 23 (Google Scholar).
19. Margaret Davis, Russell Shilling, Alex Mayberry, Jesse McCree, Phillip Bossant, Scott Dossett, Christian Buhl, Christopher Chang, Evan Champlin, Travis Wiglesworth and Michael Zyda "Researching America's Army," in Design Research: Methods and Perspectives, edited by Brenda Laurel, MIT Press, 1 October 2003, ISBN 0262122634, pp. 268-275.
20. Michael Zyda and Douglas Bennett, "The Last Teacher," in 2020 Visions, from the Summit & Press Conference on the Use of Advanced Technologies in Education and Training, US Department of Commerce, 17 and 27 September 2002.
21. Kay M. Stanney and Michael Zyda "Virtual Environments in the 21st Century," in Handbook of Virtual Environments - Design, Implementation, and Applications, Lawrence Erlbaum Associates, Publishers, Mahwah, NJ, 2002, pp. 1-14.
22. Zyda, Michael "Games on the 'Net!," Chapter 9 of Das Internet von morgen - Neue Technologien fur neue Anwendungen, edited by Clemens Baack and Jorg Eberspacher, Huthig Verlag Press, Heidelberg, Germany, September 1999, pp. 117-127. (revised from the Proceedings of the Munchner Kreis Congress on the Internet of Tomorrow, held at the European Patent Office in Munich, 19 - 20 November 1998).
23. Zyda, Michael J., Monahan, James G. and Pratt, David R. "NPSNET: Physically-Based Modeling Enhancements to an Object File Format," chapter in Creating and Animating the Virtual World, Editors: Nadia Magnenat Thalmann and Daniel Thalmann, Publisher: Springer-Verlag Tokyo, 1992, pp. 35-52.

Refereed Publications: Accepted Papers/Published Papers

24. Michael Zyda, "Why the VR You See Now Is Not the Real VR," MIT Press Journal Presence, Vol. 25, No. 2, pp 166-169, September 2016.
25. Marc Spraragen, Peter Landwehr, Balakrishnan Ranganathan, Michael Zyda, Kathleen Carley, Yu-Han Chang and Rajiv Maheswaran (2013) Cosmopolis: A Massively Multiplayer Online Game for Social and Behavioral Research. *Journal of Artificial Societies and Social Simulation* **16** (1) 9. http://jasss.soc.surrey.ac.uk/16/1/9.html
26. Lin, J., Spraragen, M., & Zyda, M. (2012a). Computational models of emotion and cognition. Advances in Cognitive Systems, 2, 59-76. Retrieved from http://cogsys.org/pdf/paper-3-2-39.pdf
27. Michael Zyda, "Computer Science in the Conceptual Age," CACM, Vol. 52, No. 12, December 2009, pp. 66-72.
28. Michael Zyda, "Creating a Science of Games," CACM, Vol. 50, No. 7, July 2007, pp. 26 - 29.

29. Joerg Wellbrink, Michael Zyda and John Hiles "Modeling Vigilance Performance as a Complex Adaptive System," Journal of Defense Modeling and Simulation, Volume 1, No.1, 2004, January 2004, pp.29-42.
30. Michael Zyda, John Hiles, Alex Mayberry, Michael Capps, Brian Osborn, Russ Shilling, Martin Robaszewski and Margaret Davis "Entertainment R&D for Defense," IEEE CG&A, January/February 2003, pp.28-36.
31. Helmuth Trefftz, Ivan Marsic, and Michael Zyda "Handling Heterogeneity in Networked Virtual Environments," Presence, Vol. 12, No.1, January 2003, pp. 38-52. Revised from IEEE CG&A 2002. This paper describes how to manage heterogeneous collections of computing hardware to work together in a real-time, networked virtual environment. Citations: 32 (Google Scholar).
32. Katherine L. Morse and Michael Zyda "Multicast Grouping for Data Distribution Management," Journal of Simulation Modeling Practice and Theory, Elsevier, Vol. 9, Issue 3-5, 15 April 2002, pp.121-141.
33. J.L. Marins, Xiaoping Yun, E.R. Bachmann, R.B. McGhee & M.J. Zyda "An extended Kalman filter for quaternion-based orientation estimation using MARG sensors," Proceedings 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems, 29 Oct 2001.
34. Russell L. Storms and Michael J. Zyda "Interactions in Perceived Quality of Auditory-Visual Displays," Presence, Vol. 9, No. 6, December 2000, pp.557-580.
35. Yun, X., Bachmann, E.R., McGhee, R.B., Whalen, R.H., Roberts, R.L., Knapp, R.G., Healey, A.J., and Zyda, M.J. "Testing and Evaluation of an Integrated GPS/INS System for Small AUV Navigation," IEEE Journal of Oceanic Engineering, Vol. 24, No. 3, July 1999, pp.396-404.
36. Storms, R.L., Roesli, J.T., Biggs, L.J., Falby, J.S., Barham, P.T. and Zyda, Michael J., "The NPSNET Sound Cube," Presence, Vol. 7, No. 5, October 1998, pp.503-507.
37. Macedonia, Michael and Zyda, Michael "A Taxonomy for Networked Virtual Environments," IEEE Multimedia, Volume 4, No. 1, January - March 1997, pp. 48-56.
38. Brutzman, Donald P., Macedonia, Michael R. and Zyda, Michael J. "Internetwork Infrastructure Requirements for Virtual Environments," in White Papers - The Unpredictable Certainty, National Academy Press, pp. 110-122, 1997. Also in the Proceedings of the Virtual Reality Modeling Language (VRML) Symposium, San Diego Supercomputer Center (SDSC), San Diego, CA, December 13-15, 1995.
39. Macedonia, Michael R., Zyda, Michael J., Pratt, David R., Brutzman, Donald P. and Barham, Paul T. "Exploiting Reality with Multicast Groups," IEEE Computer Graphics & Applications (revised from appearance in the VRAIS '95 Proceedings), September 1995, pp.38-45.
40. Macedonia, Michael R., Zyda, Michael J., Pratt, David R., Barham, Paul T. and Zeswitz, Steven "NPSNET: A Network Software Architecture for Large Scale Virtual Environments," Presence, Vol. 3, No. 4, Fall 1994, pp.265-287.
41. Zyda, Michael J., Pratt, David R., Falby, John S., Barham, Paul and Kelleher, Kristen M. "NPSNET and the Naval Postgraduate School Graphics and Video Laboratory," Presence, Vol. 2, No. 3., pp. 244-258.
42. Zyda, Michael J., Pratt, David R., Falby, John S., Lombardo, Chuck and Kelleher, Kristen M. "The Software Required for the Computer Generation of Virtual Environments,"Presence, Vol. 2, No. 2, pp. 130-140.
43. Cooke, Joseph M., Zyda, Michael J., Pratt, David R. and McGhee, Robert B. "NPSNET: Flight Simulation Dynamic Modeling Using Quaternions," Presence , Vol 1., No. 4, pp. 404-420.
44. Zyda, Michael J., Wilson, Kalin P., Pratt, David R., Monahan, James G. and Falby, John S. "NPSOFF: An Object Description Language for Supporting Virtual World Construction,"Computers & Graphics, Vol. 17, No. 4, pp 457-464.
45. Zyda, Michael J., Pratt, David R., Falby, John S. and Mackey, Randy L. "NPSNET: Hierarchical Data Structures for Real-Time Three-Dimensional Visual Simulation," Computers & Graphics, Vol. 17, No. 1, 1993, pp. 65-69. This paper describes the fundamental data structures necessary for the real-time movement through large virtual worlds. It has been cited by the founder of Google Earth as the origin of Google Earth's data structures. Citations: 199 (Google Scholar).

46. Zyda, Michael J., Pratt, David R., Osborne, William D., and Monahan, James G. "NPSNET: Real-Time Collision Detection and Response," The Journal of Visualization and Computer Animation, special issue on Simulation and Motion Control, Vol. 4, No. 1, January - March 1993, pp.13-24.

47. DeHaemer, Michael J. and Zyda, Michael J. "Simplification of Objects Rendered by Polygonal Approximations," Computers & Graphics, Vol. 15, No. 2, 1991, Great Britain: Pergamon Press, pp. 175-184. Paper received "Best Paper 1991" award from an international selection committee appointed by the editor of Computers & Graphics, 29 Sep 92. Also, one of the best papers of the decade in the journal's 2002 collection. This is the first paper to describe multiple algorithms for reducing the number of polygons in large 3D models. Citations: 252 (Google Scholar).

48. Zyda. M.J., McGhee, R.B., Kwak, S., Nordman, D.B., Rogers, R.C., and Marco, D. "3D Visualization of Mission Planning and Control for the NPS Autonomous Underwater Vehicle," IEEE Journal of Oceanic Engineering, Vol. 15, No. 3, July 1990, pp.217-221.

49. Luqi, P. D. Barnes and M. Zyda "Graphical Tool for Computer-Aided Prototyping," Information and Software Technology, Vol. 32, No. 3, April 1990, Great Britain: Butterworth & Co. Ltd..

50. Zyda, Michael J., Fichten, Mark A., and Jennings, David H. "Meaningful Graphics Workstation Performance Measurements," Computers & Graphics, Vol. 14, No. 3, 1990, Great Britain: Pergamon Press, pp.519-526.

51. Zyda, Michael J., McGhee, Robert B., McConkle, Corinne M., Nelson, Andrew H. and Ross, Ron S. "A Real-Time, Three-Dimensional Moving Platform Visualization Tool," Computers & Graphics, Vol. 14, No. 2, 1990, Great Britain: Pergamon Press, pp.321-333.

52. Zyda, Michael J. "A Decomposable Algorithm for Contour Surface Display Generation," ACM Transactions on Graphics, Vol. 7, No. 2, April 1988.

53. Zyda, Michael J., McGhee, Robert B., Ross, Ron S., Smith, Doug B. and Streyle, Dale G. "Flight Simulators for Under $100,000," IEEE Computer Graphics & Applications, Vol. 8, No. 1, January 1988, pp. 19-27.

54. Zyda, Michael J. and Walker, Robert A. "Design Notes on a Single Board Multiprocessor for Real-Time Contour Surface Display Generation," Computers & Graphics, Vol. 12, No. 1, March 1988, Great Britain: Pergamon Press, pp. 91-97.

55. Zyda, Michael J., Jones, Allan R. and Hogan, Patrick G. "Surface Construction from Planar Contours," Computers & Graphics, Vol. 11, No. 4, December 1987, Great Britain: Pergamon Press, pp. 393-408.

56. Zyda, Michael J. "A Contour Display Generation Algorithm for VLSI Implementation," Computer Graphics, Vol. 16, No. 3 (July 1982), p. 135. Reprinted in Selected Reprints on VLSI Technologies and Computer Graphics, Compiled by Henry Fuchs, p. 459, Silver Spring, Maryland: IEEE Computer Society Press, 1983.

57. Anderson, Scott J., Gardner, Bruce W., Wilson, Kent R., ... and Zyda, Michael J., "Correlation Between Air Pollution and Socio-Economic Factors in Los Angeles County," Atmospheric Environment, Vol. 12 (July 1978), pp. 1531-1535.

Conferences: Accepted Papers/Published Papers

58. Lin, J., Spraragen, M., & Zyda, M. (2012b). Memory framework for complex emotion integration with cognition. Poster Collection of the First Annual Conference on Advances in Cognitive Systems (pp. 119-129). Palo Alto, CA. Retrieved from http://cogsys.org/pdf/paper-3-2-91.pdf

59. Marc Spraragen, Peter Landwehr, Balakrishnan Ranganathan, Michael Zyda, Kathleen Carley, Yu-Han Chang, and Rajiv Maheswaran. "Social and Behavioral Modeling in an Online Multiplayer Game," Proceedings of AHFE 2012, San Francisco, CA, July 2012

60. Jim Blythe, Aaron Botello, Joseph Sutton, David Mazzoco, Jerry Lin, Marc Spraragen and Michael Zyda "Testing Cyber Security with Simulated Humans that Plan," Proceedings of the Twenty-Third Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-11), 9-11 August 2011, San Francisco, pp.

61. Lin J, Spraragen M, Blythe J, Zyda M. "EmoCog : Computational Integration of Emotion and Cognitive Architecture," Proceedings of the Twenty-Fourth International Florida Artificial Intelligence Research Society Conference, 18-20 May 2011, pp.
62. Zyda M, Spraragen M, Ranganathan B, Arnason B, and P Landwehr. Designing a Massively Multiplayer Online Game / Research Testbed Featuring AI-Driven NPC Communities. Proceedings of 6th International Conference on AI and Interactive Digital Entertainment, Palo Alto CA 11-13 October 2010.
63. Zyda M, Spraragen M, Ranganathan B, Arnason B, and H Liu. Information Channels in MMOGs: Implementation and Effects. Proceedings of 3rd Applied Human Factors and Ergonomics Conference, Miami FL, 17-20 July 2010.
64. Lin J, Blythe J, Clark S, Davarpanah N, Hughston R & Zyda M "Unbelievable Agents for Large Scale Security Simulation," Working Notes for the 2010 AAAI Workshop on Intelligent Security. Atlanta, Georgia, 11-12 July 2010, pp20-25.
65. Michael Zyda, Dhruv Thukral, James Ferrans, Jonathan Englesma, and Mat Hans "Enabling a Voice Modality in Mobile Games through VoiceXML," in the Proceedings of the ACM SIGGRAPH Sandbox Symposium, August 2008, Los Angeles, pp.in the Proceedings of the ACM SIGGRAPH Sandbox Symposium, August 2008, Los Angeles, pp.143-147.
66. Michael Zyda, Devin Rosen & Bharathwaj Nandakumar "GOGS" USC GamePipe Online Game Server," in the Proceedings of the ACM SIGGRAPH Sandbox Symposium, August 2008, Los Angeles, pp.51-53.
67. Michael Zyda, Victor Lacour, and Chris Swain "Operating a Computer Science Game Degree Program," in the Proceedings of the 2008 Game Development in Computer Science Education Conference, Microsoft sponsored event held on Celebrity Cruise Lines, 28 Feb – 3 March 2008, pp.
68. Gurminder Singh and Michael Zyda, "Connected Immersion," in the Proceedings of VR International, part of HCI 2005, Las Vegas, July 2005.
69. Don McGregor, Andrzej Kapolka, Michael Zyda and Don Brutzman "Requirements for Large-Scale Networked Virtual Environments," Proceedings of the 7th International Conference on Telecommunications ConTel 2003, Zagreb, Croatia, 11-13 June 2003, pp. 353-358.
70. Russ Shilling, Michael Zyda and E. Casey Wardynski, "Introducing Emotion into Military Simulation and Videogame Design: America's Army Operations and VIRTE," in the Proceedings of the GameOn Conference, London, 30 November 2002, pp. 151-154.
71. Helmuth Trefftz, Ivan Marsic, and Michael Zyda "Handling Heterogeneity in Networked Virtual Environments," Proceedings of IEEE VR, Orlando, Florida, 25 - 27 March 2002, pp.7-14.
72. Eric R. Bachmann, Robert B. McGhee, Xiaoping Yun, and Michael J. Zyda "Inertial and Magnetic Posture Tracking for Inserting Humans Into Networked Virtual Environments," Proceedings of ACM Symposium on Virtual Reality Software & Technology (VRST 2001), Banff, Alberta, Canada, 15 - 17 November 2001, pp.9-16.
73. João Luís Marins, Xiaoping Yun, Eric R. Bachmann, Robert B. McGhee, and Michael J. Zyda "An Extended Kalman Filter for Quaternion-Based Orientation Estimation Using MARG Sensors," Proceedings of the 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems, Maui, Hawaii, USA, Oct. 29 - Nov. 03, 2001, pp.2003-2011.
74. J.L. Marins, Xiaoping Yun, E.R. Bachmann, R.B. McGhee & M.J. Zyda "An extended Kalman filter for quaternion-based orientation estimation using MARG sensors," Proceedings 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems, 29 Oct 2001. Citations: 465 (Google Scholar).
75. Katherine Morse and Michael Zyda "Multicast Grouping for Data Distribution Management," Proceedings of the Computer Simulation Methods and Applications Conference, October 2000.
76. Katherine Morse and Michael Zyda "Online Multicast Grouping for Dynamic Data Distribution Management," Proceedings of the Fall 2000 Simulation Interoperability Workshop, September 2000.

77. Bachmann, E.R., Duman, I., Usta, U.Y., McGhee, R.B., Yun, X.P., and Zyda, M.J., "Orientation Tracking for Humans and Robots Using Inertial Sensors", Proc. of 1999 International Symposium on Computational Intelligence in Robotics and Automation, Monterey, CA, December, 1999, pp. 187-194.
78. Abrams, H., Watsen, K. and Zyda, M. "Three Tiered Interest Management for Large-Scale Virtual Environments,"Proceedings of VRST 98, November 1998, Taipei.
79. Liles, S., Watsen, K. and Zyda, M. "Dynamic Discovery of Simulation Entities Using Bamboo and HLA," in the Proceedings of the 1998 Fall Simulation Interoperability Workshop, Orlando, Florida, September 1998.
80. Watsen, K. and Zyda, M. "Bamboo - Supporting Dynamic Protocols For Virtual Environments," in the Proceedings of the IMAGE 98 Conference, Scottsdale, Arizona, 2-7 August 1998, KA-1-9.
81. Watsen, Kent and Zyda, Michael "Bamboo - A Portable System for Dynamically Extensible, Real-Time, Networked, Virtual Environments," in the Proceedings of VRAIS 98, 16 - 19 March 1998, Atlanta, GA, pp.252-259.
82. Yun, X., Bachmann, E., McGhee, R.B., Whalen, R.H., Roberts, R.L., Knapp, R.G., Healey, A.J., and Zyda, M.J. "Testing and Evaluation of an Integrated GPS/INS System for Small AUV Navigation," Proceedings of the 10th International Symposium on Unmanned Untethered Submersible Technology (UUST), Durham, NH, September 7-10, 1997.
83. Brutzman, Don, Zyda, Michael, Watsen, Kent, Macedonia, Michael "virtual reality transfer protocol (vrtp) Design Rationale," Proceedings of the IEEE Sixth International Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises (WET ICE '97), Distributed System Aspects of Sharing a Virtual Reality workshop, June 18-20, 1997, at the Massachusetts Institute of Technology in Cambridge, Massachusetts, USA, pp.179- 186.
84. Brutzman, Don and Zyda, Michael "Cyberspace Backbone (CBone) Design Rationale," Proceedings of the 15th Workshop on Standards for DIS, Orlando, Florida, September 1996.
85. Storms, Russell, Biggs, Lloyd, Cockayne, William, Barham, Paul, Falby, John, Brutzman, Don and Zyda, Michael, "The Auralization and Acoustics Laboratory," Proceedings of ICAD '96, International Conference on Auditory Display, Palo Alto, California, November 4-6, 1996, pp..
86. Cockayne, W., Zyda, M., Barham, P., Brutzman, D., and Falby, J. "The Laboratory for Human Interaction in the Virtual Environment," Proceedings of the ACM Symposium on Virtual Reality Software and Technology '96, Hong Kong, July 1-4, 1996, ACM Press, New York, NY, pp 157-160.
87. Stone, Steve, Zyda, Michael , Brutzman, Don and Falby, John S. "Mobile Agents and Smart Networks for Distributed Simulations," in the Proceedings of the 14th DIS Workshop, 11 - 15 March 1996, Orlando, Florida, pp..
88. Bible, Steven R., Brutzman, Don and Zyda. Michael "Using Spread Spectrum Ranging Techniques for Position Tracking in a Virtual Environment," in the Proceedings of Network Realities '95, 26 - 28 October 1995, Boston, Massachusetts, pp.
89. Zyda, Michael , Pratt, David R., Pratt, Shirley, Barham, Paul and Falby, John S. "NPSNET-HUMAN: Inserting The Human Into The Networked Synthetic Environment," in the Proceedings of the 13th DIS Workshop, 18 - 22 September 1995, Orlando, Florida, pp.103-106.
90. Lentz, Fred C., Shaffer, Alan B., Pratt, David R., Falby, John S. and Zyda, Michael "NPSNET: Naval Training Integration," in the Proceedings of the 13th DIS Workshop, 18 - 22 September 1995, Orlando, Florida, pp. 107-112.
91. Waldroup, Marianne S., Pratt, Shirley M., Pratt, David R., McGhee, Robert B., Falby, John S. and Zyda, Michael J. "Real-Time Upper Body Articulation of Humans in a Networked Virtual Environment," in Proceedings of the First ACM Workshop on Simulation and Interaction in Virtual Environments, University of Iowa, 13 - 15 July 1995, pp. 210-214.
92. Macedonia, Michael R., Brutzman, Donald P., Zyda, Michael J., Pratt, David R., Barham, Paul T., Falby, John and Locke, John "NPSNET: A Multi-Player 3D Virtual Environment Over the Internet," in the Proceedings of the 1995 Symposium on Interactive 3D Graphics, 9 - 12 April 1995, Monterey, California.

93. Macedonia, Michael R., Zyda, Michael J., Pratt, David R., Brutzman, Donald P. and Barham, Paul T. "Exploiting Reality with Multicast Groups: A Network Architecture for Large Scale Virtual Environments," Proceedings of the 1995 IEEE Virtual Reality Annual Symposium, 11 - 15 March 1995, RTP, North Carolina, pp. 2-10. This work extended the idea of area of interest management to deployment using multicasting. Citations: 349 (Google Scholar).

94. Zyda, Michael "Networked Virtual Environments," Proceedings of the 1995 IEEE Virtual Reality Annual Symposium, 11 - 15 March 1995, RTP, North Carolina, pp. 230-231.

95. Pratt, D. R., Barham, P. T., Locke, J., Zyda, M., Eastman, B., Moore, T. Biggers, K. Douglass, R., Jacobsen, S. Hollick, M., Granieri, J., Ko, H., Badler, N. "Insertion of an Articulated Human into a Networked Virtual Environment," Proceedings of the 1994 AI, Simulation and Planning in High Autonomy Systems Conference, University of Florida, Gainesville, 7-9 December 1994. This is the first networked virtual environment with fully instrumented body suits that played across the Internet. Citations: 54 (Google Scholar)

96. Macedonia, Michael R., Pratt, David R. and Zyda, Michael J. "A Network Architecture for Large Scale Virtual Environments," Proceedings of the 19th Army Science Conference, Orlando, Florida, June 1994. This work created the idea of area of interest management for large scale virtual environments. Citations: 695 (Google Scholar).

97. Pratt, David R., Walter, Jon C., Warren, Patrick T., and Zyda, Michael J. "NPSNET: JANUS-3D - Providing Three-Dimensional Displays for a Two-Dimensional Combat Model," in the Proceedings of the Fourth Annual Conference on AI, Simulation, and Planning in High-Autonomy Systems, 20-22 September 1993, pp. 31-37.

98. Zyda, Michael J. "The Software Required for the Computer Generation of Virtual Environments," abstract in Computer Graphics, Proceedings of SIGGRAPH '93, Anaheim, August 1 - 6, 1993, under panel on Virtual Reality and Computer Graphics Programming, pp. 392.

99. Pratt, David R., Zyda, Michael J,. Falby, John S., Amburn, Philip, and Stytz, Marty "NPSNET and AFIT-HOTAS: Interconnecting Hetereogeneously Developed Virtual Environments," Computer Graphics Visual Proceedings, SIGGRAPH '93, Anaheim, 1 Aug - 6 Aug 1993, pp. 214-215.

100. Zyda, Michael J., Lombardo, Chuck, and Pratt, David R. "Hypermedia and Networking in the Development of Large-Scale Virtual Environments," in the Proceedings of the International Conference on Artificial Reality and Tele-Existence, Tokyo, Japan, 6-8 July 1993.

101. Wilson, Kalin P., Zyda, Michael J., and Pratt, David R. "NPSGDL: An Object Oriented Graphics Description Language for Virtual World Application Support," in the Proceedings of the Third Eurographics Workshop on Object-Oriented Graphics, Champery, Switzerland, 28 - 30 October 1992, pp 429-446.

102. Pratt, David R., Zyda, Michael J., Mackey, Randy L., and Falby, John S. "NPSNET: A Networked Vehicle Simulator with Hierarchical Data Structures," in the Proceedings of the IMAGE VI Conference, Scottsdale, Arizona, 14 - 17 July 1992.

103. Zyda, Michael J., Pratt, David R., Monahan, James G. and Wilson, Kalin P. "NPSNET: Constructing a 3D Virtual World," in Computer Graphics, Special Issue on the 1992 Symposium on Interactive 3D Graphics, MIT Media Laboratory, 29 March - 1 April 1992, pp. 147-156.

104. Brutzman, Donald P., Kanayama, Yutaka and Zyda, Michael J. "Integrated Simulation for Rapid Development of Autonomous Underwater Vehicles," Proceedings of the 1992 Symposium on Autonomous Underwater Vehicle Technology, Washington, DC, June 2-3, 1992, pp 3-10.

105. Zyda, Michael J. and Pratt, David R. "NPSNET: A 3D Visual Simulator for Virtual World Exploration and Experience," short paper in Tomorrow's Realities, July 1991, pp. 30 (Note: This is a short paper contained in the gallery catalog. This paper is different than the abstract below of the same title.)

106. Zyda, Michael J. and Pratt, David R. "NPSNET: A 3D Visual Simulator for Virtual World Exploration and Experience," abstract in Computer Graphics, Vol. 25, No. 4, July 1991, pp. 383.

107. Luqi, Barnes, Patrick D. and Zyda, Michael J. "Graphical Support for Reducing Information Overload in Rapid Prototyping," Proceedings of the 23rd Hawaii International Conference on Systems Sciences, December 1989.

108. Ross, Ron S., McGhee, Robert B., Zyda, Michael J. and Rowe, Neil C. "A Context-Dependent Classification Paradigm for Land Mobility Problems," Proceedings of the Third Annual Expert Systems in Government Conference, October 19-23, 1987, IEEE Computer Society Press, pg. 2.

109. Richbourg, R.F., Rowe, N. C., Zyda, M.J., and McGhee, R.B. "Solving Global Two-Dimensional Routing Problems Using Snell's Law and A* Search," Proceedings 1987 IEEE International Conference on Robotics and Automation, Vol. 3, March 1987, pg. 1631.

110. Richbourg, Robert F., Rowe, Neil C. and Zyda, Michael J. "Exploiting Capability Constraints to Solve Global, Two-Dimensional Path Planning Problems," Proceedings of the 1986 IEEE International Conference on Robotics and Automation, Vol. 1, April 1986, p 90.

Invited Papers

111. Michael Zyda "Why the VR You See Now is Not the Real VR," Presence: Teleoperators & Virtual Environments, Vol. 25, No. 2, October 2016, pp.

112. Michael Zyda, Marc Spraragen & Balakrishnan Ranganathan "Testing Behavioral Models with an Online Game," IEEE Computer, April 2009, pp.103-105.

113. Michael Zyda, Dhruv Thukral, Sumeet Jakatdar, Jonathan Englesma, James Ferrans, Mat Hans, Larry Shi, Fred Kitson, and Venu Vasudevan "Educating the Next Generation of Mobile Game Developers," IEEE Computer Graphics & Applications, March/April 2007, pp. 93-96.

114. Michael Zyda "Educating the Next Generation of Game Developers," IEEE Computer, June 2006, pp. 30-34.

115. Michael Zyda "From Visual Simulation to Virtual Reality to Games," IEEE Computer, September 2005, pp. 25-32.

116. Kay Stanney and Michael Zyda "Advances in Virtual Environments Technology: Musings on Design, Evaluation, & Applications," Preface to VR International 2005, part of HCI 2005, Las Vegas, July 2005.

117. Michael Zyda, Don Brutzman, Rudy Darken, John Hiles, Ted Lewis, Alex Mayberry, Russell Shilling, Joe Sullivan, Alex Callahan, and Margaret Davis "This Year in the MOVES Institute," in the Proceedings of IEEE Cyberworlds 2003, the International Conference on Cyberworlds, Singapore, 3 – 5 December 2003, pp. xxxiii-xl.

118. Michael Zyda "This Year in the MOVES Institute," Abstract in Proceedings of the 7th International Conference on Telecommunications ConTel 2003, Zagreb, Croatia, 11-13 June 2003, pp. 37-38.

119. Michael Zyda, Alex Mayberry, Casey Wardynski, Russell Shilling, and Margaret Davis "The MOVES Institute's America's Army Operations Game ," Proceedings of the ACM SIGGRAPH 2003 Symposium on Interactive 3D Graphics, 28-30 April 2003, pp.217-218, color plate pp.252.

120. Michael Capps, Perry McDowell & Michael Zyda "A Future for Entertainment-Defense Collaboration," IEEE Computer Graphics & Applications, January/February 2001, pp. 2 - 8.

121. Michael Zyda "NPS MOVES - Entertainment Research Directions," in the Proceedings of the Summer Computer Simulation Conference, Vancouver, 16 - 20 July 2000, pp.

122. Michael Capps, Don McGregor, Don Brutzman, and Michael Zyda "NPSNET-V: A New Beginning for Dynamically Extensible Virtual Environments," IEEE Computer Graphics & Applications, September/October 2000 pp.12-15.

123. Capps, M., Watsen, K. and Zyda, M. "Cyberspace and Mock Apple Pie: A Vision of the Future of Graphics and VEs," IEEE Computer Graphics & Applications, November/December 1999, pp. 8-11.

124. Capps, M., Abrams, H., Anderson, D., Greenhalgh, C., Morse, K., Singhal, S., Watsen, K., and Zyda, M. "Developing Shared Virtual Environments," ACM SIGGRAPH 99, Course #34 Course Notes, 10 August 1999, in form of a printed book and on the course CD-ROM.

125. Zyda, M., Hiles, J., Rosenbaum, R., Roddy, K., Gagnon, T., and Boyd, M. "SimNavy – Phase 0 Building an Enterprise Model of the US Navy," in the Proceedings of the 1998 Technology Initiatives Game, Fort Belvoir, VA, 21- 25 September 1998.

126. Zyda, M. and Darken, R.P. "The Naval Postgraduate School's Moves Curriculum," IEEE Computer Graphics & Applications, May/June 1998, pp.

127. Zyda, M.,Brutzman, D., Darken, R., McGhee, R., Falby, J., Bachmann, E., Watsen, K., Kavanagh, B. & Storms, R. "NPSNET - Large-Scale Virtual Environment Technology Testbed," Proceedings of the International Conference on Artificial Reality and Tele-Existence, Tokyo, Japan, 3 - 5 December 1997, pp. 18 - 26.

128. Zyda, Michael J. "Networking Large-Scale Virtual Environments," Proceedings of Computer Animation '96, 3-4 June 1996, Geneva, Switzerland, IEEE Computer Society Press, pp. 1-4. (an earlier version of this paper also appeared in the Proceedings of the Second International Conference on the Military Applications of Synthetic Environments and Virtual Reality, Stockholm, Sweden, 6-8 December 1995, pp. 119-125.)

129. Pratt, David R., Zyda, Michael and Kelleher, Kristen "Virtual Reality: In the Mind of the Beholder," IEEE Computer, July 1995, pp. 17 - 19 (editors notes for the special issue on virtual environments).

130. Macedonia, Michael R., Zyda, Michael J., Pratt, David R., Brutzman, Donald P. and Barham, Paul T. "Building Large-Scale Virtual Environments: A Network Software Architecture," Proceedings of Industrial Virtual Reality '95, Tokyo, Japan, 28 - 30 June 1995, pp.18-28.

131. Zyda, Michael J. and Pausch, Randy "Why a Pacific Rim Issue of PRESENCE at All?," Presence, Vol. 3, No. 1, pp. iii-iv, intro to special issue on Pacific Rim Virtual Reality and Telepresence, Winter 1994.

132. Macedonia, Michael R., Zyda, Michael J., Pratt, David R., Barham, Paul T. and Zeswitz, Steven "NPSNET: A Network Software Architecture for Large Scale Virtual Environments," Proceedings of the Fourth International Conference on Artificial Reality and Tele-Existence, 14-15 July 1994, Nikkei Hall, Otemachi, Tokyo, Japan (as one keynote speaker), pp. 99 - 129. Later revised for Presence.

133. Zyda, Michael J. "The Software Required for the Computer Generation of Virtual Environments," abstract in The Journal of the Acoustical Society of America, Vol. 92, No. 4, Pt. 2, October 1992, pp. 2345-2346.

134. Falby, John S., Zyda, Michael J., Pratt, David R. and Wilson, Kalin P. "Educational and Technological Foundations for the Construction of a 3D Virtual World," in the Proceedings of Virtual Reality '92, San Jose, 23 - 25 September 1992.

135. Zyda, Michael J., and Pratt, David R. "NPSNET Digest: A Look at A 3D Visual Simulator for Virtual World Exploration and Experimentation," in the Proceedings of the 1992 EFDPMA Conference on Virtual Reality, Washington, DC, June 1-2, 1992, pp. 190-208.

136. Zyda, Michael J. and Pratt, David R. "NPSNET: A 3D Visual Simulator for Virtual World Exploration and Experimentation," 1991 SID International Symposium Digest of Technical Papers, Volume XXII, 8 May 1991, pp. 361-364.

137. Zyda, Michael J. and Pratt, David "3D Visual Simulation as Workstation Exhaustion," Proceedings of Ausgraph 90, Melbourne, Australia, 10 - 14 September 1990, pp. 313-328.

138. Zyda, Michael J. "3D Visual Simulation for Graphics Performance Characterization," NCGA '90 Conference Proceedings, Vol. I, 22 March 1990, pp. 705-714.

139. Zyda, Michael J. "CAD/CAM Workstation Graphics," Plus the Total Computer Magazine, Dataworld Corporation Press, Bombay, India, Vol. IV, No. 11, December 1987, pp. 57-74. (Reprinted from the NCGA Proceedings, May 1986).

140. Zyda, Michael J. "Teaching Computer Graphics," IRIS Universe, the IRIS Community Magazine, Winter/Spring 1988, pp. 14-17.

141. Zyda, Michael J. "Future Graphics Support for CAD/CAM," in Proceedings of the Workshop on Information System Support for Integrated Design and Manufacturing Processes, Monterey, California: April 1986. This paper is an early version of [17] presented at a small workshop.

142. Zyda, Michael J. "Workstation Graphics Capabilities for the 1990's and Beyond," Computer Graphics '86 Conference Proceedings, Technical Sessions Volume III, May 1986, p. 442.

143. Marshall, Garland R., Zyda, Michael J. et al., "Interactive Aids in Three-Dimensional Structure-Activity Studies," Abstract in 179th Proceedings of the American Chemical Society: National Meeting, Houston 1980.

Technical Reports

144. John Hiles, Michael VanPutte, Brian Osborn and Michael Zyda “Innovations in Computer Generated Autonomy at the MOVES Institute,” MOVES Institute Technical Report NPS-MV-02-002, December 2001.

National Academy Appointments

Awarded a lifetime appointment as a National Associate of the National Academies, an appointment made by the Council of the National Academy of Sciences in November 2003, awarded in recognition of "extraordinary service" to the National Academies.

Appointed a member of the National Research Council Division on Engineering & Physical Sciences Air Force Studies Board Committee on Opportunities for the Employment of Simulation in US Air Force Training Environments, October 2014 – December 2014.

Appointed a member of the National Research Council Division on Earth and Life Sciences Committee on the Future US Workforce for Geospatial Intelligence, Feb 2011 – April 2012.

Appointed a member of the National Research Council Division of Engineering & Physical Sciences Tiger Standing Committee, October 2008 – October 2010.

Appointed a member of the National Research Council Laboratory Assessments Board, Soldier Systems Panel, June 2007 – June 2009.

Appointed a member of the National Research Council Behavioral and Social Sciences and Education Division Committee on Organizational Models from Individuals to Societies, March 2005 – 31 January 2007.

Appointed member of the National Research Council Mathematical Sciences and Their Application Board Committee on Defense Modeling, Simulation and Analysis, October 2004 – November 2006.

Appointed member of the National Research Council Naval Studies Board Committee for the review of FORCEnet Implementation Strategies, 1 August 2003 – December 2004.

Appointed member of the National Research Council Aeronautics and Space Engineering Board Panel on The Review of NASA's Revolutionize Aviation Program, 1 December 2002 – May 2004.

Appointed chair of the National Research Council Aeronautics and Space Engineering Board Panel on Computing, Information, and Communications Technology (CICT) and member of the parent NRC Committee for the Review of NASA's Pioneering Revolutionary Technology Program, 15 May 2002 – 31 January 2004.

Appointed member of the National Research Council's Aeronautics and Space Engineering Board's Committee on Advanced Engineering Environments, 15 June 1998 - September 30, 2000.

Appointed chair of National Research Council, Computer Science and Telecommunications Board committee on "Modeling and Simulation: Linking Entertainment & Defense," March 96 - September 97.

Appointed member of the National Research Council, Behavioral and Social Sciences Commission Committee on Virtual Reality Research and Development, 11 January 1993 - January 1995.

Patents

US Provisional Application 61/833,822, Filing Date: 12 June 2013, "Dynamic advertising based on user data from social media profiles".

US Provisional Application 61/826,709, Filing Date: 24 May 2013, "System on a Mobile Device that Enables Calling for Help During an Emergency Using Gestures".

US Provisional Application 61/804,577, Filing Date: 22 March 2013, "System for Recording a Virtual Character's Performance of the Physical Activity of a User".

United States Patent Publication # US 2013/0052623 A1, Filing Date 26 October 2012, "System for Encouraging a User to Perform Substantial Physical Activity," filed 23 Oct 2008. Inventors – Dhruv Thukral (Santa Monica, CA), Michael Zyda (Carmel, CA), Chang Wei-Chung (Tainan City, TW), Shu Fen Lin (Los Angeles, CA). A continuation of #7,980,997 & 8,317,657.

United States Patent #8,317,657 B2, Issue Date 27 November 2012, "System for Encouraging a User to Perform Substantial Physical Activity," filed 23 Oct 2008. Inventors – Dhruv Thukral (Santa Monica, CA), Michael Zyda (Carmel, CA), Chang Wei-Chung (Tainan City, TW), Shu Fen Lin (Los Angeles, CA). A continuation of #7,980,997.

Zyda M, Arnason B, Ranganathan B, and M Spraragen. United States Utility Patent Application for "Information Channels in MMOGs", US Patent Application No. 12/891,556, filed September 27, 2010, and US Provisional Application No. 61/308,705, filed February 26, 2010.

United States Patent #7,980,997 B2, Issue Date 19 July 2011, "System for Encouraging a User to Perform Substantial Physical Activity," filed 23 Oct 2008. Inventors – Dhruv Thukral (Santa Monica, CA), Michael Zyda (Carmel, CA), Chang Wei-Chung (Tainan City, TW), Shu Fen Lin (Los Angeles, CA).

United States Patent #7,089,148 B1, "Method and apparatus for motion tracking of an articulated rigid body," granted 8 August 2006, filed 30 September 2004. Inventors - Bachmann; Eric R. (Oxford, OH); McGhee; Robert B. (Carmel, CA); Yun; Xiaoping (Salinas, CA); Zyda; Michael J. (Carmel, CA); McKinney; Douglas L. (Prunedale, CA). Division of application No. 10/020,719 filed on Oct. 30, 2001, now Pat. No. 6,820,025. Licensed by PNI Sensor Corporation for use in the Nintendo Wii U, December 2011 – present.

United States Patent #6,820,025, "Method and apparatus for motion tracking of an articulated rigid body," granted 16 Nov 2004, filed 30 October 2001. Inventors - Bachmann; Eric R. (Oxford, OH); McGhee; Robert B. (Carmel, CA); Yun; Xiaoping (Salinas, CA); Zyda; Michael J. (Carmel, CA); McKinney; Douglas L. (Prunedale, CA). Licensed by PNI Sensor Corporation for use in the Nintendo Wii U, December 2011 – present.

Advisory Boards

Member, Academy of Interactive Arts & Sciences, February 2003 – present.

Appointed member of the Board of Advisors for the Virginia Modeling and Simulation Center at Old Dominion University, May 2004 – May 2006.

Appointed as member of the US Army's Distance Learning/Training Technology Applications Subcommittee of the Army Education Committee by US Army TRADOC, with the approval of the Secretary of the Army, with concurrence of the Secretary of Defense, November 2003 – November 2005.

Member, Board of Advisors, Georgia Institute of Technology Modeling and Simulation Research and Education Center, March 2000 – 2004.

Appointed to the Editorial Advisory Board of the journal Computers & Graphics, 1 August 96 – August 2002.

Member of the Technical Advisory Board of the Fraunhofer Center for Research in Computer Graphics, Providence, Rhode Island, December 95 – 30 September 2002.

Senior Editor for Virtual Environments, PRESENCE April 1994 to December 2004.

Associate Editor of PRESENCE (with Nat Durlach) November 1993 to April 1994.

Significant Software

20 April 2015 – present – Game development project with Wall Tiger Entertainment at 411 Productions DTLA. Built two games for Wall Tiger Entertainment, Papa and Tiao Tiao to come out at the same time as the film Two Wall Tigers. This project turned into a larger effort with the USC Dean of Architecture and I co-founding Great Wall Tiger, Xi'an, China, with initial funding from the Ministry of Culture, Shaanxi Province. We both received official appointments as Technology and Entertainment Advisors to the Ministry of Culture.

1 June 2014 – 31 October 2014 – Transportopia – I directed the development of an augmented reality game entitled Transportopia with funding from Google's Niantic Laboratories. We invented an authoring tool and client for creating geomobile fiction. The project was the prototype of the technology underneath Pokemon Go.

29 September 2010 - USC Game Trainer Grand Prize Winner in White House Competition - a student developed game built jointly between the USC GamePipe Laboratory, the School of Cinematic Arts Interactive Media program and the School of Fine Arts Game Art & Design Program was the Grand Prize winner in the White House Apps for Healthy Kids competition, as well as the GE Healthymagination Student Award winner. The Trainer game was first shown shown at the GamePipe Laboratory's December 2009 Demo Day. It was built with funds donated from the Humana Innovation Center. I was the recipient of that donation from Humana and the PI on the game development project.

Immune Attack – immunology education game for advanced placement, high school biology, 2005 – 2006. With the Federation of American Scientists, and Brown University.

America's Army Operations – multiple award winning online game, October 1999 – March 2004. Awards including Action Vault's 2002 Debut Game of the Year, Surprise of the Year, and honorable-mention Multiplayer Game of the Year; Frictionless Insight's Best Business Model (Developer) at E3 2002; IGN Editors' Choice Award for first-person shooters 2002; IGN's Biggest Surprise of E3 2002; Gamespy's Best PC Action Game runner-up 2002; Penny Arcade's Best Misappropriation of Taxpayer Dollars Ever; Wargamers Best of Show, first-person/tactical shooters 2002; Well-Rounded Entertainment's Best of E3 2002; DoubleClick's Insight Awards, honorable mention, Best Multi-Channel Marketing Campaign 2002; Academy of Interactive Arts and Sciences, finalist, PC First Person Action Game of the Year February 2003; and Computer Gaming World's Editors' Choice January 2003. Served as the principal investigator and development director of the America's Army PC game funded by the Assistant Secretary of the Army for Manpower and Reserve Affairs. Took America's Army from conception to three million plus registered players and hence, transformed Army recruiting.

NPSNET I – IV – large-scale, networked virtual environment testbed, January 1990 – December 1996. First networked virtual environment to play across the multicast backbone of the Internet; first low-cost simulation system to work with SIMNET; first networked virtual environment to have fully articulated humans.

Consulting and Other Positions

Consultant to the Ministry of Culture & Shaanxi Cultural Group, Xi'an, China – entertainment technology advisor for AR & VR & theme park projects in/around the historic sites of Shaanxi Province, including the Terracotta Warriors Museum, the e-Pang Palace and the Zhaojin Red Army Base, 2015 – present.
Co-Founder, with Qingyun Ma, of Great Wall Tiger, Xi'an, China, Jan 2016 – present.
CEO, 411 Productions DTLA, June 2014 – present. 411 Productions DTLA is a game & AR/VR production studio.
Happynin' Games, Chairman – May 2009 – December 2011.
CiiNow – August 2010 - present
Cynergen, March 2010 – December 2011
e4e/Absolute Quality – January 2009 – February 2011.
Emsense, emotional state sensor for use in videogames, October 2004 – September 2011.
Vizzario Laboratories – May 2007 – present.
Virtual Heroes, Cary, North Carolina – June 2006 – April 2009. Company acquired by Applied Research Associates.
Big Stage, South Pasadena – July 2007 – December 2009.

NASA AMES Code T (Space Exploration), plan R&D on computing, information and communications technology for the return to the moon & subsequent trip to Mars, July 2004 – December 2004.
BBN and MaK Technologies, as Technical Advisor to the DARPA DARWARS Program, June 2003 – December 2003
Member Technical Advisory Board, Muse3d.com, San Mateo, California, December 2000 – April 2002
Member Technical Advisory Board, SpiritChannel.com, Covent Gardens, United Kingdom, March 2000 – July 2000
Speaker with Celebrity Speakers International, www.speakers.co.uk, London, United Kingdom, August 1999 - present
Advanced Telecommunications, Inc., San Diego, California, August 97 - December 97
For the Assistant Director, White House Office of Science and Technology Policy, March 97 - May 2000
TecMagik, Foster City, March 97 - September 97
Paramount Digital Entertainment, Los Angeles, California, January 97 - September 97
Minister of Industrial Development, Sabah Province, Malaysia, March 97
Consultant, Hitachi Plant Construction & Engineering, Tokyo, January 90 - July 96
SimGraphics Engineering, Pasadena, August 90 - June 91
Silicon Graphics International, Geneva, Switzerland, May 90 - December 91
Consultant, Silicon Graphics International, Geneva, Nihon Silicon Graphics KK, Tokyo, August 88 - March 89
Consultant, Stellar Computer, Boston, August 88 - November 88
Consultant, Digital Computer Limited (Tokyo), Technology and Knowledge for Tomorrow (Tokyo), January 87
Consultant, Mitsubishi Heavy Industries, Sharp Electric Co., Ishikawajima Harima Industries, Mitsubishi Electric Co., Teijin System Technology Co., Computer Graphics Labs Co., Toyo Lincs Co., Toshiba Co., Sumitomo Electronics Co., Digital Computer Limited, February 86
Consultant, Silicon Graphics, Inc., Mountain View, California, September 85 - December 86
Consultant, NASA AMES-Dryden Flight Research Facility, Edwards AFB, California, September 85
Executive Consultant, Japan Tech Services Corporation, Tokyo, Japan, January 85 - present
Consultant, Quadrex Corporation, Campbell, California; Japan Technical Services Corporation, Tokyo, Japan; Hitachi Works, Hitachi, Ltd., Hitachi-shi, Ibaraki-Ken, Japan, January 85 - June 85
Consultant, Tripos Associates, St. Louis, Missouri, April 83 - February 84
Consultant, Smith-Kline & French Laboratories, Philadelphia, Pennsylvania, September 81 - March 83
Consultant, Nautilus Computer Consulting, May 81 - March 83

Expert Witness

Eolas vs Google. Expert for Google through Quinn Emanuel, 30 Jan 2017 – present.
PalTalk vs Valve Software. Expert for Valve through Shook, Hardy & Bacon & Barcelo, Harrison & Walker LLP.
Acceleration Bay vs Activision. Expert for Activision Blizzard, Electronic Arts, Take-Two Interactive – Rockstar Games through Winston & Strawn, Jan 2017 – present.
Acceleration Bay vs Bungie. Expert for Bungie through Wilson Sonsini, Nov 2016 – present.
Game & Technology Co. Ltd vs Valve Software. Expert for Valve Software through Pillsbury Winthrop Shaw Pittman LLP. 28 September 2016 – 7 October 2016. Draft IPR doc caused plaintiff to settle.
Treehouse Avatar LLV vs Valve Software. Expert for Valve Software through Barcelo, Harrison & Walker LLP. 2 May 2016 – present. IPR filed.
Illinois Tool Works and Miller, Seaberry Solucion (Spain) v. Lincoln Electric. Expert for Illinois Tool Works and Miller, Seabury Solucion (Spain) through McAndrews Held LLP. 16 Feb 2016 – present. IPR filed. Non-infringement doc.
Gameloft, Inc vs Inventor Holdings, LLC. 11 August 2015 – present. Expert for Gameloft through eRise. IPR filed.
Art+Com v. Google, deposition at Akin Gump 8 July 2015.
Zenimax Media Inc. vs Facebook/Oculus VR/Palmer Luckey, 19 March 2015 – June 2015. Expert for Facebook/Oculus VR/Palmer Lucky through Cooley LLP. Zenimax did not want me on this because I work at USC.
Worlds, Inc v. Bungie, 23 March 2015 – 12 March 2016. Expert for Bungie through Wilson Sonsini. IPR Deposition/Trial 11 – 12 February 2016.
Rothchild Digital Media Innovations v. SCEA, 20 Jan 2015 – present. Expert for SCEA through Quarles & Brady LLP.
Guitar Apprentice v. Ubisoft, 21 Nov 2014 – present. Expert for Ubisoft through eRise.

Multiplayer Network Innovations v. Amazon, 18 Nov 2014 – 9 Feb 2015. Expert for Amazon through Klarquist Sparkman LLP.

Babbage Holdings LLC v. Nintendo of America, 4 Nov 2014 – 10 April 2015. Expert for Nintendo through Jenner & Block. Settlement reached.

ZiiLabs Inc., Ltd. v. Samsung Elecs. Co. Ltd., Apple Computer et al., 30 May 2014 – 20 Oct 2015. Expert for Apple Computer through Kirkland & Ellis LLP. Deposition taken 14 July 2015. Settlement reached 20 Oct 2015.

Fernandez vs Sony Computer Entertainment America LLC, 20 May 2014 – present. Expert for eRise ip.

McRo Inc dba Planet Blue vs Namco Bandai Games America, Inc.; Sega of America, Inc.; Electronic Arts Inc.; Disney Interactive Studios, Inc.; Capcom USA, Inc.; Neversoft Entertainment, Inc.; Treyarch Corporation; Index Digital Media; Activision Blizzard, Inc.; Infinity Ward, Inc.; LucasArts; and Warner Bros. Interactive Entertainment, 19 Feb 2014 – 24 September 2014. Expert for EA and Activision through Weil, Gotshal & Manges LLP. Patents ruled invalid. Reversed at Circuit Court. Deposition 29 June 2017. Continuing through 6 March 2018 when settled.

Babbage Holdings v. Sony Computer Entertainment of America & Sony Online Entertainment, 13 Dec 2013 – 28 Dec 2013 (may still be active). Expert for Sony through Duane Morris.

Straightpath vs Sony, December 2013 – May 2014. Expert for Wolf Greenfield. Issue before the ITC.

Worlds, Inc v. Activision Blizzard, 16 May 2013 – present. Expert for Activision Blizzard through Ropes & Gray.

Princeton Digital Image Corp vs Harmonix Music Systems, Inc, May 2013 – present. Expert for Finnegan, Henderson, Farabow, Garrett & Dunner. Deposition on 17 July 2014.

Gametek vs. Facebook … Big Viking Games, May 2013 – 7 May 2014. Patent held invalid. Expert for Gibson, Dunn & Crutcher.

Games2u.com vs Game Truck Licensing, August 2013. Expert for Robins, Kaplan, Miller & Ciresi. Settlement reached.

Digital Reg vs Valve Software, April 2013 – May 2013. Expert for Barcelo, Harrison & Walker. Settlement reached.

Walker Digital vs Sony Computer Entertainment of America, Nov 2012 – present. Expert for eRise LLP.

Walker Digital vs Activision-Blizzard et. al., Dec 2011 – Jan 2013. Expert for Joint Defense Group of 11 companies - Miniclip Tech (US) Limited Inc. (Brown Rudnick LLP), Microsoft Corporation (Fish & Richardson P.C), Activision Blizzard, Inc (Gibson, Dunn & Crutcher LLP), Atari Inc. (Gibson, Dunn & Crutcher LLP), Cryptic Studios, Inc (Gibson, Dunn & Crutcher LLP), Electronic Arts Inc & Popcap Games, Inc (Gibson, Dunn & Crutcher LLP), Turbine Inc. & Cartoon Interactive Group Inc (Gibson, Dunn & Crutcher LLP), Zynga Inc (Gibson, Dunn & Crutcher LLP), Gaia Interactive Inc (Goodwin Procter LLP), Sony Computer Entertainment America LLC (K&L Gates LLP) and Yahoo! Inc (Kasowitz, Benson, Torres & Friedman LLP).

Walker Digital vs Valve Software, Expert for Valve Software through Barcelo, Harrison & Walker. Dec 2011 – 17 Feb 2012. Settlement reached.

Biax Corp. vs Nvidia Corporation, Sony Computer Entertainment America Inc, Sony Electronics, Inc. Expert for Sony March 2011 – May 2012. Deposition 2 June 2011. Summary judgement for Nvidia/Sony.

Nexon Corp. via Mitchell Silberberg LLP. Expert on the security of Nexon's Combat Arms & Maple Story online games. Work was to examine and report on hacker tools used to crash Nexon's online games and to level-up player characters.

PalTalk Holdings vs Sony Computer Entertainment America, Inc, Sony Online Entertainment, LLC, Sony Corporation, Sony Corporation of America, Activision Blizzard, Inc, Blizzard Entertainment, Inc, NCSoft Corporation, Jagex LTD, and Turbine, Inc. Expert for Sony, Activision and NCSoft through Latham & Watkins, Irella and Manella, and Ropes and Gray. October 2009 – September 2011. Settlement reached.

First Media vs. Electronic Arts, Inc., Harmonix Music Systems Inc., Microsoft Corp., Viacom Inc., and Sony Computer Entertainment America, Inc. Expert for Viacom through Jenner & Block. June 2008 – February 2010.

Viacom International Inc., on behalf of itself, MTV Networks, and Harmonix Music Systems Inc. vs. Activision, on behalf of itself, Activision Publishing Inc., and RedOctane Inc.. Expert for Viacom through Omelveny & Meyers. June 2008 – November 2008.

Hochstein vs. Sony Computer Entertainment America (through Shook, Hardy & Bacon), expert witness on networked game patents, October 2004 – March 2008. Deposition 2007 approx.

Yahoo vs. Xfire (through Fenwick & West), expert witness on networked game patents, October – November 2005.

Miscellaneous

3 May 2017 – Appointed a member of the National Academy of Inventors in recognition of advanced technological development and innovation as issued by the United States Patent & Trademark Office.

22 March 2017 – USC Named Top School for Video Game Design for Seventh Year of Eight – Princeton Review.

20 March 2017 – Received IEEE Virtual Reality Technical Achievement Award for fundamental work in virtual reality networking, body tracking & institutionalizing the application of virtual reality.

, IEEE VR Annual Conference, Los Angeles, CA.

13 March 2015 – USC Named Top School for Video Game Design for Sixth Straight Year – Princeton Review.

11 March 2014 – USC Named Top School for Video Game Design for Fifth Straight Year – Princeton Review.

12 March 2013 – USC Named Top School for Video Game Design for Fourth Straight Year – Princeton Review.

1 March 2012 - USC Named Top School for Video Game Design for Third Straight Year - GamePro Media and Princeton Review once again awarded USC the two top prizes in their "Top Schools for Video Game Design Study."

11 August 2011 – promoted to Senior Member IEEE.

6 May 2011 – Alumni Award - Outstanding Achievement in Technology Development in Computer Graphics, Virtual Environments & Games from the University of Massachusetts, Amherst.

1 March 2011 - USC Named Top School for Video Game Design for Second Straight Year - GamePro Media and Princeton Review once again awarded USC the two top prizes in their "Top Schools for Video Game Design Study."

2009 – present - appointed a member of the ACM's Distinguished Speakers Program http://dsp.acm.org

20 April 2009, promoted to Senior Member ACM.

25 June 2003, World Technology Network 2003 Finalist for the Information Technology Software (corporate) award for The MOVES Institute, elected member of the World Technology Network.

Received Recognition of Service Award, April 2003, from the Association for Computing Machinery for role as Symposium Chair of the 2003 Symposium on Interactive 3D Graphics.

29 January 2002, Received Pioneer Certificate from the Modeling & Simulation Professional Certification Commission. I am one of the 27 pioneers listed for modeling & simulation by this commission. http://simprofessional.org/events/20020129_sanantonio.html

Received a Research Recognition Award, 14 April 1998, from the Provost of the Naval Postgraduate School.

Received Recognition of Service Award, July 1996, from the Association for Computing Machinery for role as Program Co-Chair of the 1996 Virtual Reality Software & Technology Conference, Hong Kong.

Received Recognition of Service Award, April 1995, from the Association for Computing Machinery for role as Symposium Chair of the 1995 Symposium on Interactive 3D Graphics.

Received an Instruction Recognition Award, 19 October 1994, from the Superintendent and Provost of the Naval Postgraduate School.

Received Performance Award, 27 September 1993, from the Provost of the Naval Postgraduate School.

Received "Best Paper 1991" award from the journal *Computers & Graphics*, 29 September 1992.

Received Performance Award, 21 September 1992, from the Provost of the Naval Postgraduate School.

Received a Research Recognition Award, 31 March 1992, from the Provost of the Naval Postgraduate School.

Received an Instruction Recognition Award, 15 October 1991, from the Superintendent and Provost of the Naval Postgraduate School.

Received Performance Award, 1 October 1991, from the Provost of the Naval Postgraduate School.

Received Performance Award, 30 September 1990, from the Provost of the Naval Postgraduate School.

Received Recognition of Service Award, April 1990, from the Association for Computing Machinery for role as Symposium Chair of the 1990 Symposium on Interactive 3D Graphics.

Promoted to Full Member, October 1990, Sigma Xi, the Scientific Research Society.

Received Performance Award, 30 September 1989, from the Provost of the Naval Postgraduate School.

Received Letter of Commendation for Excellence in Teaching, 26 June 1989, from the Provost of the Naval Postgraduate School.

Received Performance Award, 30 September 1988, from the Provost of the Naval Postgraduate School.

Member Association for Computing Machinery, April 1977 to Present.

Member IEEE Computer Society, 1980 to Present.

Member First Place Team, 1980 ACM National Computer Programming Contest, Kansas City, Missouri.

Nominated for Distinguished Teaching Award, 1977 at the University of Massachusetts, Amherst.

Research Support

Funding at USC

Transportopia, Google Niantic Laboratories, Summer 2014, $230,000.

Hospital Games, Lockheed, Summer 2012, $50,000.

SAIC Analyst Game Gift, $65,000.

SEA-VAK – funded by the National Reconnaissance Office, October 2011 – August 2012, $600,000 (co-PI with three others at USC ISI).

Ground Truth: Tactics, funded by Sandia National Laboratories, May 2011 – December 2011, $100,000.

AI-Based Scenario Generation & Virtual Human Simulation, DARPA National Cyber Range Initiative, 1 Feb 2010 – 1 August 2011, $1.5M.

Massively Multiplayer Online Games (MMOG) – Social and Cultural Model Embedding Technologies, Office of Naval Research, Fall 2008 – Fall 2011, $1.8M.

The Grasped World – Developing a Modeling & Simulation Infrastructure for the Study of Peace Maintenance & Globalization, funded by the Provost of the Naval Postgraduate School, Fall 2008 – Fall 2009, $100,000.

Real-Time Graphics for Simulation, funded by the Naval Postgraduate School, Fall 2008 – Fall 2009, $100,000.

Games for Fitness Course Support, funded by the Humana Innovation Laboratory, $100,000 as an unrestricted gift, Spring 2009 – Spring 2010.

Designing Games for Fitness, Humana Innovation Laboratory, 2008 – 2009, $125,000.

Improving Computer Science Undergraduate Education through the Use of Game Development Concepts, Microsoft Research, 2008 – 2009, $100,000 as unrestricted gift.

A request to Microsoft Research to fund an assessment of the effectiveness of using game development curriculum to increase Computer Science enrollment and graduation rates at the USC Viterbi School of Engineering, Microsoft Research, 2007 – 2008, $100,000 as unrestricted gift (with Ellis Horowitz and Gerard Medioni).

Game Technology Enhanced Simulation for Homeland Security Training, Sandia Labs, 2007 – 2009, $120,000.

Networked and Context Aware Mobile Games, Motorola Research Labs, 2006-2007, $100,000.

Serious Game Prototype, Lockheed Martin, 2007, $25,000.

Immune Attack, A Serious Game for Immunology Education, NSF-ISE, 2005-2006, $272,000.

Funding at the Naval Postgraduate School (1984 – 2004)

Prior to January 2005, I was a Professor at the Naval Postgraduate School, Monterey, California (1984 – 2004). In 2000, I founded the MOVES Institute and grew that from approximately $2.5M in 2000 to $10M in research funding by 2004, with some 60+ research accounts. $4M per year from 2000 – 2004 was the funding to develop and operate the America's Army Game. $650-750K per year was seed funding for the MOVES Institute from the Navy Modeling and Simulation Management Office and ONR. The remainder of funding was from various sponsors for specific tasks from all across the US Department of Defense.

Before I founded the MOVES Institute, I operated the NPSNET Research Group from 1986 – 2000. A typical year for that group was about $1.4M in research funding from various Department of Defense sponsors, with DARPA and the US Army being the largest sponsors.

2 May 2000 – 31 March 2004, $15,000,000, "Army Game Project," Awarded by the Assistant Secretary of the Army for Manpower and Reserve Affairs.

1 October 2001 - 30 September 2002, $650,000, "The Modeling, Virtual Environments and Simulation (MOVES) Research Center". Awarded by the Navy Modeling and Simulation Management Office.

1 April 2001 - 31 December 2004, $1,170,000, "The Context Machine". Awarded by the DARPA. With Co-PIs Michael Capps and Rudy Darken.

1 October 2000 - 30 September 2001, $550,000, "The Modeling, Virtual Environments and Simulation (MOVES) Research Center". Awarded by the Navy Modeling and Simulation Management Office.

1 January 2000 - 31 December 2002, $140,000, "Inertial Motion Tracking Technology for Inserting Humans into a Networked Synthetic Environment". Awarded by the Army Research Office, with Bob McGhee and Xiaoping Yun.

1 October 2000 – 30 September 2001, $75,000, "Self-Learning Autonomous Agents for Distributed Simulations". Awarded by the Defense Modeling and Simulation Office, with Michael van Putte and Brian Osborne.

1 October 99 - 30 September 2000, $525,000, "The Modeling, Virtual Environments and Simulation (MOVES) Research Center". Awarded by the Navy Modeling and Simulation Management Office.

1 October 98 - 30 September 1999 $550,000, "The Modeling, Virtual Environments and Simulation (MOVES) Research Center". Awarded by the Navy Modeling and Simulation Management Office.

1 January 99 - 31 December 1999, $300,000, "Continued Joint Theater Level Simulation (JTLS) Federation Development". Awarded by Defense Modeling and Simulation Office.

1 March 98 - 1 July 1999, $500,000, "Joint Theater Level Simulation (JTLS) with High Level Architecture (HLA)". Awarded by Defense Modeling & Simulation Office.

1 October 97 - 31 December 2000, $840,000, "The Virtual Reality Transfer Protocol (vrtp)". Awarded from Advanced Network and Services, with Don Brutzman and Michael Capps.

1 January 1999 - 31 December 1999, $30,000, "An Operating Plan for the Institute for Collaborative Environment Studies". Awarded from the Army Research Office.

1 May 98 - 30 September 1998, $200,000, "Virtual Environment Integration, Performance Measurement & Education for the High Level Architecture". Awarded by the Defense Modeling & Simulation Office.

1 March 98 - 31 December 1999, $140,000, "Inertial Motion Tracking Technology for Inserting Humans into a Networked Synthetic Environment". Awarded by the Army Research Office, with Bob McGhee.

1 October 97 - 30 September 1998 $50,000, "Dial-A-Behavior Virtual Environment Network Protocol". Awarded by the Office of Naval Research, with Don Brutzman.

1 October 1996 - 30 September 1997, $75,000, "Rapidly Configurable Virtual Worlds". Awarded by National Imagery Mapping Agency.

1 February 1996 - 31 January 1999, $450,000, "Rapidly Reconfigurable Virtual Environment Network Protocols". Awarded by ONR, with Don Brutzman.

1 October 1995 - 30 September 1998, $405,000, "NPSNET-Human: Inserting the Human into the Networked Synthetic Environment". Awarded by DARPA.

1 October 1994 - 30 September 1995, $205,000, "NPSNET-Human: Inserting the Human into the Networked Synthetic Environment". Awarded by ARPA, with David Pratt.

1 October 1994 - 30 September 1995, $50,000, "Inserting the Human into the Networked Synthetic Environment". Awarded by ARPA.

1 October 1994 - 30 September 1995, $23,804, "Implementation of Dynamic Terrain". Awarded by Defense Modeling and Simulation Office, with David Pratt.

1 October 1994 - 30 September 1995, $20,000, "1995 Symposium on Interactive 3D Graphics". Awarded by ARPA, with David Pratt.

1 October 1994 - 30 September 1995, $20,000, "1995 Symposium on Interactive 3D Graphics". Awarded by the Army Research Laboratory, with David Pratt.

1 October 1994 - 30 September 1995, $15,000, "1995 Symposium on Interactive 3D Graphics". Awarded by the Office of Naval Research, with David Pratt.

1 October 1993 - 31 December 1994, $100,000, "Implementation of Dynamic Terrain". Awarded by Defense Modeling and Simulation Office, with David Pratt.

1 October 1994 - 30 September 1995, $40,000, "NPSNET-Human: Inserting the Human into the Synthetic Environment - Year Two". Awarded by US Army Research Laboratory, Aberdeen, with David Pratt.

1 June 1994 - 31 December 1994, $50,000, "NPSNET: Terrain and Command and Control (C2) Visualization - Year 1". Awarded by NRaD, San Diego, with David Pratt.

1 July 1994 - 31 December 1994, $58,000, "Implementation of Dynamic Terrain in Distributed Interactive Simulation - Year 2". Awarded by US Army Topographics Engineering Center, with David Pratt.

1 October 1993 - 30 September 1994, $100,000, "NPSNET: Autonomous Force Development & Issues in Designing Intelligent Computer-Aided Training Systems". Awarded by Headquarters, Department of the Army AI Center, Washington, D.C..

1 January 1994 - 30 September 1994, $80,000, "NPSNET-WISE: Integrating the Infantry into a Virtual Environment". Awarded by US Army Research Laboratory, Aberdeen.

1 January 1993 - 31 December 1993, $728,000, "NPSNET: A 3D Visual Simulator for Virtual World Exploration and Experimentation - Year Two". Awarded by DARPA/ASTO, Arlington, Virginia.

1 October 1992 - 30 September 1993, $100,000, "Terrain Visualization and Intelligent Computer-Aided Training - Year 5". Awarded by Headquarters, Department of the Army AI Center, Washington, D.C..

1 October 92 - 30 September 1993, $80,000, "NPSNET: Environmental and Sensor Studies". Awarded by USA STRICOM.

1 January 1992 - 31 December 1992, $1,096,000, "NPSNET: A 3D Visual Simulator for Virtual World Exploration and Experimentation". Awarded by DARPA/ASTO, Arlington, Virginia.

1 October 1991 - 30 September 1992, $100,000, “Terrain Visualization and Intelligent Computer-Aided Training - Year 4". Awarded by Headquarters, Department of the Army AI Center, Washington, D.C..

1 October 1991 - 30 September 1992, $40,000, "NPSNET: Eagle Integration". Awarded by US Army TRADOC Analysis Command, Ft. Leavenworth, Kansas.

1 October 1991 - 30 September 1992, $40,000, “NPSNET: A 3D Visual Simulator for Virtual World Exploration & Experimentation”. Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Ocean Systems Center, San Diego, California.

1 April 1992 - 31 December 1992, $20,000, “NPSNET: Terrain Database Studies”. Awarded by US Army STRICOM, Orlando, Florida.

1 October 1990 - 30 September 1991, $100,000, “Terrain Visualization and Reasoning - Year 3”. Awarded by Headquarters, Department of the Army AI Center, Washington, D.C..

8 May 1991 - 31 December 1991, $60,000, “NPSNET: Low-Cost, Networkable 3D Visual Simulation”. Awarded by US Army Project Manager Training Devices, Orlando, Florida.

1 March 1991 - 30 Sep 1991, $10,000, “NPSNET: Terrain Database Standards for 3D Visual Simulation”. Awarded by the US Army Engineer Topographic Laboratories, Fort Belvoir, Virginia.

1 October 1990 - 30 September 1991, $140,000, “Inexpensive, Three-Dimensional Visual Simulation for the Command and Control Workstation of the Future - Year 3”. Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Ocean Systems Center, San Diego, California.

1 October 1989 - 30 September 1990, $40,000, “Inexpensive, Real-Time 3D Terrain Visualization - Year Two”. DARPA money awarded through the US Army Engineer Topographic Laboratories, Fort Belvoir, Virginia.

16 March 1990 - 30 September 1990, $40,000, “Inexpensive, Three-Dimensional Visual Simulation for the Command and Control Workstation of the Future - Year 2”. Awarded by the Naval Ocean Systems Center, San Diego.

1 September 1990 – 31 Dec 1990, $20,000, “Development of a SIMNET-Compatible, Non-Line-of-Sight, 3D Visual Simulator". Awarded through US Army Test and Experimentation Command, Fort Ord, California.

23 March 1990 - 30 September 1990, $50,000, “Terrain Visualization and Reasoning -- Year 2”. Awarded through Headquarters, Department of the Army AI Center, Washington, D.C..

1 October 1989 - 30 September 1990, $153,000, “Real-Time, Interactive Visual Simulation for the Future Command and Control Workstation - Year 2”. Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Underwater Systems Center, Newport, Rhode Island.

1 October 1989 – 30 Septe 1990, $135,000, “Line-of-Sight and Visual Enhancements to the Moving Platform Simulator”. Awarded through US Army Test and Experimentation Command, Fort Ord, California.

1 June 1989 - 30 Sep 1989, $50,000, “Terrain Visualization and Reasoning”. Awarded through Headquarters, Department of the Army AI Center, Washington, D.C..

1 June 1989 - 31 Dec 1989, $40,000, “Inexpensive, Real-Time 3D Terrain Visualization”. DARPA money awarded through the US Army Engineer Topographic Laboratories, Fort Belvoir, Virginia.

1 October 1988 - 30 Sep 1990, $50,000, “The Integration of a High Resolution Digital Terrain Database with the Moving Platform Simulator”. Awarded through the US Army Test and Experimentation Command, Fort Ord, California.

1 October 1988 - 30 Sep 1989, $56,000, “Real-Time, Interactive Visual Simulation for the Future Command and Control Workstation”, Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Underwater Systems Center, Newport, Rhode Island.

1 October 1988 - 30 Sep 1989, $78,000, “Inexpensive, Three-Dimensional Visual Simulation for the Future Command and Control Workstation”. Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Ocean Systems Center, San Diego.

1 October 1987 - 30 Sep 1988, $102,205, “An Architecture for Interactive, Real-Time Graphics Between Networked Workstations -- Year 2". Awarded from the Naval Postgraduate School’s Direct Funding Program, reviewed by the Naval Ocean Systems Center, San Diego.

1 June 1987 - 30 Sep 1988, $103,000, “Real-Time Modeling and Animation Tools in Support of Three-Dimensional Simulation". Awarded through the US Army Combat Developments Experimentation Center, Fort Ord, California.

1 October 1986 - 30 Sep 1987, $16,360, “An Architecture for Interactive, Real-Time Graphics Between Networked Workstations -- Year 1”. Awarded by the Naval Ocean Systems Center, San Diego.

1 Oct 1986 - 30 Sep 1987, $50,000, “High-Performance, Interactive Graphics for a Multinetwork Controller Monitoring Station". Awarded through the Naval Ocean Systems Center, San Diego, California.

1 Oct 1985 - 30 Sep 1986, $35,000, “A Feasibility Study for Software Portability and Graphics Capability Enhancements for a Command and Control Workstation”. Awarded through the Naval Ocean Systems Center, San Diego, California.

1 Oct 1985 - 30 Sep 1986, $60,000, “An Equipment Proposal for the Instructional Use of Computer Graphics at the Naval Postgraduate School". Awarded by the Lab Council of the Naval Postgraduate School as part of the second year of the school-wide Laboratory Upgrade Initiative.

1 Oct 1985 - 30 Sep 1986, $19,496, “The Use of VLSI Technology for the Real-Time Generation of Graphics Displays". Awarded by the Research Council of the Naval Postgraduate School.

1 Oct 1984 - 30 Sep 1985, $38,113, “The Effects of Real-time Display Generation on the Architecture of Graphics Display Systems". Awarded by the Research Council of the Naval Postgraduate School.

1 Jun 1984 - 30 Sep 1984, $52,400, “An Equipment Proposal for the Instructional Use of Computer Graphics at the Naval Postgraduate School". Awarded by the Lab Council of the Naval Postgraduate School.

1 Jul 1984 - 30 Sep 1984, $56,786, “The Effects of Real-time Display Generation on the Architecture of Graphics Display Systems". Awarded by the Research Council of the Naval Postgraduate School.

PhD Students

Powen Yao, TBD topic, PhD student in Computer Science, USC, expected graduation date 2020. On leave this academic year to perform military service.

David Young, Modeling Real-Time Hair for Interactive Games, PhD student in Computer Science, USC, expecetd graudation date 2019.

Tian Zhu, Analyzing Player-Game Interaction as a Sequence of Interactive Events, PhD student in Computer Science, USC, expected graduation date 2019.

Fotos Frangoudes, TBD topic, PhD student in Computer Science, USC, expected graduation date 2020.

Marc Spraragen, "A Computational Architecture for Modeling the Effects of Emotion on Planning," PhD student in Computer Science, USC, June 2013.

Brian A. Osborn, "An Agent-Based Architecture for Generating Interactive Stories," PhD in Computer Science, Naval Postgraduate School, September 2002.

Michael VanPutte, "A Computational Model and Multi-Agent Simulation for Information Assurance," PhD in Computer Science, Naval Postgraduate School, June 2002, Dissertation Committee Chair.

Eric Bachmann "Inertial and Magnetic Angle Tracking of Human Limb Segments for Inserting Humans into Synthetic Environments," PhD in Computer Science, Naval Postgraduate School, December 2000.

Michael V. Capps "Fidelity Optimization in Distributed Virtual Environments," PhD in Computer Science, Naval Postgraduate School, June 2000.

Katherine L. Morse "An Adaptive, Distributed Algorithm for Interest Management," PhD in Information and Computer Science, University of California, Irvine, June 2000.

Abrams, Howard "Extensible Interest Management for Scalable Persistent Distributed Virtual Environments," PhD in Computer Science, December 1999.

Storms, Russell "Auditory-Visual Cross-Modal Perception Phenomena," PhD in Computer Science, Naval Postgraduate School, September 1998.

Pandzic, Igor S. "Facial Communication in Networked Collaborative Virtual Environments," PhD Thesis, March 1998, MIRALab, Centre Universitaire d'Informatique, Universitie de Geneve. Member of thesis jury.

Le Van Gong, Hubert "Paradigmes pour l'interoperabilite entre environnements virtuels," PhD Thesis, December 1996, l'Universite Paris VI au Laboratoire MASI, L"Universite Pierre et Marie Curie, examinateur.

Macedonia, Michael R. "A Network Software Architecture for Large Scale Virtual Environments," PhD in Computer Science, Naval Postgraduate School, June 1995.

Brutzman, Donald P. "A Virtual World for an Autonomous Underwater Vehicle", PhD in Computer Science, Naval Postgraduate School, December 1994.

Amburn, Phil "Development and Evaluation of an Air-to-Air Combat Debriefing System Using a Head-Mounted Display," PhD Thesis, University of North Carolina, Chapel Hill, May 1994. I was a member of his PhD committee. The chair of the PhD committee was Frederick P. Brooks, Jr. of UNC.

MacPherson Jr., David Leonard "Automated Cartography by an Autonomous Mobile Robot Using Ultrasonic Range Finders", PhD Thesis, Naval Postgraduate School, September 1993. Member of PhD committee.

Pratt, David "A Software Architecture for the Construction and Management of Real-Time Virtual Worlds", PhD in Computer Science, Naval Postgraduate School, June 1993.

Delaney, Kevin J. "Classification of Short-Duration Non-Stationary Signals," PhD Thesis, Electrical and Computer Engineering Department, Naval Postgraduate School, Monterey, California, March 1992. Outside department member of the PhD committee.

Lott Jr., Gus K. "High Frequency (HF) Radio Signal Amplitude Characteristics, HF receiver Site Performance Criteria, and Expanding the Dynamic Range of HF Digital New Energy Receivers By Strong Signal Elimination," PhD Thesis, Electrical and Computer Engineering Department, Naval Postgraduate School, Monterey, California, June 1990. Outside department member of the PhD committee.

Sciomacco, Edward M. "Parametric Modeling and Estimation of Pulse Propagation on Microwave Integrated Circuit Interconnections," PhD Thesis, Electrical and Computer Engineering Department, Naval Postgraduate School, Monterey, California, June 1990. Outside department member of the PhD committee.

Ross, Ronald S. "Planning Minimum-Energy Paths in an Off-Road Environment with Anisotropic Traversal Costs and Motion Constraints," PhD Thesis, Computer Science Department, Naval Postgraduate School, Monterey, California, June 1989. Member of commiteee. I helped Ron in the early part of his thesis efforts. We have co-authored several papers. There is a substantial graphics component to this thesis.

Richbourg, Robert "Solving a Class of Spatial Reasoning Problems," PhD Thesis, Computer Science Department, Naval Postgraduate School, Monterey, California, June 1987. Member of committee. I helped Bob Richbourg in the early part of his thesis efforts by putting an organization and structure to his work. We have co-authored several papers. There is a substantial graphics component to this thesis.

O'Dwyer, John Mark "Power Line Noise Models and Energy Detection in the High Frequency Radio Band," PhD Thesis, Electrical and Computer Engineering Department, Naval Postgraduate School, Monterey, California, June 1986. I was the minor department member of O'Dwyer's thesis committee. As all committee members, I read and commented upon his work.

Biography - Michael Zyda

Michael Zyda is the Founding Director of the USC GamePipe Laboratory, and a Professor of Engineering Practice in the USC Department of Computer Science. At USC, he founded the B.S. in Computer Science (Games), the M.S. in Computer Science (Game Development), and the USC Games joint Advanced Games course and took that program from no program to the #1 Games program in the world. That program has been rated #1 by the Princeton Review for eight of the last nine years. His alums have shipped games played by over 2.5 billion players, about $100B in revenue.

From Fall 2000 to Fall 2004, he was the Founding Director of the MOVES (modeling, virtual environments, and simulation) Institute located at the Naval Postgraduate School, Monterey, and a Professor in the Department of Computer Science at NPS as well. At NPS, Zyda's NPSNET Research Group built the first networked virtual environment with fully instrumented body suits that played across the Internet. His work on the networking of virtual environments contributed to the development of the IEEE 1278.1 standard for distributed interactive simulation. He helped found the subspecialty in modeling and simulation for the United States Navy, the simulation operations functional area (57) for the US Army and the simulation operations area (MOS-9625) for the US Marine Corps. While at NPS, Zyda was Associate Editor and then Senior Editor for the MIT Press Journal Presence: Teleoperators and Virtual Environments from 1993 - 2004. With Fred Brooks and Henry Fuchs, he co-founded the ACM SIGGRAPH Symposium on Interactive 3D Graphics in 1990.

He was a member of the National Research Council Committee that put out the report "Virtual Reality - Scientific and Technological Challenges". He chaired the NRC Committee that put out the study "Modeling and Simulation - Linking Entertainment and Defense". That NRC report changed the entire Department of Defense towards the usage of games and entertainment technology for its future modeling and simulation systems. From that report, Zyda wrote the operating plan and research agenda that founded USC's Institute for Creative Technologies.

For the National Research Council, he has served on committees for the Behavioral and Social Sciences and Education Commission, the Computer Science and Telecommunications Board, the Aeronautics and Space Engineering Board, the Mathematical Sciences and Their Applications Board, the Naval Studies Board, the Air Force Studies Board, the Army Research Laboratory Technical Assessment Board, the Board on Higher Education and Workforce, the Board on Behavioral, Cognitive, and Sensory Sciences, and the Board on Earth Sciences and Resources.

Zyda holds a lifetime appointment as a National Associate of the National Academies, an appointment made by the Council of the National Academy of Sciences in November 2003, awarded in recognition of "extraordinary service" to the National Academies.

In May 2017, Zyda was appointed a member of the National Academy of Inventors in recognition of advanced technological development and innovation as issued by the United States Patent & Trademark Office.

In March 2017, Zyda was awarded the IEEE Virtual Reality Technical Achievement Award for fundamental work in virtual reality networking, body tracking & institutionalizing the application of virtual reality.

Zyda is a member of the Academy of Interactive Arts & Sciences. He served as the principal investigator and development director of the America's Army PC game funded by the Assistant Secretary of the Army for Manpower and Reserve Affairs. He took America's Army from conception to three million plus registered players and hence, transformed Army recruiting. The creation of the America's Army game founded the serious games field. He co-holds two patents that form the basis for the nine-axis sensor in the Nintendo Wii U.

Professor Zyda has consulted for the White House Office of Science and Technology Policy, NASA AMES, the Ministry of Industrial Development Sabah Province, Malaysia, Japan Tech Services Corporation, Tokyo, and Paramount Digital Entertainment, among others. He is a speaker with Celebrity Speakers, International. He is the founder and Chairman of Happynin Games, and 411 Productions DTLA. He is co-founder, with Qingyun Ma, of Great Wall Tiger, Xi'an, China. He is consultant to the Ministry of Culture & Shaanxi Cultural Group, Xi'an, China – entertainment technology advisor for AR & VR & theme park projects in/around the historic sites of Shaanxi Province, including the Terracotta Warriors Museum, the e-Pang Palace and the Zhaojin Red Army Base, 2015 – present.

Professor Zyda began his career in Computer Graphics in 1973 as part of an undergraduate research group, the Senses Bureau, at the University of California, San Diego. Professor Zyda received a BA in Bioengineering from the

University of California, San Diego in La Jolla in 1976, an MS in Computer and Information Science from the University of Massachusetts, Amherst in 1978 and a DSc in Computer Science from Washington University, St. Louis, Missouri in 1984.