

MARK T. BOLAS

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EDUCATION

M.S. Mechanical Engineering (Product Design) 1989
Stanford University
Thesis: *Design and Virtual Environments*

Graduate Coursework: Computer Music 1985-1987
University of California, San Diego
Music Department: Courses in *Computer Music and Composition*
Electrical Engineering Department: *Digital Signal Processing*

B.A. Physics; Minor in Music 1983
University of California, San Diego

EMPLOYMENT

Academic:

University of Southern California
Interactive Media Division, School of Cinema-Television:

Visiting Associate Professor 2004-present
Director, Interactive Narrative and Immersive Technologies Lab
Consulting Faculty, Institute for Creative Technologies
Affiliate Faculty, Center for Robotics and Embedded Systems

Visiting Scholar Summer 2003

Stanford University
Design Division, Mechanical Engineering:

Consulting Assistant Professor 2003-2004

Lecturer (four appointments) 1991-2002

Teaching Assistantships 1988-1989

Keio University, Japan
Graduate School of Media and Governance
Assistant Professor 2001-2002

Professional:

Fakespace Labs 1988-present
Founder, Chairman (former CEO and President)

One of the first virtual reality companies established. I was directly responsible for groundbreaking research and products in areas including: human/computer interaction, immersive displays (head-coupled and projector-based), and virtual environment software and content ranging from interactive music to scientific data visualization. My partners and I grew the company to over 50 people and spun off the systems integration product line as a new company, Fakespace Systems. It continues to be the largest provider of immersive visualization systems as part of Mechdyne, Inc.

Fakespace Labs now is a basic and applied research firm, often working in close collaboration with academic researchers, on projects including systems for computational illumination, human computer interface devices and displays, and advanced optical designs for display systems, including home entertainment. I resigned as CEO and president in 2001 to focus on design at Fakespace Labs and on academia.

Sonicbox, Inc. 1999-2001
Chairman, Co-Founder

Co-invented and patented key technologies for Internet radio and streaming audio. Lead designer of the Sonicbox Tuner and original product line. Played key role in developing the initial business plan, designing prototypes, and securing financing for the company, which licensed technology to Philips, Creative Labs, Acer, and Yahoo Japan.

Bentex 1984-1986
Electronic Group Leader

Responsible for final electronic system design and production of the Sprint 101, an innovative sub-sea remote inspection robot. Provided field support in the Antarctic and Norway. Developed robotic technology for Naval Ocean Systems Center.

Scripps Institute of Oceanography 1981-1984
Junior Developmental Engineer; Engineering Aide

Engineering and field support of electronic and mechanical equipment supporting a foremost geophysical observatory.

Other Employment 1978-1987

- Robotic speaker position system design, A&M Records
- Sound stage design & construction, UC San Diego
- Concert sound engineer, UC San Diego
- Cajun accordion MIDI design and development, RCA Records
- Design and debug of digital bus emulator, Meridian Design
- Custom installation of residential security systems
- Recording studio technician, Silverlake Studios

COURSES & TEACHING

University of Southern California

- CTIN 499 Inventing Extreme Dataspace
- CTIN 532 Interactive Experience Design
- CTIN 541 Design for Interactive Media, Mobile & Programming Module
- CTIN 542 Interactive Design and Production
- CTIN 555 Advanced Interactive Project (two terms)

Stanford University

- ME101 Visual Thinking (three terms)
- ME261 Designing and Building Virtual Environments
- ME218D Smart Project Design, Project Coach
- ME310 Design for Manufacture, Project Coach (two terms)
- ME101 Visual Thinking, Teaching Assistant
- ME103 Design for Manufacture, Teaching Assistant

Keio University

- Mobile and Augmented Media Project, Advanced Project Advisor

AWARDS & HONORS

Virtual Reality Technical Achievement Award, *for Seminal Technical Achievement in Virtual & Augmented Reality*. By IEEE Visualization and Graphics Technical Committee, 2005.

Innovations Award, *for Sonicbox*. By the Consumer Electronics Association, 2001.

CES Innovations Design & Engineering Honors Program - Audio, *for iRhythm*, 2001.

Best of What's New 2000 (100 Hottest Products), *for the Sonicbox Remote Tuner*. By Popular Science, December 2000.

Best of Tech, *for Sonicbox*. By InStyle, December 2000.

The Best of the Season, *for Sonicbox*. By Rolling Stone, December 2000.

Top Ten Products of the Year, *for the Immersive WorkWall*. By IEEE Computer Graphics, 1999.

Innovation Award, *for the Versabench*. By Computer Graphics World, 1998.

Product of the Year Award Nominee in Arts and Events, *for Fakespace Music*. By CyberEdge Journal, 1996.

Industry Excellence Award, *for the Immersive WorkBench*. Second place, by IEEE Computer Graphics and Applications, 1996.

Virtual Reality Product of the Year Award – Hardware, for the PUSH. By CyberEdge Journal, 1995.

Industry Excellence Award, for the PUSH. Second place, by IEEE Computer Graphics and Applications, 1995.

Virtual Reality Product of the Year Award – Hardware, for the BOOM, By CyberEdge Journal, 1993.

RESEARCH CONTRACTS & GRANTS

(PI or Project Director. Excludes standard product sales)

Low cost wide field of view head mounted display for aviation training, with Ian McDowall, for Latika Eifert, US Army RDECOM, Contract N61339-05-C-0032, 2005, \$75,000

Context sensitive audio analysis for interactive multimedia indexing, with Larry Leifer and Julius Smith, Stanford MediaX Grant, 2004, \$5,000 (\$25,000 total grant)

Interactive networked toys: Using sensing technologies to create social awareness, with Glenda Revelle, Byron Reeves, Deanne Perez-Granados, Sesame Street Workshop, Stanford MediaX Grant, 2003, \$35,000 (\$74,768 total grant)

MULE, a multi-use light engine, with Ian McDowall, for Ralph Wachter, Office of Naval Research, Bridge extension to N00014-99-C-0122, 2003, \$75,000

High-speed 3D shape digitization using projected light patterns, with Marc Levoy and Ian McDowall, Stanford MediaX Grant, 2002, \$53,600 (\$84,831 total grant)

FIDGET, a force input device for graphical environment tweaking, with Rolf Faste, Stanford MediaX Grant, 2002, \$25,000

Fast action head mounted display, with Ian McDowall, for Jim Templeman and Linda Sibert, Office of Naval Research, Contract N00014-02-M-0230, 2002, \$600,000 (Fakespace Labs/USC collaboration)

Boom Chameleon, a novel input/output device consisting of a tracked flatpanel touch sensitive display, with Ian McDowall, for Bill Buxton, Alias Research, 2000, \$25,000

A multi-user deployable virtual workbench, with Ian McDowall, For Larry Rosenblum, Naval Research Lab, Ralph Wachter, Office of Naval Research, Richard Kaste, Army Research Laboratory, Contract N00014-99-C-0122, 1999, \$500,000

Physical presence for virtual model displays, with Ian McDowall, for Steve Bryson, NASA Ames Research Center, Contract NAS2-98075, 1998, \$40,000

Reconfigurable advanced visualization environment, for Los Alamos National Laboratories, 1998, \$2,000,000 (transferred to Fakespace Systems, Inc.)

A versatile stereoscopic workbench for environment and model visualization, with Ian McDowall, for Dr. Richard Dunn, Naval Air Warfare Center, 1997, \$200,000

A hybrid immersive/non-immersive virtual environment workstation, for Rudy Darken, Navy Research Laboratory, Contract N00014-96-C-2074, 1996, \$65,498

FS2, A hands-free counter-balanced head-mounted stereoscopic display for ergonomic simulation, for Ken Socks, Chrysler Automotive, 1994, \$164,000.

Low cost head-mounted display design, for Astounding Technologies, 1993, \$25,000

A five degree of freedom mobile telepresence system, for Scott Fisher, Telepresence Research, 1993, \$45,000

A telepresence system for the interactive virtual reality simulation system for robot control and operator training, for Sharon Stansfield, Sandia National Laboratories, 1992, \$50,000

A binocular omni orientation monitor, for Creon Levitt, NASA Ames Research Center, 1991, \$27,000

POINT, a proof of concept pan-only infrared tracker for a virtual reality game, for Rich Gold, Mattel Toys (new products division), 1990, \$8,500

Molly, a three degree of freedom telepresence camera system, for Scott Fisher, NASA Ames Research Center, 1988, \$25,000

MIDI-based Cajun accordion performance system, for Jo-El Sonnier and RCA Records, 1987, \$12,000

PUBLICATIONS & PAPERS

Bolas, M., Gold, R., McDowall, I. *Second Harvest*. Forthcoming, Ambidextrous Magazine (publication of the Stanford Design School), 2006.

Bolas, M., Pair, J., Haynes, K., McDowall, I. *Environmental and Immersive Display Research at the University of Southern California*. Forthcoming, IEEE VR 2006 Workshop on Emerging Display Technologies, 2006.

MacDonald, K., Williams, J., Levoff, J., Morie, F., Bolas, M. *Application of Story Discovery to Intelligence Analysis*. Final Technical Report, February 2006.

Bolas, M., co-editor. *Stereoscopic Displays and Virtual Reality Systems I - XII*. Proceedings SPIE, 1994-2006.

- Jones, A., Gardner, A., Bolas, M., McDowall, I., Debevec, P. *Performance Geometry Capture For Spatially Varying Relighting*. SIGGRAPH Technical Sketches, 2005.
- Jones, A., Gardner, A., Bolas, M., McDowall I., Debevec P. *ICT Technical Report ICT-TR-01.2005*, July 2005.
- Revelle, G., Zuckerman, O., Druin, A., Bolas, M. *Tangible User Interfaces For Children*. Conference on Human Factors in Computing Systems, Extended Abstracts, pp. 2051-2052, April 2005.
- Fisher, S., Anderson S., Ruiz, S., Naimark M., Hoberman, P., Bolas M., Weinberg R.: *Experiments in Interactive Panoramic Cinema*. Proc. SPIE Vol. 5664, pp. 626-632, March 2005.
- McDowall, I., Bolas, M. *Display, Sensing, and Control Applications for Digital Micromirror Displays*. Workshop On Emerging Display Technologies, pp. 35-36, IEEE VR, March 2005.
- Levoy, M., Chen, B., Vanish, V., Horowitz, M., McDowall, I., Bolas, M. *Synthetic Aperture Confocal Imaging*. ACM Trans. Graph. 23(3), pp. 825-834, 2004.
- Bolas, M., McDowall, I., Corr, D. *New Research and Explorations into Multiuser Immersive Display Systems*. IEEE Computer Graphics and Applications 24(1), pp. 18-21, 2004.
- Ju, W., Madsen, S., Fiene, J., Bolas, M., McDowall I., Faste, R. *Interaction Devices for Hands-On Desktop Design*. Proc. SPIE 5006, pp. 585-595, May 2003.
- Fisher, S., Saito, T., McDowall, I., Nakayama, Y., Bolas, M., Kohiyama, K. *Micro Archiving and Interactive Virtual Insect Exhibit*. Proc. SPIE 4660, pp. 375-381, May 2002.
- McDowall, I., Bolas, M. *Reviewing Single and Multiple Viewer Stereo with DLP Projectors*. Invited paper, Immersive Projection Technology Symposium Program, Orlando, Florida, March 2002.
- McDowall, I., Bolas, M., Corr, D., Schmidt, T. *Single and Multiple Viewer Stereo with DLP Projectors*. Proc. SPIE 4297, pp. 418-425, June 2001.
- Bolas, M., McDowall, I., Bolas, N., Frerichs, D. *Internet Radio Strategy*. White paper for Sonicbox, Inc., 2000.
- Bolas, M., McDowall, I., Williams, G., Corr, D., Berta, J. *Pixels are Good*. Proc. SPIE 3957, pp. 389-395, May 2000.
- Williams, G., Faste, H., McDowall, I., Bolas, M. *Physical Presence – Palettes in Virtual Spaces*. Proc. SPIE 3639, pp. 374-384, May 1999.
- Bolas, M., McDowall, I. *Physical Presence for Virtual Model Displays*. Final Report for NASA Ames Research Center, Contract NAS2-98075, 1999.

Williams, G., McDowall, I., Bolas, M. *Human Scale Interaction for Virtual Model Displays: A Clear Case for Real Tools*. Proc. SPIE 3295, pp. 350-353, April 1998.

Bolas, M. *Position Paper*. In: Modeling and Simulation: Linking Entertainment and Defense. Computer Science and Telecommunications Board, National Research Council. Washington, D.C.: National Academy Press, pp. 120-121, 1997.

McDowall, I., Bolas, M. *Immersive Display Technology Developments*, International Immersive Projection Technology Workshop. Stuttgart, Germany. Bullinger, H., Riedel, O. (eds.), Springer, pp. 87-95, 1997.

Bolas, M. *The Future of Virtual Reality: Head Mounted Displays versus Spatially Immersive Displays*. SIGGRAPH 97 Conference Proceedings, Annual Conference Series, ACM SIGGRAPH, Addison Wesley, pp. 485-86, August 1997.

Agrawala, M., Beers, A., McDowall, I., Frohlich, B., Bolas, M., Hanrahan, P., *The Two-User Responsive Workbench: Support for Collaboration Through Individual Views of a Shared Space*. SIGGRAPH Proceedings, pp. 327-332, August 1997.

McDowall, I., Bolas, M. *New Developments for Virtual Model Displays*. Computer Graphics, 31(2), pp. 50-52, May 1997.

Bolas, M., Bryson, S., McDowall, I. *Virtual Model Displays*. Proc. SPIE 3012, pp. 429-438, May 1997.

Fisher, S., Bolas, M., Merritt, J., Editors. *Stereoscopic Displays and Virtual Reality Systems IV*. Proc. SPIE 3012, May 1997.

Greuel, C., Bolas, M., Bolas, N., McDowall, I. *Sculpting 3D Worlds with Music: Advanced Texturing Techniques*. Proc. SPIE 2653, pp. 306-315, April 1996.

McDowall, I., Bolas, M. *Stereo Texture Facades*. Proc. SPIE 2653, pp. 316-319, April 1996.

Fisher, S., Bolas, M., Merritt, J., Editors. *Stereoscopic Displays and Virtual Reality Systems III*. Proc. SPIE 2653, April 1996.

Bolas, M., McDowall, I., Mead, R. *Applications Drive VR Interface Selection*. Computer 28(7), pp. 72-75, July 1995.

McDowall, I., Bolas, M. *High Resolution Stereo Solutions for Virtual Reality Applications*. Society for Information Display International Symposium, Digest of Applications Papers Volume XXVI, Orlando, Florida, SID95, pp. 41-44, May 1995.

Bolas, M., McDowall, I., Mead, R., Lorimer, E., Hackbush, J., Greuel, C. *Alternative Display and Interaction Devices*. Proc. SPIE 2409, pp. 211-219, February 1995.

Fisher, S., Bolas, M., Merritt, J., Editors. *Stereoscopic Displays and Virtual Reality Systems II*. Proc. SPIE 2409, February 1995.

Bolas, M., McDowall, I., Mead, R. *Immersive Desktop Display with Axial Muscle Navigation and Control*. White Paper. Symposium on Interactive 3D Graphics, ACM. Monterey, California. 1995.

Bolas, M., Lorimer, E., McDowall, I., Mead, R. *Proliferation of Counterbalanced, CRT-Based Stereoscopic Displays for Virtual Environment Viewing and Control*. Proc. SPIE 2177, pp. 325-334, April 1994.

Fisher, S., Bolas, M., Merritt, J., Editors. *Stereoscopic Displays and Virtual Reality Systems*, Proc. SPIE 2177, April 1994.

Bolas, M. *Human Factors in the Design of an Immersive Display*. IEEE Computer Graphics and Applications, 14(10), pp. 55-57, January 1994.

Bolas M: *Designing Virtual Environments*. In: The Virtual Reality Casebook, Loeffler, C and Anderson, T., Eds., pp. 49-54. New York: Van Nostrand Reinhold, 1994. Also in Japanese: In: Anthology of Industry and Culture. *Virtual Realities*. ISBN4-87408-576-8.

Bolas, M. *Practical VR – Five Years of Lessons Learned*. Industrial Virtual Reality Show and Conference. Proceedings, pp. 90-99. Tokyo, Japan: Reed Exhibitions Japan, Ltd., 1993.

Bolas, M. *Virtual Environments for Public Exhibitions*. SIGGRAPH Visual Proceedings, p. 225, 1993.

Bolas, M. *Design Background for the Boom2C: A Headcoupled Stereoscopic VR Display*. Journal of Three Dimensional Images 7(2), March 1993.

Bolas, M. *Design and Virtual Environments*. Second International Conference on Artificial Reality and Tele-Existence, Japan Technology Transfer Association., pp. 135-141, Tokyo, Japan, 1992.

Bolas, M., Stone, P. *Virtual Mutant Theremin*. Proceedings International Computer Music Association Conference, San Jose, California, pp. 360-361, 1992.

McDowall, I., Bolas, M., Pieper, S., Fisher, S., Humphries, J. *Implementation and Integration of a Counterbalanced CRT-based Stereoscopic Display for Interactive Viewpoint Control in Virtual Environment Applications*. Stereoscopic Displays and Applications, Merritt, J., Fisher, S., Eds., Proc. SPIE 1256, pp. 136-146, September 1990.

Bolas, M., Fisher, S. *Head-Coupled Remote Stereoscopic Camera System for Telepresence Applications*. Virtual Environment Applications, Stereoscopic Displays and Applications, Merritt, J., Fisher, S., Eds., Proc. SPIE 1256, pp. 113-123, September 1990.

Fisher, S., Jacoby, R., Bryson, S., Stone, P., McDowall, I., Bolas, M., Dasaro, D., Wenzel, E., Coler, C., Kerr, D. *The Ames Virtual Environment Workstation: Implementation Issues and Requirements*. Human machine interfaces for teleoperators and virtual environments, NASA Conference Publication 10071, pp. 70-73, 1990.

ARTWORK (*in juried exhibit)

*Horsie** (with Ian McDowall), 2004.
*Still Life** (with Christian Greuel et al), 1996.
*Phlor-X** (with Niko Bolas et al), 1995.
*New York Dance** (with Niko Bolas et al), 1995.
*Vacuii** (with Christian Greuel et al), 1995.
*Tango Texture** (with Ian McDowall), 1993.
*Enter**, 1989.
Composition with Line 1918 (also *Flatlands**), 1989.
Touch Face, 1989.
Mutant Theremin (with Phil Stone), 1989.
A sea-sic walrus. (on CARL computer music synthesizer), 1986.
Why am I arguing with a lizard? (on Buchla synthesizer), 1981.

PATENTS (*licensed or implemented in products or exhibits)

Patents Granted:

*Multi-person stereo display system**. McDowall, I., Bolas, M.
2005: U.S. Patent 6,924,833
2003: U.S. Patent 6,535,241

*Internet radio receiver with linear tuning interface**. McDowall, I., Bolas, M., Smith, S.
2005: U.S. Patent 6,920,479

*Gimbal mounted virtual reality display system**. Mead, R., Bolas, M., McDowall, I.
2004: U.S. Patent 6,774,870
2002: U.S. Patent 6,396,462
2000: U.S. Patent 6,094,180

*Method and apparatus for sharing streaming media links**. Sass, J., Bolas, M.
2004: U.S. Patent 6,769,028.

Method and system for adding advertisements over streaming audio based upon a user profile over a world wide area network of computers. Frerichs, D., McDowall, I., Bolas, M.
2004: U.S. Patent 6,684,249.

*Method and system for high performance computer-generated virtual environments**.

McDowall, I., Bolas, M.

2002: U.S. Patent 6,441,815

2001: U.S. Patent 6,285,370

1999: U.S. Patent 5,905,499

*Internet radio receiver having a rotary knob for selecting audio content provider designations and negotiating internet access to URLs associated with the designations**. Bolas, M., McDowall, I.

2002: U.S. Patent 6,389,463

*Remote tuner for internet-based radio**. Bolas, M., Fisher, S., Jones, W., Kim, S.

2001: U.S. Design Patents D439,576; D439,888; D439,889; D440,551; D440,553; D440,554

*Virtual reality glove system with fabric conductors**. McDowall, I., Bolas, M., Mead, R., Greuel, C.

2000: U.S. Patent 6,128,004

*Adjustable immersive projection table**. McDowall, I., Bolas, M.

2000: U.S. Patent. 6,075,502

Method for line field-sequential color video display. McDowall, I., Bolas, M.

1996: U.S. Patent 5,528,262

*Method and system for controlling computer-generated virtual environment in response to audio signals**. Bolas, M., McDowall, I.

1996 U.S. Patent 5,513,129

*Image display method and apparatus with means for yoking viewpoint orienting muscles of a user**. Bolas, M., McDowall, I., Mead, R.

1995: U.S. Patent 5,436,638

*Spring counterbalanced boom suspension system**. Bolas, M., Mead, R.

1993: U.S. Patent 5,253,832

Patents Pending:

U.S. Patent Application 11/269,900, pending publication. Filed: August 2005.

U.S. Patent Application 11/166,897, pending publication. Filed: June 2005.

U.S. Patent Application 11/165,812, pending publication. Filed: June 2005.

U.S. Patent Application 10/971,376, pending publication. Filed: October 2004.

U.S. Patent Application 60/621,268, pending publication. Filed: October 2004.

System and method for limiting dead air time in internet streaming media delivery. U.S. Patent Application 20050165942. McDowall, I., Bolas, M. 2005.

Playlist radio. U.S. Patent Application 20040254659. Bolas, M., McDowall, I. 2004.

Method and system for high performance computer-generated virtual environments. U.S. Patent Application 20020030679. McDowall, I., Bolas, M. 2002.

Gimbal-mounted virtual reality display system. U.S. Patent Application 20020140634. Mead, R., McDowall, I., Bolas, M. 2002.

Internet radio receiver with linear tuning interface. U.S. Patent Application 20020073171. McDowall, I., Bolas, M., Smith, S. 2002.

Internet radio receiver and interface. U.S. Patent Application 20010042109. Bolas, M., McDowall, I. 2001.

EXHIBITS (*lead role in juried exhibit)

Snared Illumination. Emerging Technologies Gallery, SIGGRAPH, Los Angeles, 2004.*

MicroArchiving. By Keio University. Emerging Technologies Gallery, SIGGRAPH, Los Angeles, 2001.

In Search of the Holy Grail. By Infobyte and ENEL. In *Mediascape* at the Guggenheim SOHO, New York, 1996, and in *TILE Conference*, award winner, Brussels, 1997.

The Tomb of Neferatari. By Infobyte and ENEL. At the Museum of Civilization in Ottawa, 1996, and the Museum of Cairo, 1997.

Soundscapes II. Digital Bayou, SIGGRAPH, New Orleans, 1996.*

Vacuii. VR Garden, IntermediaWORLD. San Francisco, March 1996.

Soundscapes. Interactive Entertainment, SIGGRAPH, Los Angeles, 1995.*

Boom Room at the VROOM, SIGGRAPH, Orlando, 1994.

Virtual Basilica of St. Francis of Assisi. By Infobyte. Walt Disney EPCOT Center, 1994.

Virtual Environments for Public Exhibitions. Tomorrow's Realities Gallery, SIGGRAPH, Anaheim, 1993.*

Boom and Molly. Cyberarts. Pasadena, November 1991.

Be Here Now. Tomorrow's Realities Gallery, SIGGRAPH, Las Vegas, 1991.*

Molly. Cyberthon, Whole Earth Institute, San Francisco, October 1990

Molly. TED2 Conference, Monterey, California, February 1990.

SITE INSTALLATIONS

Imaging, The Tools of Science. By the Chicago Museum of Science and Industry, 1993-present.

Virtual Chemist. By Sense8. Petronas Twin Towers, Kuala Lumpur, Malaysia, 1998-2004.

Virtual Brewery Adventure. By Telepresence Research. Sapporo Beer Museum, Tokyo, 1995-2000.

Project Mercury. By Greystone Entertainment, SegaCity Irvine, California, 1998.

GameArc. By GameWorks, Inc. At GameWorks, Seattle and Las Vegas, 1997.

Strats, Studios and the Seattle Sound. By Fakespace. Experience Music Project. December 1996-February 1997.

CLIENTS & APPLICATIONS (selected)

Academic & scientific research clients: *Stanford Medical School* – pre-reconstructive surgical visualization; *NASA Goddard Flight Center* – ocean temperature and magnetic field modeling; *Stanford Research Institute* – protein binding site modeling; *Mississippi State University* – oceanography model of Sea of Japan; *NASA Ames* – computational fluid dynamic visualization, space shuttle aerodynamics; *Army Corps of Engineers* – visualizing complex waterway designs; *National Center for Supercomputer Applications* – study of galaxy formation.

National research laboratories: *Oak Ridge* – material science visualizations to study the interaction between atoms; *Los Alamos* – visualization for stockpile stewardship; *Pacific Northwest* – data mining tool using metaphors of virtual galaxies; *Sandia* – telepresence for managing nuclear waste.

Industry: *Petronas* (Kuala Lumpur) – off-shore oil platform design; *Ford, Chrysler, BMW, Boeing, Lockheed Martin, Hughes, Fiat* (Italy), *Northrop, Electric Boat, Daimler* (Germany) – computer-aided design of aircraft, ships, boats, and automobiles; *Deneb Robotics* – factory floor simulation; *Fraunhofer* (Stuttgart) – industrial applications; *Matsushita* (Japan) – virtual showroom, equipment design.

Public entertainment & education: *Chicago Museum of Science and Industry* – one of the first permanent VR displays, still in operation after 13 years and over a million patrons; *Infobyte at the Guggenheim SoHo* – virtual reality game set in Italian churches and piazzas; *Walt Disney Epcot Center* – virtual Basilica of St. Francis of Assisi; *Experience Music Project* museum – immersive music environment.

National security: *Naval Research Lab* – virtual sandbox for strategic planning; *US Army Tank Command* – collaborative environments to improve vehicle performance; *Naval Postgraduate School* – student research and education in simulation and modeling; *US Naval Air Warfare Center* – visualization system qualification for deployment.

INVITED PRESENTATIONS & PANELS

Invited speaker for the upcoming IEEE International Workshop on Projector-Camera Systems, New York, June 2006.

Invited presentation. *Displays for Immersive Education and Training*. USC Institute for Creative Technologies. Marina del Rey, California, October 2005.

Panelist. *VR in Entertainment*. 11th International Conference on Human-Computer Interaction. Las Vegas, July 2005.

Panelist. *Bridging the Gap: Divergence Between Procams Research in Industry and Academics*. IEEE International Workshop on Projector-Camera Systems. San Diego, June 2005.

Invited short presentation. *The Sociable Elmo Project: Using Sensing Technologies to Create Social Awareness in Toys*. Third Annual Media X Conference. November 2004.

Panelist. *Research, Development and Investment in Entertainment Technologies and Media Studies Innovation: From the University to Industry Application*. Digital Hollywood. Santa Monica, September 2004.

Invited presentation. Stanford MediaX, *Fisher Price Focus Meeting*, September, 2004.

Invited short presentation. *FIDGET – Further Developments*. Media X Conference, November 2003.

Invited presentation. *A Rapid Structured Light Scanner - The Zebra*. Graphics Lunch Series. Stanford University, April 2003.

Panelist. *The Future of Stereoscopic Imaging*, Stereoscopic Displays and Virtual Reality Systems X, San Jose, January 2003.

Invited short presentation. *Force Input Device for Graphical Environment Tweaking – FIDGET*. First Annual Media X Conference. Nov 16, 2002.

Panelist. *VR Goes Bezerkely!* Virtual Systems and Multi-Media, 7th Annual Conference. University of California, Berkeley, 2001.

Invited presentation. *Pixels are Good, Now Put Them to Work*. Terascale Post-Processing Seminar, Center for Applied Scientific Computing. Livermore, California, July 2001.

Invited presentation. *Be There Here: Art & Virtual Reality*. San Francisco Museum of Modern Art, Media Arts Council, March 2001.

Panelist. *The Next Generation: Novel Techniques for Display and Interaction*. IEEE VR '99. Houston, March 1999.

Invited presentation. SRI Seminar. Menlo Park, California, May 1998.

Panelist. *Usability is from Venus, Virtual Environments are from Mars: User-Centered Evaluation Methodology in a New Medium*. Virtual Reality Annual International Symposium, Atlanta, Georgia, March 1998.

Invited lecture. *The Entrepreneurial Engineer*. Stanford University Electrical Engineering 203. January 1998.

Invited private presentation. *Potential of VR Instrumentation for the Multimedia Super Corridor*. For the Prime Minister of Malaysia, Dato' Seri Dr. Mahathir Bin Mohamad, New York, 1997.

Panelist. *The Future of Virtual Reality: Head Mounted Displays Versus Spatially Immersive Displays*. SIGGRAPH 97, August 1997.

Keynote speaker. *Immersion*. Virtual Reality WorldWide Conference. Santa Clara, April 1997.

Invited speaker. *Interface Between Human and Technology = Immersion*. VERGE Conference at the Exploratorium, Virtual Reality Education Foundation, Inc. San Francisco, February 1997.

Invited participant. *Experiential Computing and Virtual Reality*. Committee on Modeling and Simulation: Linking Entertainment and Defense Conference, Computer Science and Telecommunications Board, National Research Council, October 1996.

Featured panelist. *Virtual Reality in the Real World*. Architectural, Engineering, and Construction Systems Conference, June 1996.

Panelist. *The Design Process and New Horizons in Virtual Reality*. IEEE VRAIS, April 1996

Invited presentation. *Virtual Reality Issues Related to Visualization and Drug Development*. Computer-Aided Drug Development, Cambridge Healthtech Institute. San Francisco, April 1995.

Invited Speaker. *Head-Coupled Displays*. Virtual Reality 94. San Jose, May 1994.

Invited presentation. *Virtual Reality – It's Not Just for Demos Any More*. Dartmouth College, October 1993.

Invited presentation. *BOOM2C*. Industrial Virtual Reality Conference. Tokyo, Japan, June 1993.

Invited participant. First Small Business Retreat on the Future Directions of Human-Computer Interaction. Santa Fe, New Mexico, May 1993.

Invited demonstration. *Boom 3C*. President Bill Clinton and Vice President Al Gore at Silicon Graphics, Inc. Mountain View, California, February 1993.

Invited presentation. *Design and Virtual Environments*. Second International Conference on Artificial Reality & Tele-existence. Tokyo, Japan, July 1992.

Panelist. *TechnoStress*. Human Factors Society 35th Annual Meeting, San Francisco, September 1991.

Invited presentation. *Design and Virtual Environments*. Stanford Design Conference. Palo Alto, July 1991.

Invited presentation. *Virtual Worlds: Real Challenges*. SRI International, David Sarnoff Research Center. Palo Alto, June 1991.

Invited participant. *International Workshop on Virtual Reality*. Esalen Institute. Big Sur, June 1991.

Invited speaker. *In Cyberspace*. Culture Board of the City of Munich, German Museum. Munich, Germany, April 1991.

Invited presentation. *The Medium of Virtual Reality*. Computer Game Developers' Conference. San Jose, March 1991

Invited lecture. *VR is a Metaphor*. Center for Design Research seminar, Stanford University. October 1990.

PROFESSIONAL ACTIVITIES

E-Learning Committee, Interactive Media Division, 2006.

Chair, Thesis Policy Committee, Interactive Media Division, 2005-present.

Workshop Organizer. Emerging Display Technologies New System Applications: From Images to Sensing, Interaction, and Enhancement. IEEE VR, 2005 & 2006.

Paper Reviewer. Computer Human Interface Conference, 2006.

Program Committee. IEEE International Workshop on Projector-Camera Systems. New York, 2006.

Chair. The Engineering Reality of Virtual Reality Conference, SPIE. 1994-present.

National Science Foundation Review Panel, Graphics and Visualization, 2005

Stanford Product Realization Lab Strategy Planning Committee, 2005

Paper Reviewer. IEEE Transactions on Visualization and Computer Graphics, 2005.

Paper Reviewer. SIGGRAPH 2005.

Reviewer. Emerging Technologies Jury, SIGGRAPH 2005.

Panel Moderator. Emerging Technologies, SIGGRAPH 2005.

Scientific Committee. Virtual Concept 2005 Conference, 2005.

Reviewer. Eurographics Workshop in Virtual Environments and Immersive Projection Technology Workshop, 2005.

Reviewer, IEEE and ACM International Symposium on Mixed and Augmented Reality, 2005.

Proposal Review Committee. Stanford Media X Grants, 2004

Program Committee, Immersive Projection Technology Workshop, 2000.

Review Committee. International Conference on Virtual Systems and MultiMedia, 1999.

Program Committee. IEEE VR, 1999 & 2000.

Paper Reviewer and Program Committee. Virtual Reality Annual International Symposium, 1996, 1997 & 1998.

Panel Chair. Virtual Environment Research and Applications at NASA Ames. Virtual Universe Conference, 1997.

Panels Committee and Jury. SIGGRAPH 1995.

Co-Chair. Symposium on Research Frontiers in Virtual Reality Program Committee, IEEE Visualization 1993.

Current & Recent Advisory Roles:

Advisor. *Ambidextrous Magazine*, the journal of the Stanford University d.school for the larger design community.

Advisory Committee. University of North Carolina, Chapel Hill's Science and Technology Center proposal to National Science Foundation, 2004.

Advisor, *Ausim Inc.*

Advisor, *Limcom, Inc.*

Advisor, *LibSyn, Inc.*

Consultant, *Intuitive Surgical, Inc.*

Advisor, *Visual Acuity, Ltd.*

Memberships:

- Institute of Electrical and Electronic Engineering (IEEE)
- International Society for Optical Engineering (SPIE)
- Association for Computing Machinery (ACM): Special Interest Group: Graphics (SIGGRAPH)
- Society for Information Displays (SID)
- Microscopical Society of Southern California

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Biography

Mark Bolas is a research scientist, artist, and designer of perceptually focused computer systems used to augment perception, agency, and intelligence. He is a Visiting Associate Professor in the Interactive Media Division, School of Cinema and Television at the University of Southern California, and Chairman of Fakespace Labs in Mountain View, California.

Mark's 1988-89 thesis work *Design and Virtual Environments* was done under the direction of Rolf Faste in Stanford's design program and Scott Fisher at NASA Ames. It was among the first efforts to map the breadth of virtual reality as a new medium. This effort provided the foundation for a number of seminal observations that led Mark toward a basic model for immersive experience design, concluding that the medium's power to deeply transport a user is closely tied to finding an appropriate balance between realism and abstraction.

Mark co-founded Fakespace Inc. to build instrumentation for research labs to explore virtual reality and grow the emerging field. His work with Ian McDowall resulted in the invention of display and interaction tools used by most VR research and development centers around the world. The Boom, the Pinch, the Rave, and VLIB software are just a few examples of the tools they created that changed design and research in many areas: automotive and aerospace design, oil and gas exploration, molecular modeling and data visualization, to name a few. Fakespace products have been used to design cars at Chrysler, bring immersion to software environments like Catia, allow our national laboratories and research centers around the world to dig a bit deeper in visualizing their data, and educate patrons at the Chicago Museum of Science and Industry.

Mark continues to explore the nature of virtual reality through the design of immersive experiences. His work focuses on creating virtual environments and transducers that fully engage one's perception and cognition, and create a visceral memory of the experience. His work has been exhibited in many venues including six Emerging Technology exhibits at Siggraph starting in 1991 with *Flatlands*, which used the illusion of perspective to transform a sculpture into *Mondrian's Composition with Line, 1918*; the music-driven worlds of *Vacuii* and *StillLife* created with Christian Greuel and Niko Bolas; and the invisibly structured *Snares Illumination* created with Perry Hoberman and Ian McDowall.

Mark has been a professor at Stanford University and Keio University, exploring tangible interfaces, augmented reality, and computational illumination. These projects have explored context sensitive audio interfaces, socially interactive toys, augmented reality, confocal illumination, and mobile phone web logging. Mark has co-chaired *The Engineering Reality of Virtual Reality* conference at SPIE for over 10 years. He holds twenty patents with his co-inventors at Fakespace and has won many significant awards for his products and designs.

Mark's cross-disciplinary work and teaching have led him to understand that design is a conceptual discipline that can be taught independently of the field to which it's being applied. It is a discipline or process that transcends the specific implementation details of the science or art through which it is being learned or practiced. Developing the implications of this theoretical model of design is now part of his ongoing research and teaching at USC.

(27) Marc Bola. (2) Anfernee Dijksteel. Midfielder. (22) George Saville. (16) Jonathan Howson. (8) Adam Clayton. (17) Paddy McNair. Name in Home Country / Full Name: Marc Joel Bola. Date of Birth: Dec 9, 1997. Place of Birth: London. Age: 21. Mark T. Bolas. USC Institute for Creative Technologies. SPIE Involvement: Retrieving Data, please wait CONTACT DETAILS. Sign In. Sign In to send a private message or view contact details. Upcoming Presentations Most Recent | Show All.