

Mark Lucente

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experience

Zebra Imaging, Inc. (Austin, TX USA) www.zebraimaging.com **2005 - present**

Program Manager; Chief Scientist: Leading creation of dynamic 3D holographic display technology and its productization. Responsible for \$4-8M each year, 12+ engineers and support staff, external customer/partner relationships. Technologies include modulation (e.g., LED, liquid crystal), custom optics, computer graphics and high-end computation hardware/software. Applications include geospatial visualization (e.g., battle-space management), scientific visualization (e.g., geoseismic), financial analysis, multi-player online gaming.

CLP Research Institute, Ltd. (Hong Kong) www.clpgroup.com **2002 - 2005**

Technology Strategist: Developed and managed research program focused on customer-side technologies for CLP Holdings, a group of energy services and investment companies. Created strategic partnerships with industry and academia to transfer technologies for renewable energy, energy efficiency, and intelligent infrastructure.

RestaurantTrade, Inc. (New York, NY USA) www.averro.com **2001 - 2002**

Vice President of Technology Operations: Led 20-person team to create software products that provide internetworked business intelligence and data-mining services for hospitality industry customers; led deployment to customers. 2002 revenue: US\$4mil.

Soliloquy, Inc. (New York, NY) www.soliloquy.com **1999 - 2001**

Chief Technology Officer: Created start-up to automate online self-service. Built 45-person organization that generated rapid results: designed and created interactive software products; deployed products on clients' websites (Shop@AOL, buy.com, CNET, etc.); developed advanced technologies incorporating natural language understanding, artificial intelligence and statistical analytics. Managed team that included 12 Ph.D.'s. Corporate management included marketing, strategy, fund-raising. Member of the Board of Directors.

IBM Corp. – T. J. Watson Research Center (Yorktown Heights, NY) **1995 - 1999**

Research Staff Member: 3D interactivity. Led team to create multimodal systems/devices that interact with user's speech, gestures and other sensory inputs, employing speech recognition, machine vision, eye tracking, and other sensing/biometric technologies. Transferred technology to IBM product divisions; applications: visualization, entertainment, education and home/mobile information. Co-authored IBM strategies for natural user interface, pervasive computing and 3D imaging. Interacted with customers (Chevron, Cable & Wireless, Nickelodeon, Disney, Edmark, P&G, Boeing), IBM Board of Directors, and global media (CNN, ABC, USA Today, WSJ, Comdex).

MIT Media Laboratory (Cambridge, MA) **1989 - 1995**

Postdoctoral Research Fellow; Research Assistant: Created first-ever interactive electronic holographic 3D imaging system. Invented essential computation/encoding algorithms to achieve interactive speeds and bandwidth compression. Technologies: spatial light modulation based on acousto-optics, magneto-optics, liquid crystals, nonlinear optics

and micro-mirror MEMS; iterative numerical simulation and optimization; digital video. Applications: biological/medical imaging, geoseismic visualization, computer-aided design.

MIT Lincoln Laboratory – Optical Communication Group (Lexington, MA) 1987 - 1989

Research Assistant: High-bandwidth optical communication systems and semiconductor device physics. Analyzed excited carrier dynamics in semiconductor lasers used as optical transmitters. Applied nonlinear optics.

MIT Research Laboratory of Electronics (Cambridge, MA) 1985 - 1987

Research Assistant: 3D imaging of biological tissue using ultrashort pulses of laser light. Applied ion lasers, solid state lasers, and colliding-pulse mode-locked dye lasers.

education

Ph.D. Massachusetts Institute of Technology (Cambridge, MA USA) 1994

Electrical Engineering and Computer Science

Thesis: “Diffraction-specific fringe computation for electro-holography”

Areas: photonics, optical modulation; numerical simulation algorithms; digital media.

S.M. Massachusetts Institute of Technology 1989

Electrical Engineering and Computer Science

Thesis: “Four-wave mixing in a broad-area semiconductor laser”

Areas: optical communication; solid-state physics, quantum physics.

S.B. Massachusetts Institute of Technology 1986

Electrical Engineering and Computer Science

Thesis: “Femtosecond optical ranging of biological systems”

Areas: electromagnetics, Fourier optics; lasers; economics; architecture.

teaching

Columbia University – Department of Computer Science (New York, NY) 1996

Adjunct Assistant Professor: Created and taught novel course in 3D imaging technology.

MIT – Electrical Engineering and Computer Science 1989 - 1994

Research Assistant: Taught holographic imaging; synthetic holography; and spatial imaging. Conducted laboratory sessions, tutorials and some lectures.

MIT – Electrical Engineering and Computer Science 1986 - 1987

Teaching Assistant for modern optics laboratory. Conducted laboratory sessions, tutorials.

invited talks, panels, etc.:

OSA Frontiers in Optics, Optics in Information Science: 2007-2008 “Optics for Virtual/Mixed Environments and Interactivity” Theme Chair; 2006 “Optics for Multimedia & Immersive Environments” Co-Chair.

DARPA Tech 2007: Highly acclaimed demonstration of interactive 3D holographic display technology; part of STO exhibit.

CLP Science & Technology Colloquium: “New materials for photovoltaics & illumination”, CLP Holdings, Ltd., Hong Kong, 2004.

MIDM HKU lecture: “Electricity distribution and renewables in a dense urban setting infrastructure”, Master of Interdisciplinary Design & Management Programme, University of Hong Kong Department of Architecture, 2003.

Imperial College IIS Colloquium: “Interactivity and intelligence: natural, visual, commercial”, Imperial College of Science, Technology and Medicine, London, U.K., Department of Electrical & Electronic Engineering, Intelligent and Interactive Systems Group.

GIS Forum: “e-Learning: MIT OpenCourseWare Project”, The Open Group Japan, (Tokyo, Japan), 2003.

ACM SIGCHI ‘01 panel: “Panel: Is ignorance bliss?: informed consent online”, (Seattle, WA, March 2001) Special Interest Group on Computer-Human Interaction; with Batya Friedman, John C. Thomas, Mark Ackerman, Nancy Willard, Ulrike Lechner.

New York Academy of Sciences lecture: “e-Commerce, conversations and customers”, 2000.

TED8 panel: “People and Information”, (Monterey, CA 1998) Technology, Entertainment, Design; with Walt Mossberg, Ann Winblad, Kim Polese, Janet Baker.

SIGGRAPH ‘98 panel: “Interfaces for Humans: Natural Interaction, Tangible Data, and Beyond”, (Orlando, FL, 1998 July); with Michael Harris, Bill Buxton, William Freeman, Hiroshi Ishii, Michael Sinclair

GIS Forum: “Internet2: the next generation of internetworking”, The Open Group Japan, (New York), 1998.

MIT EECS Colloquium: “Computational bandwidth reduction for interactive 3D holography”, Department of Electrical Engineering and Computer Science, 1995.

Gordon Research Conference: “Interactive 3D holographic imaging using bandwidth compression algorithms”, Optical Signal Processing and Holography, 1995.

TI CRL Colloquium: “3D holographic imaging with DMDs”, Texas Instruments Central Research Laboratory, 1993.

Lasers and Electro-optics Society of the IEEE invited lecture: “Electro-holographic displays”, 1992.

publications on holography:

- M. Lucente, “Interactive holographic displays: the first 10 years”, book chapter in Holography. The first 50 years, (Springer Series in Optical Sciences Vol. 78), Springer-Verlag (Berlin), editor J.-M. Fournier, ISBN #3540670750, 2004.
- M. Lucente, “Interactive three-dimensional holographic displays: seeing the future in depth”, *ACM SIGGRAPH Computer Graphics*, vol. 31, #2, p. 63, May 1997. Invited paper.
- E. A. Sholler, F. M. Meyer, M. Lucente and D. G. Hopper, “True 3-D displays for avionics and mission crewstations”, *Cockpit Displays IV, Proc. of the SPIE*, vol. 3057, #40, Apr. 1997.
- M. Lucente, “Computational holographic bandwidth compression”, *IBM Systems Journal*, vol. 35, #3&4, p. 349, Oct. 1996.

- M. Lucente, "Holographic bandwidth compression using spatial subsampling", *Optical Engineering*, vol. 35, #6, p. 1529, June 1996.
- M. Lucente and T. A. Galyean, "Rendering interactive holographic images", *Proceedings of SIGGRAPH 95* (Los Angeles, CA, Aug. 1995). In *Computer Graphics Proceedings, Annual Conference Series, 1995, ACM SIGGRAPH*, p. 387.
- M. Lucente, R. Pappu, C. J. Sparrell, and S. A. Benton, "Progress in holographic video with the acousto-optical modulator display", *International Conference on Applications of Optical Holography, Proc. SPIE Int. Soc. Opt. Eng.*, vol. 2577, #2, 1995.
- J. A. Watlington, M. Lucente, C. J. Sparrell, V. M. Bove, Jr., and I. Tamitani. "A hardware architecture for rapid generation of electro-holographic fringe patterns", *Practical Holography IX, Proc. SPIE Int. Soc. Opt. Eng.* vol. 2406, #23, p. 172, 1995.
- M. Lucente, S. A. Benton and P. St.Hilaire, "Electronic holography: the newest". *International Symposium on Three Dimensional Imaging and Holography*, Osaka, Japan, p. 107, 1994. Invited.
- M. Lucente, "Diffraction-Specific Fringe Computation for Electro-Holography", *Ph. D. Thesis*, Dept. of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 1994 Sept.
- M. Lucente, "Interactive computation of holograms using a look-up table", *Journal of Electronic Imaging*, vol. 2, #1, p. 28, Jan 1993.
- P. St.Hilaire, S. A. Benton, M. Lucente, J. D. Sutter and W. J. Plesniak, "Advances in holographic video", *Practical Holography VII, Proc. SPIE Int. Soc. Opt. Eng.*, vol. 1914, #27, 1993.
- P. St.Hilaire, S. A. Benton and M. Lucente, "Synthetic aperture holography: a novel approach to three-dimensional displays", *Journal of the Optical Society of America A*, vol. 9, #11, p. 1969, 1992.
- S. A. Benton and M. Lucente, "Interactive computation of display holograms", *Proc. of the 10th International Conference of the Computer Graphics Society on Visual Computing*, p. 247, 1992.
- M. Lucente, "Optimization of hologram computation for real-time display", *Practical Holography VI, Proc. SPIE Int. Soc. Opt. Eng.*, vol. 1667, #04, p. 32, 1992.
- P. St.Hilaire, S. A. Benton, M. Lucente and P. M. Hubel, "Color images with the MIT holographic video display", *Practical Holography VI, Proc. SPIE Int. Soc. Opt. Eng.*, vol. 1667, #33, p. 73, 1992.
- M. Lucente, P. St.Hilaire, S. A. Benton, et al., "New approaches to holographic video", *Holographics International '92, Proc. SPIE Int. Soc. Opt. Eng.* vol. 1732 #48, p. 377, 1992.
- P. St.Hilaire, S. A. Benton, M. Lucente, J. Underkoffler and H. Yoshikawa, "Real-time holographic display: improvements using a multichannel acousto-optic modulator and holographic optical elements", *Practical Holography V, Proc. SPIE Int. Soc. Opt. Eng.*, vol. 1461, p. 254, 1991.
- P. St.Hilaire, S. A. Benton, M. Lucente, M. L. Jepsen, J. Kollin, et al., "Electronic display system for computational holography", *Practical Holography IV, Proc. SPIE Int. Soc. Opt. Eng.* vol. 1212, p. 174, 1990.

publications on nonlinear/semiconductor photonics:

- M. Lucente, E.S. Kintzer, S.B. Alexander, J.G. Fujimoto and V.W.S. Chan, "Coherent optical communication with injection-locked high-power semiconductor laser array", *Electronics Letters*, vol. 25, #17, p. 1112, 17 Aug. 1989.
- M. Lucente, G.M. Carter and J.G. Fujimoto, "Nonlinear mixing and phase conjugation in broad-area diode lasers", *Applied Physics Letters*, vol. 53, #6, p. 467, 8 Aug. 1988.
- M. Lucente, J.G. Fujimoto and G.M. Carter, "Spatial and Frequency Dependence of Four-Wave Mixing in a Broad-Area Diode Laser", *Applied Physics Letters*, vol. 53, #20, p. 1897, 14 Nov. 1988.

publications on intelligent interaction & energy:

- M. Lucente, "Conversational interfaces for e-commerce applications", *Communications of the ACM (CACM)*, vol. 43, #9, p. 59, Sept. 2000. Invited paper: natural language conversations via websites.
- M. Lucente, "Visualization Space: a testbed for deviceless multimodal user interface", *Intelligent Environments Symposium, AAAI Spring Symposium Series* (Stanford University), 1998. Chaired session.
- M. Lucente, "A response to 'Some thoughts on the state of the technical science in 2012'", *Proceedings of the IEEE*, vol. 86, #10, p. 2108, Oct.1998. Invited predictive paper: a glimpse of the world 50 years in the future.
- U.T. Mello, M. Lucente and T. Jackman, "Using visualization and parallel computing for interactive reservoir characterization", *Proc. of 1997 Offshore Technology* (Houston, TX), May 1997.
- G. Kendall, M. Lucente and C.C. Ngan, "Electrical engineering for 21st century power systems", *ICEE (International Conference on Electrical Engineering) 2003*, (Hong Kong), 2003.

patents: 1 (natural language); 2 pending (dynamic holographic imaging).

honors: Sigma Xi, Tau Beta Pi, Eta Kappa Nu.

memberships

Optical Society of America (OSA),
American Association for the Advancement of Science (AAAS),
Institute of Electrical and Electronics Engineers (IEEE),
Association for Computing Machinery (ACM).

Citizen of U.S.A.