Jeff Bertrand

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Research Interests

3D Human-Computer Interaction, Virtual Environments, Virtual Humans, 3D User Interfaces

Education

University of Iowa | Iowa City, IA   Aug 2006 – May 2010
B.A. in Informatics, B.A. in Art
College of Liberal Arts and Sciences

Clemson University | Clemson, SC   Aug 2010 - Present
Ph.D. Candidate, Human-Centered Computing
Advisor: Dr. Sabarish V. Babu
School of Computing, Human-Centered Computing Division

Experience

Research Assistant
Hank Virtual Environments Laboratory   May 2009 – Aug 2010
Department of Computer Science, University of Iowa
http://psychology.uiowa.edu/hank-virtual-environments-lab

Research Assistant   Aug 2010 - Present
CyberInnovations Laboratory
School of Computing, Clemson University
http://www.cs.clemson.edu/group/vegroup/index.html

Graduate Mentor for Human Centered Computing REU   May 2011 – Aug 2011
CyberInnovations Laboratory
School of Computing, Clemson University

Software Analyst   Jan 2013 - Present
Clemson University Center for Workforce Development, Clemson University
http://www.clemson.edu/centers-institutes/cucwd/

Publications

Peer Reviewed Journals

1. Napieralski, P., Altenhoff, B., **Bertrand, J.,** Long, L., Babu, S., Pagano, C., Kern, J., Davis, T. (2011). "Near-field distance perception in real and virtual environments using both verbal and action responses." in *ACM Transactions on Applied Perception*, Vol. 8, Issue 3, Article 18.

Peer Reviewed Conference Papers and Posters

2. **Bertrand, J.,** Babu, S.V., Polgreen, P., and Segre, A. (2010) "Virtual Agents Based Simulation for Training Healthcare Workers in Hand Hygiene Procedures." in *Lecture Notes in Computer Science: Proceedings of the 10th International Conference on Intelligent Virtual Agents (IVA 2010)*, Springer Verlag Berlin/Heidelberg, Vol. 6395, pp. 125-131.

3. **Bertrand, J.,** Babu, S.V., Gupta, M., Segre, A.M., Polgreen, P. (2011) "A 3D Virtual Reality Hand Hygiene Compliance Training Simulator." In the proceedings of the 2011 Annual Scientific Meeting of The Society of Healthcare Epidemiology of America.

4. Cairco, L, **Bertrand, J.,** Gupta, M., Armstrong, R., Babu, S., Hodges, L. F., Fasolino, T. (2012) "Towards Simulation Training for Nursing Surveillance." In Proceedings of Carolina Women in Computing 2012 (CWIC 2012). Columbia, SC, February 17-18, 2012.

5. Gupta, M., **Bertrand, J.,** Babu, S., Polgreen, P., Segre, A. (2012) "An evolving multi-agent scenario generation framework for simulations in preventive medicine education." In Proceedings of the *2nd ACM SIGHIT International Health Informatics Symposium (IHI 2012).* ACM, New York, NY, pp. 237-246.

6. Bliss M. Altenhoff, Phillip E. Napieralski, Lindsay O. Long, **Jeffrey W. Bertrand,** Christopher C. Pagano, Sabarish V. Babu, and Timothy A. Davis. (2012). "Effects of calibration to visual and haptic feedback on near-field depth perception in an immersive virtual environment." In *Proceedings of the ACM Symposium on Applied Perception* (SAP '12), pp. 71-78.

7. Phillip E. Napieralski, Bliss M. Altenhoff, **Jeffrey W. Bertrand,** Lindsay O. Long, Sabarish V. Babu, Christopher C. Pagano, Timothy A. Davis, and Georges M. Fadel. (2012) "Effects of immersion on spatial updating in virtual panoramas." In *Proceedings of the ACM Symposium on Applied Perception* (SAP '12), pp. 129.

8. Dukes, L., **Bertrand, J.,** Gupta, M., Armstrong, R., Fasolino, T., Babu, S., Hodges, L.H. (2013) "Comparing Usability of a Single versus Dual Interaction Metaphor in a MultiTask Healthcare Simulation." In the proceedings of *IEEE International Conference on 3D User Interfaces 2013*.

9. **Bertrand, J.**, Dukes, L. C., Dukes, P., Ebrahimi, E., Hayes, A., Mack, N., McClendon, J., Parmar, D., Pence, T. B., Shannon, B., Wachter, A., Wu, Y., Babu, S., and Hodges, L. F. (2013) "Serious Games for Training, Rehabilitation and Workforce Development", In the Proceedings of the *IEEE International Conference on Virtual Reality 2013*.

10. Wang, T., **Bertrand, J.**, Frady, K., Zelaya, M., Kapil, C. M., Wagner, J., Babu, S.V., and Gramopadhye, A. (2013) "Interactive Three Dimensional Visualization Based Engineering Technology Education – Modeling and Animation", in the *2013 ASEE Annual Conference*, Atlanta, GA.

11. Dukes, L., **Bertrand, J.,** Gupta, M., Armstrong, R., Fasolino, T., Babu, S., Hodges, L.H. (2013) "Empirical Evaluation of Interaction Metaphors for Nursing Practitioners in Interactive Patient Surveillance Simulation." *IEEE International Conference on Health Informatics 2013*. **Won Best Paper Award**

12. **Bertrand, J.,** Ebrahimi, E., Wachter, A., Luo, J., Babu, S. V., Duchowski, A. T., Gramopadhye, A. K. (2013). "Visual Attention to Wayfinding Aids in Virtual Environments." In *Joint Virtual Reality Conference of EGVE-EuroVR* (pp. 9-16).

13. Wu, Y., Armstrong, R., Porter, E., **Bertrand, J.,** Babu, S., (2014) "Effects of Virtual Human Animation on Emotional Contagion in Simulated Inter-Personal Experiences." *IEEE International Conference on Virtual Reality 2014.*

14. Parmar, D., **Bertrand, J.,** Babu, S., (2014) "Interactive breadboard activity simulation (IBAS) for psychomotor skills education in electrical circuitry." *IEEE 9th Symposium on 3D User Interfaces.*

15. Barber, T., **Bertrand, J.,** Christ, C., Melloy, B., Neyens, D. (2014) "Comparing the Use of Active versus Passive Navigational Tools In a Virtual Desktop Environment via Eye Tracking." *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. Vol. 58. No. 1. SAGE Publications.

16. Gramopadhye, N., Chalil Madathil, K., **Bertrand, J**., Shannon, C. (2014) "An Investigation of the Effectiveness of Navigational Aids in a Virtual Environment." *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. Vol. 58. No. 1. SAGE Publications.

17. **Bertrand, J.,** Brickler, D., Babu, S. (2014) "The Role of Interaction Fidelity on Bimanual Psychomotor Skills Education in Immersive Virtual Environments." In Review *IEEE International Conference on Virtual Reality 2015.*

I was acknowledged and created the virtual environments for the following papers:

• Tien Dat Nguyen, James F. Cremer, Joseph K. Kearney, and Jodie M. Plumert. (2011) "Effects of scene density and richness on traveled distance estimation in virtual environments". In *Proceedings of the ACM SIGGRAPH Symposium on Applied Perception in Graphics and Visualization* (APGV '11), Stephen N. Spencer (Ed.).

• Christine J. Ziemer, Benjamin Chihak, Jodie M. Plumert, Tien Dat Nguyen, James F. Cremer, and Joseph K. Kearney. (2011) "Is perception-action coupling more malleable in virtual than in real environments?" In *Proceedings of the ACM SIGGRAPH Symposium on Applied Perception in Graphics and Visualization* (APGV '11), Stephen N. Spencer (Ed.).

• Timofey Y. Grechkin, Tien Dat Nguyen, Jodie M. Plumert, James F. Cremer, and Joseph K. Kearney. (2010) "How does presentation method and measurement protocol affect distance

estimation in real and virtual environments?" *ACM Trans. Appl. Percept.* 7, 4, Article 26 (July 2010), 18 pages.

- Ebrahimi, Elham, et al. (2014) "Effects of visual and proprioceptive information in visuo-motor calibration during a closed-loop physical reach task in immersive virtual environments." *Proceedings of the ACM Symposium on Applied Perception*. ACM.

Honors and Awards

- Outstanding HCC PhD Student Award, April 2013
- Best Paper Award at International Conference on Health Informatics 2013
- NSF/Advanced Technological Education Conference Scholarship, September 2013

Current Projects

Bimanual Interaction Study

Jul 2012 – Present, Clemson University

- Used the metrology modules from the CA^{2}VES project to compare interactions using a mouse or a two-handed, 6-DOF interaction metaphor
- Began by using the Microsoft Kinect for interacting with the instruments but found that the Razer Hydra was far more accurate for a precision measurement task

CA²VES Online Module Development

Jan 2012 – Present, Clemson University

- Develop a set of online virtual training modules to supplement the current curriculum for technical college students in basic metrology and electrical instruments and manufacturing safety protocols
- Create simulation logic and accurate physics models to replicate the flow of electricity in a breadboard and govern how calipers and micrometers interact with objects
- Perform usability evaluations and studies to determine effectiveness and efficiency of training

Rapid Response Training Simulation

Dec 2010 – Dec 2013, Clemson University

- Model and animate virtual humans to represent rapidly deteriorating patients in a hospital
- Designed to train nurses in detecting early warning signs of rapid deterioration
- Virtual humans display verbal and non-verbal behaviors that are modeled after real world cases
- Developed a method for integrating lip-syncing and animation event handling
- Environment contains an electronic health record for each patient that updates as the simulation progresses in discrete time intervals

Wayfinding Aids in Large Scale Virtual Environments

Nov 2012 – Dec 2013, Clemson University

- Conducted a study to evaluate the effectiveness of using a wayfinding aid to navigate a large virtual hospital ward and complete the task of identifying infringements of proper hand hygiene protocols
- Based on previous Hand Hygiene Training Simulation

Previous Projects

Hand Hygiene Training Simulation

Jan 2010 – Aug 2010, University of Iowa and Aug 2010 – Jan 2012, Clemson University

- Work with staff from the University of Iowa Hospitals and Clinics to design an online virtual training application for teaching nurses best practices for hand hygiene
- The trainees goal was to follow and observe healthcare workers as they interact with virtual patients and identify when the healthcare worker was not in compliance with the 5 Moments of Hand Hygiene
- Modeled an entire ward of the 4th floor of the Carver Pavilion at the University of Iowa
- Used real world sensors to map virtual nurses and doctors to paths between patient rooms
- Developed path finding and avoidance algorithms for virtual agents

Applied Perception Research

Aug 2010 – Aug 2012, Clemson University

- Investigate near-field depth perception using a Head Mounted Display
- Modeled virtual lab to within 1mm accuracy
- Conducted an experiment that led to a journal paper

Bicycling Simulator Research

May 2009 – Aug 2010, University of Iowa

- Modeled a new bicycling town for use in experiments involving a real bicycle and a CAVE with surrounding projection screens

Perception and Adaptation Research

May 2009 – Aug 2010, University of Iowa

- Modeled a large hallway to within 1 inch accuracy for accurate distance estimation studies
- Studies compared large screen projections of the environment in a CAVE with a treadmill with walking through the real hall with an HMD

Invited Talks and Presentations

- "Virtual Agents Based Simulation for Training Healthcare Workers in Hand Hygiene Procedures." *Intelligent Virtual Agents conference,* Philadelphia, PN. Sep 2010
- "A 3D Virtual Reality Hand Hygiene Compliance Training Simulator" *Society for Healthcare Epidemiology of America Conference* Dallas, TX. April 2011
- "Hand Hygiene Training Simulator" *Visual Computing Seminar,* Clemson, SC. Nov 2011

- "An evolving multi-agent scenario generation framework for simulations in preventive medicine education." *2nd ACM SIGHIT International Health Informatics Symposium.* Miami, FL. Jan 2012
- "Bimanual Interaction and Learning" *Research Demo at IEEE International Conference on Virtual Reality 2013,* Orlando, FL. March 2013
- "Bimanual Interaction Study" *CyberInnovations Lab Seminar,* Clemson, SC. April 2013
- "CA^{2}VES: Technology Innovations " *NSF National Visiting Committee Review Board.* Greenville, SC. May 2013
- "CA^{2}VES: Virtual Reality Developments " and "Bimanual Interaction for Metrology Training." *Research Demo and Poster Presentation* at *ATE National Principal Investigators Conference*. Washington DC. October 2013
- "Visual Attention to Wayfinding Aids in Virtual Environments." *Joint Virtual Reality Conference of EGVE-EuroVR* . Paris, France. December 2013
- "CA^{2}VES: Technology Innovations " *NSF National Visiting Committee Review Board.* Charleston, SC. May 2014
- "Workshop: Research Medley – A Look at Research Studies in Technology Education", "Breakfast Roundtable: Advanced Three-Dimensional (3D) Visualization and Virtual Reality Improving Engineering Technology at Two-Year Colleges", "CA^{2}VES: Virtual Reality Developments" at *ATE National Principal Investigators Conference*. Washington DC. October 2014

Service Activities

- Assisted in reviewing the following:
    - Presence – Journal on Virtual Reality and Telepresence 2010
    - IEEE Transactions in Computer Graphics and Visualization 2011
    - EuroGraphics 2012
    - ACM SIGCHI 2013
    - IEEE 3DUI 2013
- Student Volunteer, IEEE International Conference on Virtual Reality 2013, Orlando, FL
- Graduate Mentor for Human Centered Computing REU, Summer 2011

Teaching

- 3D modeling and game engine instruction for CPSC 411/611 Virtual Reality Systems. 2 day seminar in Fall of 2011, Fall of 2012 and Fall 2014

Other Activities

- Assistant Network Administrator for Indianola Public School District 2004 – 2006
- Computer Technician at Best Buy Geek Squad 2005 – 2008
- IT Technician at University of Iowa Foundation 2008 – 2009
- Modeling and animation using Blender since 2004
- Also interested in drawing, graphic design, and playing guitar