

Henry FUCHS

Federico Gil Distinguished Professor of Computer Science,
Adjunct Professor in Department of Biomedical Engineering
University of North Carolina at Chapel Hill



fuchs@cs.unc.edu
Office Phone: 919-962-1911

Citizenship: United States of America

Education

1975	Ph.D Computer Science, University of Utah
1970	B.A. Information and Computer Science, University of California at Santa Cruz

Position(s) Held

1978- present	UNC Chapel Hill Adjunct Professor of Biomedical Engineering (2000-) Federico Gil Distinguished Professor (1988-) Adjunct Professor of Radiation Oncology (1988-2008) Professor of Computer Science (1983-) Associate Professor of Computer Science (1978-83).
1975-82	University of Texas at Dallas Adjunct Associate Professor of Medical Computer Science (Southwestern Medical School, The University of Texas Health Science Center) (1979-82) Adjunct Associate Professor of Programs in Mathematical Sciences (1978-82) Computer Science Coordinator of Programs in Mathematical Sciences (1977-78) Assistant Professor of Programs in Mathematical Sciences (1975-78).
1970-74	University of Utah Research Assistant and Teaching Fellow, Computer Science Department
1970-	Consultant or Member of Technical Technical Advisory Board, Mersive Technologies External Advisory Board, Harvard Neuroimage Analysis Center Former consulting and advisory board memberships: Mitsubishi Electric Research Lab,

	Thomson, Digital Equipment Corp., Fraunhofer CRCG, General Electric, Lockheed-Georgia, RAND Corp., Research Triangle Institute, ShoGraphics, Stellar Computer, Xerox Palo Alto Research Center, others.
1968-74	Engineer and Consultant, Image Processing Laboratory of Jet Propulsion Laboratory of the California Institute of Technology (summers)
1968-70	Programmer and Consultant, Computer Center, University of California at Santa Cruz

Professional Activities (Selected)

1. Member, External Advisory Board, Harvard's Neuroimage Analysis Center, 2004-present.
2. Member, External Advisory Board, Mersive Technologies. ~2008-present.
3. Member, Steering Committee, ISMAR, International Symposium on Mixed and Augmented Realities, 2008 - present
4. Member, Dept. of Energy Blue Ribbon Panel for Evaluation of ASCI Program, 1998-1999.
5. UNC Delegate, New Vistas in Transatlantic Science and Tech Cooperation, Washington D.C., 1998.
6. Member, Information Science and Technology Study Group, Advanced Research Projects Agency, 1994.
7. Member, Computer Science and Telecommunications Board, National Research Council, 1993-1997.
8. Co-Director (with Gary Bishop), NSF Invitational Workshop on Research Directions in Virtual Environments, Chapel Hill, NC, March 1992.
9. Co-Director (with K.H. Höhne and Steve Pizer), NATO Advanced Research Workshop in 3D Imaging in Medicine, Travemünde, Germany, June 1990.
10. Chairman, 1986 Workshop on Interactive 3D Graphics, UNC Chapel Hill, Oct. 1986.

11. Distinguished Visitor, IEEE Computer Society, 1985-1986.
12. Chairman, 1985 Chapel Hill Conference on VLSI, May 1985. (7th Annual. All previous ones held at Caltech and MIT). Conference now called S.I.S.
13. Chairman, Tutorial on VLSI and Computer Graphics, SIGGRAPH'83, SIGGRAPH'84, SIGGRAPH'85.
14. Associate Editor, *ACM Transactions on Graphics*, 1983-1988.
15. Guest Editor, *ACM Transactions on Graphics*, Vol.1, No. 1, January 1982.
16. Technical Program Chairman, SIGGRAPH'81.
17. Member, Advisory Committee, National Science Foundation, Division of Microelectronic Information Processing Systems.
18. Member, Special Study Sections, National Institutes of Health; Review Panels and Site Visit Committees, National Science Foundation: 1978-

Honors

1. Fellow, the American Academy of Arts and Sciences, 1997
2. Member, the National Academy of Engineering, 1997
3. Satava Award, Medicine Meets Virtual Reality Conferences, 1997. "For your commitment to the transformation of medicine through visionary applications of interactive technology."
4. ACM Fellow, November 1994. For distinguished contributions in the field of computer graphics.
5. Computer Graphics Achievement Award, ACM/SIGGRAPH, 1992. "In recognition of his outstanding contribution to high-performance, parallel display architecture."
6. National Computer Graphics Association Academic Award, NCGA, 1992. "For his outstanding leadership in the development and promotion of computer graphics applications in the academic community."

Program Committee Memberships (Selected)

1. ACM-SIGGRAPH (1979, 1980, 1981, 1985-1992, 1998-2001, 2005) Annual Conferences on Computer Graphics and Interactive Techniques
2. Symposium on Interactive 3D Graphics, 2001 in Chapel Hill, N.C.
3. Symposium on Interactive 3D Graphics, 1990 at Snowbird, Utah
4. Workshop on Volume Visualization, 1989 at UNC-Chapel Hill
5. Conference on Advanced Research in VLSI (1986 at MIT, 1987 at Stanford, 1988 at MIT, 1989 at Caltech)
6. EUROGRAPHICS, 1997
7. International Electronic Image Week (CESTA, SIGGRAPH) FRANCE (1986 and 1987)
8. Computer Graphics International (1987 in Japan; 1988 in Switzerland)

Publications (Reverse chronological order)

171. Maimone, A. and H. Fuchs. "A First Look at a Telepresence System with Room-Sized Real-Time 3D Capture and Large Tracked Display." The 21st International Conference on Artificial Reality and Telexistence (ICAT) (Osaka, Japan, November 28-30, 2011).
170. Burke, C., J. Cullen, A. State, S. Gadi, K. Wilber, R. Michael, A. Bulysheva, A. Pease, M. Mauro, H. Fuchs (2011). "Development of an Animal Model for Radiofrequency Ablation of Primary, Virally Induced Hepatocellular Carcinoma in the Woodchuck." Journal of Vascular and Interventional Radiology, 22(11), p. 1613-1618, November 2011.
169. Maimone, A. and H. Fuchs (2011). "Encumbrance-free Telepresence System with Real-time 3D Capture and Display using Commodity Depth Cameras" International Symposium on Mixed and Augmented Reality (ISMAR) 2011 (Basel, Switzerland, October 26-29, 2011).
168. Lincoln, P., G. Welch, H. Fuchs (2011). "Continual Surface-Based Multi-Projector Blending for Moving Objects." IEEE Virtual Reality 2011 (Singapore, March 19-23, 2011).

167. Peck, T.C., H. Fuchs, M.C. Whitton (2011). "An Evaluation of Navigational Ability Comparing Redirected Free Exploration with Distractors to Walking-in-Place and Joystick Locomotion Interfaces." IEEE Virtual Reality 2011 (Singapore, March 19-23, 2011).
166. Gu Ye, Andrei State, Henry Fuchs (2010). "A Practical Multi-viewer Tabletop Autostereoscopic Display." Proceedings of the International Symposium on Mixed and Augmented Reality (ISMAR) 2010 (Seoul, South Korea, October 13-16, 2010)
165. Peck, T.C., H Fuchs, M C Whitton "Improved Redirection with Distractors: A Large-Scale-Real-Walking Locomotion Interface and its Effect on Navigation in Virtual Environments," IEEE Virtual Reality 2010.
164. Lincoln, P., Welch, G., Nashel, A., State, A., Ilie, A., Fuchs, H. (2010). Animatronic Shader Lamps Avatars. Virtual Reality, Springer London, pp. 10-14.
163. Peck, T.C., H Fuchs, M C Whitton, "Evaluation of Reorientation Techniques and Distractors for Walking in Large Virtual Environments," IEEE Transactions on Visualization and Computer Graphics, pp. 383-394, May/June, 2009.
162. Nashel, A. and H. Fuchs (2009). Random Hole Display: A Non-Uniform Barrier Autostereoscopic Display, In 3DTV Conference: The True Vision - Capture, Transmission and Display of 3D Video, 2009.
161. G. Welch, D. Sonnenwald, H. Fuchs, B. Cairns, K. Mayer-Patel, H. Soderholm, R. Yang, A. State, H. Towles, A. Ilie, M. Ampalam, S. Krishnan, V. Noel, M. Noland, J. Manning. (2009). "3D Medical Collaboration Technology to Enhance Emergency Healthcare." The Journal of Biomedical Discovery and Collaboration 4:4.
160. H. Towles, T. Johnson, H. Fuchs. (2009). Projector Based Displays. The PSI Handbook of Virtual Environments for Training and Education Vol. 2. D. Nicholson, D. Schmorrow and J. Cohn. Westport, Praeger Security International. pp. 63-89.
159. A. Sadagic, G. Welch, C. Basu, C. Darken, R. Kumar, H. Fuchs, H. Cheng, J.-M. Frahm, M. Kolsch, N. Rowe, H. Towles, J. Wachs, A. Lastra. (2009). New Generation of Instrumented Ranges: Enabling Automated Performance Analysis. Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC-2009), Orlando, FL.

158. P. Lincoln, G. Welch, A. Nashel, A. Ilie, A. State, H. Fuchs. (2009). Animatronic Shader Lamps Avatars. 8th IEEE and ACM International Symposium on Mixed and Augmented Reality (ISMAR), Orlando, FL.
157. P. Lincoln, A. Nashel, A. Ilie, H. Towles, G. Welch, H. Fuchs. (2009). Multi-view lenticular display for group teleconferencing. IMMERSCOM 2009, Berkeley, CA.
156. T. Johnson, G. Welch, H. Fuchs, E. LaForce, H. Towles. (2009). A Distributed Cooperative Framework for Continuous Multi-Projector Pose Estimation. IEEE VR 2009, Lafayette, LA, IEEE Computer Society Press.
155. D. Sonnenwald, H. Soderholm, J. Manning MD, B. Cairns MD, H. Fuchs and G. Welch (2008) "Exploring the potential of video technologies for collaboration in emergency medical care. Part I: Information sharing." *Journal of the American Society for Information Science and Technology*, Dec. 2008, vol.59, pp. 2320-2334.
154. D. Sonnenwald, H. Soderholm, J. Manning MD, B. Cairns MD, H. Fuchs and G. Welch (2008) "Exploring the potential of video technologies for collaboration in emergency medical care. Part II: Task performance." *Journal of the American Society for Information Science and Technology*, Dec. 2008, vol.59, pp. 2335-2349.
153. T. Peck, M. Whitton, and H. Fuchs (2008). "Evaluation of reorientation techniques for walking in large virtual environments," in Proceedings of IEEE VR 2008, IEEE Computer Society Press. Reno, NV, March 2008.
152. H. Fuchs, A. State, H. Yang, T. Peck, S.W. Lee, M. Rosenthal (MD/PhD), A. Bulysheva, C. Burke (MD) (2008). Optimizing a Head-Tracked Stereo Display System to Guide Hepatic Tumor Ablation. Proceedings of Medicine Meets Virtual Reality (MMVR) 2008. Studies in Health Technology Informatics 2008, vol. 132, pp. 126-131.
151. T. Johnson, F. Gyarfas, R. Skarbez, H. Towles, and H. Fuchs (2007). "A Personal Surround Environment: Projective Display with Correction for Display Surface Geometry and Extreme Lens Distortion," in Proceedings of IEEE Virtual Reality Conference, VR'07, pp. 147-154.
150. T. Johnson and H. Fuchs (2007). Real-Time Projector Tracking on Complex Geometry Using Ordinary Imagery, Proceedings of CVPR'07, IEEE Conference on Computer Vision and Pattern Recognition (June 2007), pp. 1-8.
149. T. Johnson and H. Fuchs (2007). A Unified Multi-Surface, Multi-Resolution Workspace with Camera-Based Scanning and Projector-Based Illumination,

Eurographics Symposium on Virtual Environments/Immersive Projections
Technology Workshop 2007, Wiemar, Germany, July 2007.

148. F.P. Brooks Jr., J. Cannon-Bowers, H. Fuchs, L. McMillan, and M. Whitton (2006). Virtual Environment Training for Dismounted Teams—Technical Challenges. Human Factors & Medicine Panel Workshop on Virtual Media for Military Applications, U.S. Military Academy, West Point, NY, June 2006, pp. 13–15.
147. P. Quirk, T. Johnson, R. Skarbez, H. Towles, F. Gyarfas, and H. Fuchs (2006). RANSAC-Assisted Display Model Reconstruction for Projective Display, Proceedings of Virtual Reality Conference (March 25-29, 2006), Emerging Display Technologies, p. 318.
146. F. Brooks, J. Cannon-Bowers, H. Fuchs, L. McMillan, and M. Whitton, "A New VE Challenge: Immersive Experiences for Team Training," Proceedings of HCI International 2005, 2005.
145. D. Cotting, M. Naef, M. Gross, and H. Fuchs, "Imperceptible Patterns for Reliable Acquisition of Mixed Reality Environments," International Workshop on Image Analysis for Multimedia Interactive Services, Montreux, Switzerland, 2005.
144. D. Cotting, R. Ziegler, M. Gross, and H. Fuchs, "Adaptive Instant Displays: Continuously Calibrated Projections Using Per-Pixel Light Control," Eurographics, Dublin, Ireland, 2005.
143. A. State, K. P. Keller, and H. Fuchs, (2005). Simulation-Based Design and Rapid Prototyping of a Parallax-Free Orthoscopic Video See-Through Head-Mounted Display. *Proceedings of the Fourth IEEE and ACM International Symposium on Mixed and Augmented Reality* (October 5-8, 2005). IEEE Computer Society, Washington, DC, pp. 28-31.
142. G. Welch, R. Yang, S. Becker, A. Ilie, D. Russo, J. Funaro, A. State, K.-L. Low, A. Lastra, H. Towles, M. D. Bruce Cairns, H. Fuchs, and A. v. Dam, "Immersive Electronic Books for Surgical Training," *IEEE Multimedia*, vol. 12, pp. 22-35, 2005.
141. D. Cotting, M. Naef, M. Gross, and H. Fuchs, "Embedding Imperceptible Patterns into Projected Images for Simultaneous Acquisition and Display," International Symposium on Mixed and Augmented Reality, Arlington, VA USA, 2004.
140. A. Ilie, K.-L. Low, G. Welch, A. Lastra, H. Fuchs, and B. Cairns, "Combining Head-Mounted and Projector-Based Displays for Surgical Training," *Teleoperators and Virtual Environments*, vol. 13, 2004.

139. G. Welch, H. Fuchs, B. Cairns, K. Mayer-Patel, D. Sonnenwald, R. Yang, A. State, H. Towles, A. Ilie, M. Ampalam, S. Krishnan, H. Maurin, V. Noel, and M. Noland, Remote 3D Medical Consultation. Chapter in BROADMED: 1st IEEE/CreateNet International Conference on Telemedicine over Broadband and Wireless Networks. (Boston: Omnipress 2005), pp. 103-110.
138. W.-C. Chen, L. Nyland, A. Lastra, and H. Fuchs, "Acquisition of Large-Scale Surface Light Fields," in *Proceedings of the SIGGRAPH 2003 conference on Sketches & applications: in conjunction with the 30th annual conference on Computer graphics and interactive techniques*. San Diego, California: ACM Press, 2003, pp. 1-1.
137. N. Kelshikar, X. Zabulis, J. Mulligan, K. Daniilidis, V. Sawant, S. Sinha, T. Sparks, S. Larsen, H. Towles, K. Mayer-Patel, H. Fuchs, J. Urbanic, K. Benninger, R. Reddy, and G. Huntoon, "Real-time Terascale Implementation of Tele-immersion," International Conference on Computation Science 2003, Melbourne, Australia, 2003.
136. S.-U. Kum, K. Mayer-Patel, and H. Fuchs, "Real-time Compression for Dynamic 3D Environments," in *Proceedings of the Eleventh ACM International Conference on Multimedia*. Berkeley, CA: ACM Press, 2003, pp. 185-194.
135. A. Raij, G. Gill, A. Majumder, H. Towles, and H. Fuchs, "PixelFlex2: A Comprehensive, Automatic, Casually-Aligned Multi-Projector Display," IEEE International Workshop on Projector-Camera Systems (PROCAMS-2003), Nice, France, 2003.
134. A. State, K. Keller, M. Rosenthal, H. Yang, J. Ackerman, and H. Fuchs, "Stereo Imagery from the UNC Augmented Reality System for Breast Biopsy Guidance," Medicine Meets Virtual Reality (MMVR), Newport Beach, CA, 2003.
133. J. Ackerman, K. Keller, and H. Fuchs, "Surface Reconstruction of Abdominal Organs Using Laparoscopic Structured Light for Augmented Reality Applications," Electronic Imaging 2002 - Photonics West, 2002.
132. M. Rosenthal, A. State, J. Lee, G. Hirota, J. Ackerman, K. Keller, E. D. Pisano, M. Jiroutek, K. Muller, and H. Fuchs, "Augmented Reality Guidance for Needle Biopsies: An Initial Randomized, Controlled Trial in Phantoms," *Medical Image Analysis*, vol. 6, pp. 313-320, 2002.
131. H. Towles, W.-C. Chen, R. Yang, S.-U. Kum, H. Fuchs, N. Kelshikar, J. Mulligan, K. Daniilidis, L. Holden, B. Zeleznik, A. Sadagic, and J. Lanier, "3D Tele-Collaboration Over Internet2," International Workshop on Immersive Telepresence (ITP2002), Juan Les Pins, France, 2002.

130. A. van Dam, H. Fuchs, S. Becker, L. Holden, A. Ilie, K.-L. Low, A. M. Spalter, R. Yang, and G. Welch, "Immersive Electronic Books for Teaching Surgical Procedures," Pre-ICAT CREST Symposium on Telecommunication, Teleimmersion, and Telexistence, Tokyo, Japan, 2002.
129. R. Yang, C. Kurashima, A. Nashel, A. Lastra, and H. Fuchs, "Creating Adaptive Views for Group Video Teleconferencing -- An Image-Based Approach," International Workshop on Immersive Telepresence (ITP2002), Juan Les Pins, France, 2002.
128. D. Bandyopadhyay, R. Raskar, and H. Fuchs, "Dynamic Shader Lamps: Painting on Real Objects," International Symposium on Augmented Reality (ISAR 2001), New York City, NY, 2001.
127. H. Fuchs, "Immersion and Tele-Immersion in the Office of the Future," Proceedings of Immersive Projection Technology and Eurographics Virtual Environment 2001 (IPT/EGVE), Stuttgart, Germany, 2001.
126. H. Fuchs, "Omnidirectional Vision and Tele-Presence," International Conference on Advanced Robotics 2001 Workshop (ICAR), Budapest, Hungary, 2001.
125. G. Hirota, S. Fisher, C. Lee, A. State, and H. Fuchs, "An Implicit Finite Element Method for Elastic Solids in Contact," Computer Animation 2001, Seoul, South Korea, 2001.
124. K.-L. Low, G. Welch, A. Lastra, and H. Fuchs, "Life-Sized Projector-Based Dioramas," ACM Symposium on Virtual Reality Software and Technology, Banff, Alberta, Canada, 2001.
123. L. S. Nyland, A. Lastra, D. K. McAllister, V. Popescu, C. Mccue, and H. Fuchs, "Capturing, Processing, and Rendering Real-World Scenes," *Videometrics and Optical Methods for 3D Shape Measurement Techniques, Electronic Imaging Photonics*, 2001.
122. M. Rosenthal, A. State, J. Lee, G. Hirota, J. Ackerman, K. Keller, E. Pisano, M. Jiroutek, K. Muller, and H. Fuchs, "Augmented Reality Guidance for Needle Biopsies: A Randomized, Controlled Trial in Phantoms," Medical Image Computing and Computer-Assisted Intervention (MICCAI), Utrecht, The Netherlands, 2001.
121. M. Rosenthal, S. Weeks, S. Aylward, E. Bullitt, and H. Fuchs, "Intraoperative Tracking of Anatomical Structures Using Fluoroscopy and a Vascular Balloon Catheter," Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2001, Utrecht, The Netherlands, 2001.

120. A. State, J. Ackerman, G. Hirota, J. Lee, and H. Fuchs, "Dynamic Virtual Convergence for Video See-through Head-mounted Displays: Maintaining Maximum Stereo Overlap throughout a Close-range Work Space," International Symposium on Augmented Reality (ISAR) 2001, New York, NY, 2001.
119. W.-C. Chen, H. Towles, L. Nyland, G. Welch, and H. Fuchs, "Toward a Compelling Sensation of Telepresence: Demonstrating a Portal to a Distant (Static) Office," IEEE Visualization 2000, Salt Lake City, UT, 2000.
118. G. Welch, H. Fuchs, R. Raskar, M. Brown, and H. Towles, "Projected Imagery In Your Office in the Future," *IEEE Computer Graphics and Applications*, vol. 20, pp. 62-67, 2000.
117. J. Rolland and H. Fuchs (2000). Optical versus Video See-Through Head-Mounted Displays in Medical Visualization. *Presence*, June 2000, vol. 9, no. 3, pp. 287-309.
116. S. Feiner, H. Fuchs, T. Kanade, G. Klinker, P. Milgram, and H. Tamura, "Mixed reality: where real and virtual worlds meet " in *ACM SIGGRAPH 99 Conference abstracts and applications* Los Angeles, California, United States ACM Press, 1999 .
115. H. Fuchs and J. Ackerman, "Displays for Augmented Reality: Historical Remarks and Future Prospects," 1st International Symposium on Mixed Reality (ISMR'99), Yokohama, Japan, 1999.
114. A. Majumder, W. B. Seales, M. Gopi, and H. Fuchs, "Immersive Teleconferencing: A New Algorithm to Generate Seamless Panoramic Video Imagery," Seventh ACM International Conference on Multimedia, 1999.
113. L. Nyland, D. McAllister, V. Popescu, C. McCue, A. Lastra, P. Rademacher, M. Oliveira, G. Bishop, G. Meenakshisundaram, M. Cutts, and H. Fuchs, "The Impact of Dense Range Data on Computer Graphics," Multi-View Modeling and Analysis Workshop (MVIEW99), Fort Collins, CO, 1999.
112. R. Raskar, M. S. Brown, R. Yang, W.-C. Chen, G. Welch, H. Towles, B. Seales, and H. Fuchs, "Multi-Projector Displays Using Camera-Based Registration," IEEE Visualization 99, San Fransisco, CA, 1999.
111. R. Yang, M. S. Brown, W. B. Seales, and H. Fuchs, "Geometrically correct imagery for teleconferencing," ACM International Conference on Multimedia, Orlando, FL, 1999.
110. R. Yang, M. S. Brown, W. B. Seales, and H. Fuchs, "Registering, Integrating, and Building CAD Models from Range Data," Seventh ACM International Conference on Multimedia, 1999.

109. Pisano, E.D. (MD), H. Fuchs, A.State, M. Livingston, G. Hitaro, W. Garrett, M. Whitton. (1998). [Augmented Reality Applied to Ultrasound-guided Breast Cyst Aspiration](#). *Breast Disease*, 1998, vol. 10, nos. 3-4, pp.
108. M. Bloomenthal, R. Zeleznik, R. Fish, L. Holden, A. Forsberg, R. Riesenfeld, M. Cutts, S. Drake, H. Fuchs, and E. Cohen, "Sketch-N-Make: Automated Machining of CAD Sketches," 18th Computers In Engineering Conference, Part of DETC98, Atlanta, GA, 1998.
107. H. Fuchs, "Beyond the Desktop Metaphor: Toward More Effective Display, Interaction, and Telecollaboration in the Office of the Future via a Multitude of Sensors and Displays," 1st International Conference on Advanced Multimedia Content Processing (AMCP '98), Osaka, Japan, 1998.
106. H. Fuchs, M. A. Livingston, R. Raskar, D. n. Colucci, K. Keller, A. State, J. R. Crawford, P. Rademacher, S. H. Drake, and M. Anthony A. Meyer, "Augmented Reality Visualization for Laparoscopic Surgery," First International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI '98), 1998.
105. R. Raskar, G. Welch, M. Cutts, A. Lake, L. Stesin, and H. Fuchs, "The Office of the Future: A Unified Approach to Image-Based Modeling and Spatially Immersive Displays," ACM SIGGRAPH 1998, Orlando, FL, 1998.
104. R. Raskar, G. Welch, and H. Fuchs, "Seamless Projection Overlaps Using Image Warping and Intensity Blending," Fourth International Conference on Virtual Systems and Multimedia (VSMM), Gifu, Japan, 1998.
103. R. Raskar, G. Welch, and H. Fuchs, "Spatially Augmented Reality," First International Workshop on Augmented Reality (IWAR), San Francisco, CA, 1998.
102. M. Cutts, D. B. Conner, R. Fush, H. Fuchs, L. Holden, M.Jacobs, B. Loss, L.Markosian, R. Riesenfeld, and G. Turk, "An Immersive Tool for Wide-Area Collaborative Design," TeamCAD, 1997R, 1997.
101. V. Interrante, H. Fuchs, and S. Pizer, "Conveying the 3D Shape of Transparent Surfaces via Texture," IEEE Transactions on Visualization and Computer Graphics (TVCG), 1997.
100. H. Fuchs, A. State, E. Pisano MD, W. F. Garrett, G. Hirota, M. A. Livingston, M. C. Whitton, and S. M. Pizer, "Towards Performing Ultrasound-Guided Needle Biopsies from Within a Head-Mounted Display," Visualization in Biomedical Computing 1996, Hamburg, Germany, 1996.
99. H. Fuchs, A. State, M. Livingston, W. Garrett, G. Hirota, M. Whitton, and E. Pisano MD, "Virtual Environments Technology to Aid Needle Biopsies of the Breast: An

Example of Real-Time Data Fusion," *Medicine Meets Virtual Reality*:4, San Diego, CA, 1996.

98. W. F. Garrett, H. Fuchs, M. C. Whitton, and A. State, "Real-Time Incremental Visualization of Dynamic Ultrasound Volumes Using Parallel BSP Trees," *IEEE Visualization '96*, San Francisco, CA, 1996.
97. V. Interrante, H. Fuchs, and S. Pizer, "Illustrating Transparent Surfaces with Curvature-Directed Strokes," *IEEE Visualization '96*, San Francisco, CA, 1996.
96. A. Lastra, H. Fuchs, and J. Poulton, "Harnessing Parallelism for High-Performance Interactive Computer Graphics," *NSF Workshop on Experimental Systems*, 1996.
95. E. D. Pisano, MD, H. Fuchs, and A. State, "Virtual Reality Applied to Ultrasound-Guided Aspiration of Breast Cysts," *1996 Annual Meeting of the American Roentgen Ray Society*, San Diego, CA, 1996.
94. A. State, M. A. Livingston, W. F. Garrett, G. Hirota, M. C. Whitton, E. D. Pisano, and H. Fuchs, "Technologies for Augmented Reality Systems: Realizing Ultrasound-Guided Needle Biopsies," *SIGGRAPH 1996*, New Orleans, LA, 1996.
93. V. Interrante, H. Fuchs, and S. Pizer, "Enhancing Transparent Skin Surfaces with Ridge and Valley Lines," *Visualization '95*, Atlanta, GA, 1995.
92. A. State, J. McAllister, U. Neumann, H. Chen, T. J. Cullip, D. T. Chen, and H. Fuchs, "Interactive Volume Visualization on a Heterogeneous Message-Passing Multicomputer," *1995 Symposium on Interactive 3D Graphics*, Monterey, CA, 1995.
91. G. Bishop, H. Fuchs, L. McMillan, and E. J. S. Zagier, "Frameless Rendering: Double Buffering Considered Harmful," *SIGGRAPH '94*, Orlando, FL, 1994.
90. H. Fuchs, G. Bishop, K. Arthur, L. McMillan, R. Bajcsy, S. Lee, H. Farid, and T. Kanade, "Virtual Space Teleconferencing Using a Sea of Cameras," *First International Symposium on Medical Robotics and Computer-Assisted Surgery*, Pittsburgh, PA, 1994.
89. V. Interrante, W. Oliver, S. Pizer, and H. Fuchs, "Display Methods for Gray-Scale, Voxel-Based Data Sets," in *Three-Dimensional Confocal Microscopy: Volume Investigation of Biological Specimens*, L. M. J. Stevens and J. Trogadis, Eds. San Diego, CA: Academic Press, 1994, pp. 131-170.
88. S. Molnar, M. Cox, D. Ellsworth, and H. Fuchs, "A Sorting Classification of Parallel Rendering," *IEEE Computer Graphics and Applications: Special Issue on Rendering*, vol. 14, pp. 23-32, 1994.

87. J. Rolland, R. Holloway, and H. Fuchs, "A Comparison of Optical and Video See-Through Head-Mounted Displays," SPIE Telemanipulator and Telepresence Technologies, Boston, MA, 1994.
86. A. State, S. Balu, and H. Fuchs, "Bunker View: Limited-Range Head-Motion-Parallax Visualization for Complex Biomedical Data Sets," Visualization in Biomedical Computing 1994, Rochester, MN, 1994.
85. A. State, D. T. Chen, C. Tector, A. Brandt, H. Chen, R. Ohbuchi, M. Bajura, and H. Fuchs, "Case Study: Observing a Volume Rendered Fetus within a Pregnant Patient," IEEE Visualization '94, Washington, DC, 1994.
84. A. State, M. Julian Rosenman, H. Fuchs, and J. Symon, "VISTAnet: Radiation Therapy Treatment Planning Through Rapid Dose Calculation and Interactive 3D Volume Visualization," Visualization in Biomedical Computing 1994, Rochester, MN, 1994.
83. U. Neumann and H. Fuchs, "A Vision of Telepresence for Medical Consultation and Other Applications," Sixth International Symposium on Robotics Research, Hidden Valley, PA, 1993.
82. J. Rosenman, M.D., E. L. Chaney, T. J. Cullip, J. R. Symon, V. L. Chi, H. Fuchs, and D. S. Stevenson, "VISTAnet: Interactive Real-Time Calculation and Display of 3-Dimensional Radiation Dose: An Application of Gigabit Networking," *International Journal of Radiation Oncology, Biology, Physics*, vol. 25, 1993.
81. M. Bajura, H. Fuchs, and R. Ohbuchi, "Merging Virtual Reality with the Real World: Seeing Ultrasound Imagery within the Patient," *Computer Graphics*, vol. 26, pp. 203 - 210, 1992.
80. G. Bishop and H. Fuchs, "Research Directions in Virtual Environments: Report of an NSF Invitational Workshop, March 23-24, 1992," *ACM Computer Graphics*, vol. 26, pp. 153-177, 1992.
79. R. Ohbuchi, D. Chen, and H. Fuchs, "Incremental Volume Reconstruction and Rendering for 3D Ultrasound Imaging," Visualization in Biomedical Computing 1992, Bellingham, WA, 1992.
78. J. Poulton, J. Eyles, S. Molnar, and H. Fuchs, "Breaking the Frame-Buffer Bottleneck with Logic-Enhanced Memories," *IEEE Computer Graphics and Applications*, vol. 12, pp. 65-74, 1992.
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3. Fuchs H., J. Duran, and B. Johnson, "A System for Automatic Acquisition of Three-Dimensional Data," 1977 National Computer Conference, 1977.
2. Fuchs H., Z. M. Kedem, and S. P. Uselton, "Optimal Surface Reconstruction from Planar Contours," *Communications of the ACM*, vol. 20, pp. 693-702, 1977. One of only two papers from Siggraph'77 Conference selected to be published in CACM.
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Patents

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11. H. Fuchs, P. Lincoln, A. Nashel, A. State, G. Welch, "Methods, systems, and computer readable media for shader-lamps based physical avatars of real and virtual people," PCT/US2010/026534, March 8, 2010. International patent pending.
10. H. Fuchs, L. McMillan, A. Nashel, "Methods, systems, and computer readable media for generating autostereo three-dimensional views of a scene for a plurality of viewpoints using a pseudo-random hole barrier," PCT/US2010/026537, March 8, 2010. International patent pending.
9. A. Bulysheva, H. Fuchs, T. Peck, A. State, H. Yang, "Methods, systems, and computer readable media for image guided ablation," US App. #12/842,261, July 23, 2010. United States patent pending.
8. Fuchs, H., K. Keller, L. McMillan, "Methods, systems, and computer program products for full spectrum projection," US App. #11/632,151, January 10, 2007. United States patent pending.
7. Fuchs, H., D. Cotting, M. Naef and M. Gross, "Methods, systems and computer program products for imperceptibly embedding structured light patterns in projected color images for display on planar and non planar surfaces," US Patent #7,182,465, February 27, 2007.
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5. Fuchs, H., M.A. Livingston, T.G. Bishop, and G.F. Welch, "Dynamic generation of imperceptible structured light for tracking and acquisition of three dimensional scene geometry and surface characteristics in interactive three dimensional computer graphics applications," US Patent #5,870,136, February 9, 1999.
4. Fuchs, H., "Image buffer having logic-enhanced pixel memory cells and method for setting values therein." US Patent #4,827,445, May 2, 1989.
3. Fuchs, H. and J. Poulton, "VLSI Graphic Display Image Buffer Using Logic Enhanced Pixel Memory Cells," US Patent #4,783,649, November 8, 1988.
2. Fuchs, H. and S. M. Pizer, "A 3-D Display Based on Conventional 2-D Graphics Equipment," US Patent #4,607,255, August 19, 1986.
1. Fuchs, H., "Graphics Display System Using Logic-Enhanced Pixel Memory Cells," US Patent # 4,590,465, May 20, 1986.

Technical Reports (Selected)

- D. Bandyopadhyay, R. Raskar, A. State, and H. Fuchs, "Dynamic Spatially Augmented 3D Painting," University of North Carolina at Chapel Hill Department of Computer Science, Chapel Hill, NC 2001.
- R. Raskar, H. Fuchs, G. Welch, A. Lake, and M. Cutts, "3D Talking Heads: Image Based Modeling at Interactive Rates Using Structured Light Projection," University of North Carolina at Chapel Hill Department of Computer Science, Chapel Hill, NC 1998.
- W. J. Dally, L. McMillan, G. Bishop, and H. Fuchs, "The Delta Tree: An Object-Centered Approach to Image-Based Rendering," Massachusetts Institute of Technology Artificial Intelligence Laboratory, Technical Memo 1604, Cambridge, MA, May 1996.
- U. Neumann, A. State, H. Chen, H. Fuchs, T. J. Cullip, Q. Fang, M. Lavoie, and J. Rhoades, "Interactive Multimodal Volume Visualization for a Distributed Radiation-Treatment Planning Simulator," University of North Carolina at Chapel Hill Department of Computer Science, Chapel Hill, NC 1994.

Grants & Contracts

1. Cisco Systems: "Telepresence Wall" (PI)
2. National Science Foundation: "CRI:IAD Intergrated Projector-Camera Modules for the Capture and Creation of Wide-Area Immersive Experiences" (PI)
3. NAVAIR: SBIR Phase 2: Deployable Intelligent Projections Systems for Training" Renaissance Science Corporation, Prime; (PI of UNC subcontract)
4. Office of Naval Research: 3D Display and Capture of Humans for Live-Virtual Training (joint PI with Greg Welch)
5. Office of Naval Research: "Behavioral Analysis and Synthesis for Intelligent Training" (joint UNC PI with Greg Welch; Project lead by Naval Postgraduate School, A. Sadagic, PI)

FORMER GRANTS AND CONTRACTS from Defense Advanced Research Projects Agency; National Institutes of Health, National Cancer Institute; National Science Foundation; , U.S. Air Force; U.S. Dept. of Energy.

Invited Talks (Selected)

46. Keynote, BEAMING Workshop, Barcelona, Spain, June 2011, "Toward Improved Telepresence: BeingThere International Research Center for Telepresence and Telecollaboration...and related work."
45. Keynote, Japan VR, Tokyo, Japan, December 2010.
44. Keynote, ISMAR 2010, Seoul, Korea, October 2010.
43. Keynote, IEEE International Symposium on Multimedia (ISM2010), Taichung, Taiwan, December 2010, "Physical and Digital Media of Telepresence."
42. ISMAR Symposium Workshop, Orlando, Florida, October 2009.
41. AMI-ARCS Workshop, London, England, September 2009.
40. NAIST, Japan, July 2009.
39. Keynote, NOSSDAV, Williamsburg, Virginia, June 2009, "Experiences Building Telepresence Systems."
38. University of Pennsylvania, Franklin Institute Symposium, RoboFest: A Celebration of Robotics at the GRASP Laboratory, April 2009
37. NASA Langley Research Center, Initiated the Speaker Series on Virtual Worlds, April 2009.
36. 9th Marconi Research Conference, Office Ergonomics Research Committee (OERC), Marconi Center, Marshall, CA, January 2009.
35. Keynote, Graphics Hardware 2008, Sarajevo, Bosnia and Herzegovina June 20, 2008.
34. Keynote, PROCAMS 2008, Los Angeles, CA, August 9, 2008.
33. Keynote (1 of 2), Eurographics 2004, Grenoble, France, September 2004
32. J. Barkley Rosser Distinguished Lecture, University of Wisconsin, Madison, WI, March 2001.
31. Distinguished Lecture, National Science Foundation (NSF), February 2001.
30. Address, Sesquicentennial Anniversary, University of Rochester, October 2000 (1 of 2 in Computer Science).

29. Distinguished Lecture, Stanford University Department of Computer Science, June 2000
28. Keynote Address, VRST '99, London, England, December 1999
27. Keynote, 1st International Symposium on Mixed Reality (ISMR'99), Yokohama, Japan. Mar. 9, 1999.
26. University of Utah Department of Computer Science Distinguished Lecture, December 8, 1998
25. Invited Paper, Advanced Multimedia Content Processing (AMCP'98), Osaka, Japan. Nov. 9, 1998.
24. Keynote, Advanced School for Computing and Imaging (ASCI'98), Lommel, Belgium. June 11, 1998.
23. Fraunhofer Inauguration Symposium, Virtual Environments Panel, Darmstadt, Germany, Oct. 30, 1997.
22. Keynote, Eurographics '97, Budapest, Hungary, September 6, 1997.
21. Keynote, Computer Graphics International'97, Hasselt, Belgium, June 25, 1997.
20. Keynote, 2nd Visualization Conference, Technicon, Haifa, Israel, June 30, 1996.
19. Keynote, 1995 Symposium on Interactive 3D Graphics, Monterey, CA, April 10-12, 1995.
18. University of Southern California Department of Computer Science Distinguished Lecture, Los Angeles, CA, Dec. 2, 1994.
17. Invited talk, The London VR User Show, VR in Medicine Workshop, London, England, September 1994.
16. IEEE EMBS 1994 International Summer School on Three-Dimensional Biomedical Imaging, to teach course on Virtual Reality in Medical Imaging, July 7-8, 1994.
15. Invited talk, ATR Workshop on Virtual Space Teleconferencing Systems, Kyoto, Japan, Dec. 3, 1993
14. Invited talk, Computer Graphics International '92 (CGI '92), Tokyo, Japan, June 24, 1992
13. NATO Advanced Research Workshop, Travemünde, Germany, June 26, 1990

12. Keynote, First Conference on Visualization in Biomedical Computing, Atlanta, Georgia, May 23, 1990.
11. Keynote Address, Computer Graphics International, Leeds, UK, June 1989
10. World Congress on Medical Physics and Biomedical Engineering, San Antonio, Texas, August 1988.
9. Member of panel on "Parallel Processing for Computer Vision and Display" at SIGGRAPH'88, August 1988.
8. Member of panel on "3D Imaging in Medicine: Pitfalls and Possible Remedies" at the National Computer Graphics Association annual conference, Anaheim, California, March 1988.
7. International Conference and Exhibition on Parallel Processing for Computer Vision and Display (sponsored by IBM - UK Labs, Univ. of Leeds, British Computer Society, Computer Graphics Society, Eurographics), University of Leeds, UK (January 1988)
6. NATO International Advanced Study Institute on Theoretical Foundations of Computer Graphics and CAD, Il Ciocco, Lucca, Italy (July 1987).
5. NATO International Advanced Study Institute on Mathematics and Computer Science in Medical Imaging, Il Ciocco, Lucca, Italy, (September 1986).
4. International Summer Institute (British Computer Society), State of the Art in Computer Graphics, Stirling, Scotland (June 1986).
3. NATO International Advanced Study Institute on Fundamental Algorithms for Computer Graphics, Ilkley, England (April 1985).
2. Eurographics'85, Nice, France (September 1985) (1 of 4 keynotes).
1. NATO International Advanced Study Institute on Microarchitecture of VLSI Computers, Urbino, Italy (July 1984).