

## BIOGRAPHICAL SKETCH

NAME Whitton, Mary	POSITION TITLE Research Associate Professor		
eRA COMMONS USER NAME (credential, e.g., agency login) MARY_WHITTON			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Duke University, Durham, NC	BA	1970	Religion
North Carolina State University, Raleigh, NC	MS	1974	Guidance and Personnel Services
North Carolina State University, Raleigh, NC	MS	1984	Electrical and Computer Engineering

### A. Positions and Honors.

#### **Professional Experience:**

**Research Associate Professor.** Department of Computer Science, University of North Carolina at Chapel Hill. July 2004 – present.

**Research Assistant Professor.** Department of Computer Science, University of North Carolina at Chapel Hill, May 1995-June 2004.

**Adjunct Assistant Research Professor.** School of Information and Library Science, University of North Carolina at Chapel Hill, December 2001-present.

**Manager of Virtual Environments Research Projects.** Department of Computer Science, University of North Carolina at Chapel Hill, January 1995-April 1995

**Director, Marketing, Sun Microsystems, Inc.,** June 1987-January 1995

**Vice President and Co-Founder, Trancept Systems, Inc.,** January 1986-May 1987  
(Trancept acquired by Sun Microsystems, May 1987)

**Partner, Whitland Associates,** May 1983 - December 1984 and July 1985- December 1985

**Director of Marketing, Graphics Terminals, Adage, Inc.,** October 1982- May 1983 and January 1985- August 1985

**Vice President and Co-Founder, Ikonas Graphics Systems, Inc.,** July 1978-September 1982  
(Ikonas acquired by Adage, Inc., October 1982)

### B. Selected peer-reviewed publications (in chronological order).

#### **Book Chapters**

Whitton, M.C. and Brooks, F.P. (*in press*). Evaluating VE Component Technologies, in Schmorow, D., Nicholson, D., Cohn, J. (Eds), *The PSI Handbook of Virtual Environments for Training and Education*, Praeger Security International, Westport, CN.

Whitton, M.C. and Loftin, R..B.. (*in press*). Section Perspective: VE Component Technologies, in Schmorow, D., Nicholson, D., Cohn, J. (Eds), *The PSI Handbook of Virtual Environments for Training and Education*, Praeger Security International, Westport, CN.

Whitton, M.C. and Razzaque, S. (2008). Locomotion Interfaces. In Kortum, P. (Ed.), *HCI Beyond the GUI: Design for Haptic, Speech, Olfactory and Other Nontraditional Interfaces*, pp 107-146. Burlington, MA: Morgan Kaufmann.

Sonnenwald, D.H., Whitton, M.C. & Magluaghlin, K. (*in press-October 2008*). Evaluation of a scientific collaboratory system: Investigating a collaboratory's potential before deployment. In G. Olson, A. Zimmerman & N. Bos (Eds.), *Science on the Internet*. Boston: MIT Press.

Taylor II, R. M., D. Borland, F. P. Brooks, Jr., M. Falvo, M. Guthold, T. Hudson, K. Jeffay, G. Jones, D. Marshburn, S. J. Papadakis, L. C. Qin, A. Seeger, F. D. Smith, D. H. Sonnenwald, R. Superfine, S. Washburn, C. Weigle, M. C. Whitton, P. Williams, L. Vicci and W. Robinett, "Visualization and Natural Control Systems for Microscopy," *Visualization Handbook*, C. Johnson, C. Hansen, eds., Harcourt Academic Press, 2003.

Sonnenwald, Diane, R. Berquist, K. Magluaghlin, E. Kupstas Soo, M. Whitton, "Designing to Support Scientific Research Across Distances: the nanoManipulator Environment," in *Collaborative Virtual Environments*, E. Churchill, D. Snowdon, and A. Munro, eds., London: Springer Verlag, 2001, pp. 202-224.

Whitton, Mary C., "Requirements for Scientific Visualization: Evolution of an Accelerator Architecture," in *Visualization in Supercomputing*, Mendez, Raul, editor, Springer-Verlag, 1990, pp. 117-129.

Whitton, Mary C., "Memory Design for Raster Graphics Displays," in *IEEE Tutorial: Computer Graphics Hardware, Image Generation, and Display*, Reghbaty, H. and Lee, A., editors, IEEE Computer Society Press, 1988, pp. 116-133. (Originally published in *IEEE Computer Graphics and Applications*, 4(3) (March 1984), 48-65.)

### Journal Papers

Peck, Tabitha, M. Whitton, H. Fuchs (*in press*). Evaluation of Reorientation Techniques for Walking in Large Virtual Environments. *Transactions on Visualization and Computer Graphics*, IEEE Press. (Invited extended version of IEEE VR 2008 conference paper.)

Mihalik JP, Whitton MC, & Kohli L. (2008). Do the physical characteristics of a virtual reality device contraindicate its use for balance assessment? *Journal of Sport Rehabilitation*, 2008, 16(38-49).

Burns, Eric, Sharif Razzaque, Mary C. Whitton, Frederick P. Brooks, Jr., (2007) "MACBETH: Management of Avatar Conflict by Employment of a Technique Hybrid," *International Journal of Virtual Reality*, 6(2):11-20.

Burns, E., Razzaque, S., Panter, A. T., Whitton, M. C., McCallus, M. R., & Brooks, F. P. (2006) "The Hand is Slower than the Eye: A quantitative exploration of visual dominance over proprioception," *Journal on Presence: Teleoperators and Virtual Environments*, 15, 1:1-15, February 2006. (Extended version of IEEE VR 2005 paper.)

Meehan, M., S. Razzaque, B. Insko, M. Whitton, F. Brooks, (2005) "Review of Four Studies on the Use of Physiological Reaction as a Measure of Presence in Stressful Virtual Environments," *Applied Psychophysiology and Biofeedback*, 30 (3), 239-258.

Hudson, T., A. Helser, D. Sonnenwald, M. Whitton. (2003) "Managing Collaboration in the nanoManipulator," *Journal on Presence: Teleoperators and Virtual Environments*, 13(2), 193-210.

Lok, Benjamin, Samir Naik, Mary Whitton, and Frederick Brooks. "Effects of Interaction Modality and Avatar Fidelity on Task Performance and Sense of Presence in Virtual Environments," *Journal on Presence: Teleoperators and Virtual Environments*, 12, 6: 615-628.

Sonnenwald, Diane H., K. Maglaughlin, M. Whitton. "Designing to Support Situation Awareness across Distances: An Example from a Scientific Collaboratory," *Information Processing & Management*, 40(6), 989-1011

Sonnenwald, Diane H., M. Whitton, K. Maglaughlin, "Evaluating a Scientific Collaboratory: Results of a Controlled Experiment," *ACM Transactions on Computer Human Interaction*, 10(2), 151-176.

Meehan, M., B. Insko, M. Whitton and F. P. Brooks Jr. (2002). "Physiological Measures of Presence in Stressful Virtual Environments." *ACM Transactions on Graphics* 21(3): 645-652. (Proceedings of ACM SIGGRAPH 2002, San Antonio, Texas).

Whitton, Mary C., "Same-Sex and Cross-Sex Reliability and Concurrent Validity of the Strong-Campbell Interest Inventory," *Journal of Counseling Psychology*, 22(3) (May 1975), 204-209.

### Reviewed Conference Papers

Jerald, J., Peck, T., Steinicke, F., Whitton, M. (*to appear*). Sensitivity to Scene Motion for Phases of Head Yaws, *Proceedings of Applied Perception in Graphics and Visualization 2008*,

Feasel, J., M.C. Whitton, J.D. Wendt, (2008). LLCM-WIP: Low-Latency, Continuous-Motion Walking-in-Place. *Proceedings of IEEE Symposium on 3D User Interfaces 2008* (Reno, NV March 2008), 97-104.

Peck, Tabitha, M. Whitton, H. Fuchs (2008). Evaluation of Reorientation Techniques for Walking in Large Virtual Environments. *Proc. of IEEE Virtual Reality 2008* (Reno, NV March 2008), 121-127.

Glencross, M., C. Jay, J. Feasel, L. Kohli, M. Whitton, R. Hubbard (2007). "Effective Cooperative Haptic Interaction over the Internet," *Proc. of IEEE Virtual Reality 2007*, (Charlotte, NC Mar 2007), 115-122.

Burns, E., Razzaque, S., Panter, A. T., Whitton, M. C., McCallus, M. R., & Brooks, F. P. (2005) "The Hand is Slower than the Eye: A quantitative exploration of visual dominance over proprioception," *Proceedings of IEEE Virtual Reality 2005*, (Bonn, Germany March 2005), 3-10, IEEE Computer Society. Honorable Mention in Best Paper Competition. (26% acceptance rate)

Whitton, M., Cohn, J., Feasel, J., Zimmons, P., Razzaque, S., Poulton, S., McLeod, B., Brooks, F., "Comparing VE Locomotion Interfaces," (2005) in *Proceedings of IEEE Virtual Reality 2005*, (Bonn, Germany March, 2005), 123-130, IEEE Computer Society. (26% acceptance rate)

Lok, B.C., S. Naik, M. Whitton, F. Brooks, "Incorporating Dynamic Real Objects into Immersive Virtual Environments," *Proceedings of ACM Symposium on Interactive 3D Graphics* (Monterey, CA April 2003), 31-40, The Association for Computing Machinery, Inc., New York. Selected for short presentation at SIGGRAPH 2003 with one page summary in *ACM Transactions on Graphics* 22(3), 701 (*Proceedings of SIGGRAPH 2003*, San Diego).

- Lok, B.C., S. Naik, M. Whitton, F. Brooks, "Effects of Handling Real Objects and Self-Avatar Fidelity on Cognitive Task Performance in Virtual Environments," *Proceedings of IEEE Virtual Reality 2003* (Los Angeles, CA, March 2003), 125-132, IEEE Computer Society.
- Hudson, T., A. Helser, D. Sonnenwald, M. Whitton, "Managing Collaboration in the nanoManipulator," *Proceedings of IEEE Virtual Reality 2003* (Los Angeles, CA, March 2003), 180-187, IEEE Computer Society.
- Meehan, M., S. Razzaque, M. Whitton, F. Brooks, "Effects of Latency on Presence in Stressful Virtual Environments," *Proceedings of IEEE Virtual Reality 2003* (Los Angeles, CA, March 2003), 141-148, IEEE Computer Society.
- Sonnenwald, Diane H., Mary Whitton, Kelly Maglaughlin (2002) "Scientific Collaboratories: Evaluating their Potential," *Bulletin of the American Society for Information Science & Technology*, Aug/Sep2002, **28** (6), 12-15.
- Usoh, Martin, K. Arthur, M. Whitton, A. Steed, M. Slater, and F. Brooks, "Walking>Virtual Walking>Flying, in Virtual Environments " *Proceedings of SIGGRAPH'99* (Los Angeles, CA, August 11-13), *Computer Graphics Annual Conference Series, 1999*, pp. 359-364.
- Aliaga, D., J. Cohen, A. Wilson, E. Baker, H. Zhang, C. Erikson, K. Hoff, T. Hudson, W. Stuerzlinger<sup>o</sup>, R. Bastos, M. Whitton, F. Brooks, D. Manocha, "MMR: An Interactive Massive Model Rendering System Using Geometric And Image-Based Acceleration," *Proceedings of the 1999 ACM Symposium on Interactive 3D Graphics* (Atlanta, GA, April 26-28, 1999), pp. 199-206, 237.
- Garrett, William, H. Fuchs, M. Whitton, A. State. "Real-Time Incremental Visualization of Dynamic Ultrasound Volumes Using Parallel BSP Trees." *Proceedings of IEEE Visualization '96* (San Francisco, California, October 1996), pp.235-240, 490.
- State, A., Livingston, M. A., Hirota, G., Garrett, W. F., Whitton, M. C., Fuchs, H. and Pisano, E. D. "Technologies for Augmented-Reality Systems: Realizing Ultrasound-Guided Needle Biopsies," *Proceedings of SIGGRAPH '96* (New Orleans, LA, August 4-9), *Computer Graphics Annual Conference Series 1996*, 439-446.

#### Other Conference Papers

- Muller, P., J. Cohn, D. Schmorrow, R. Stripling, K. Stanney, L., Milham, M. Whitton, J. Folkes (2006). "The Fidelity Matrix: Mapping System Fidelity to Training Outcome," *Proceedings of IITSEC 2007*, (Orlando, FL December 2006).
- Jerald, J, A. Fuller, A. Lastra, M. Whitton, L. Kohli, F. Brooks. Latency Compensation by Horizontal Scanline Selection for Head-Mounted Displays. In *Proceedings of SPIE Vol 6490 Stereoscopic Displays and Virtual Reality Systems*. (San Jose, CA, January 2007)
- Brooks, Jr., F. P., J. Cannon-Bowers, H. Fuchs, L. McMillan, M. Whitton, "Virtual Environment Training for Dismounted Teams—Technical Challenges," Paper presented at Human Factors & Medicine Panel Workshop on Virtual Media for Military Applications, U.S. Military Academy, West Point, NY, June 13-15, 2006.
- Brooks, F., Cannon-Bowers, J., Fuchs, H., McMillan, L, Whitton, M., "A New VE Challenge: Immersive Experiences for Team Training," *Proceedings of HCI International 2005*, v.9 (Las Vegas, July 2005). CD-ROM. (Invited)
- Whitton, M., B. Lok, B. Insko, F. Brooks, "Integrating Real and Virtual Objects in Virtual Environments," *Proceedings of HCI International 2005*, v.9 (Las Vegas, July 2005). CD-ROM. (Invited)
- Kohli, L., Whitton, M., "The Haptic Hand: Providing User Interface Feedback with the Non-Dominant Hand in Virtual Environments," *Proceedings of Graphics Interface 2005* (Victoria, BC, May 2005), 1-8.
- Lok, Benjamin, Samir Naik, Mary Whitton, and Frederick Brooks (2004). "Experiences in Extemporaneous Incorporation of Real Objects in Immersive Virtual Environments," in Beyond Glove and Wand Based Interaction Workshop, IEEE Virtual Reality 2004, Chicago, IL.
- Whitton, Mary C., "Making Virtual Environments Compelling," *Communications of the ACM*, 46 (7), 40-47. (Invited)
- Mortensen, J., V. Vinayagamoorthy, M. Slater, A. Steed, B. Lok, M. Whitton, "Collaboration in Tele-Immersive Environments," *Proceedings of the Eighth Eurographics Workshop on Virtual Reality* (2002), 93-101, ACM-The Eurographics Association.
- Razzaque, S., D. Swapp, M. Slater, M. C. Whitton and A. Steed (2002). "Redirected Walking in Place." *Proceedings of Eighth Eurographics Workshop on Virtual Environments* (2002), 123-130, ACM - The Eurographics Association.
- Razzaque, S. Z. Kohn, M. Whitton, "Redirected Walking," *Proceedings of Eurographics 2001*, pp. 289-294. September 2001, Manchester, UK.
- Hudson, Thomas, D. Sonnenwald, K. Maglaughlin, M. Whitton, R. Bergquist, "Enabling Distributed Collaborative Science" [refereed video-paper]. *Video Proceedings of ACM Conference on Computer-Supported Collaborative Work 2000*.

Arthur, K, T. Preston, R. Taylor, F. Brooks, M. Whitton, W. Wright, "Designing and Building the PIT: a Head-Tracked Stereo Workspace for Two Users," 2<sup>nd</sup> International Immersive Projection Technology Workshop, *Workshop CD-ROM*, Carolina Cruz-Neira, ed., Iowa State University, Ames, Iowa, May 11-12, 1998.

Whitton, Mary C., "Visualization Accelerators," NCGA '89 Conference Proceedings (Philadelphia, April 17-20), vol.1, 331-339.

Whitton, Mary C., "Accelerating Interactive Applications," NCGA Computer Graphics '87 (Philadelphia, March 22-26), Conference Proceedings, vol. .III, 439-448.

#### **Conference Abstracts, Posters, and Presentations**

Burns, E., S. Razzaque, M. Whitton, F. Brooks (2007), "MACBETH: The avatar which I see before me and its movement toward my hand," (Poster Abstract), *Proceedings of IEEE Virtual Reality 2007*, 295-296 (Charlotte, NC, March 2007). IEEE Computer Society.

Cohn, Joseph (LT), M. Whitton, W. Becker, F. Brooks, "Information Presentation and Control Method Impact Performance on a Complex Virtual Locomotion Task" (Poster), Human Factors and Ergonomics Society's 48th Annual Meeting (New Orleans, Louisiana, September 20-24, 2004).

Sonnenwald, D.H., Maglaughlin, K.L., & Whitton, M.C. (2001). "Using innovation diffusion theory to guide collaboration technology evaluation: Work in progress." (Video Paper) IEEE 10th International Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises.

#### **C. Research Support.**

##### ***Ongoing Research Support:***

National Institutes of Health - A National Institute of Biomedical Imaging and Bioengineering Resource  
"Computer Integrated Systems for Microscopy & Manipulation"

Role: Investigator

01/05/05 - 12/31/09

The major goal of this project is to develop forefront visualization and manipulation tools and harness them into prototype research tools for biochemists studying macromolecules, viruses, and cellular-scale systems.

Office of Naval Research

"VE Technologies for Effective Training"

11/15/03 – 12/31/08

Role: PI

The target application is training for individual Marines for close quarters combat for military operations in urban terrain.