La Trobe University
Bundoora VIC 3086
Australia
☎ *+61 3 9479 1280*
✉ *r.skarbez@latrobe.edu.au*
🖥 *rickskarbez.github.io*
ⓘ *0000-0002-2783-5257*
in *rickskarbez*

Richard T. Skarbez

▬▬ Education

August 2016 **Ph.D in Computer Science**, *The University of North Carolina at Chapel Hill*, Chapel Hill, NC, USA.
Dissertation Title: *Plausibility illusion in virtual environments*
Advised by Mary C. Whitton and Frederick P. Brooks, Jr.

May 2010 **M.S. in Computer Science**, *The University of North Carolina at Chapel Hill*, Chapel Hill, NC, USA.

December 2004 **B.S. with Honors in Computer Engineering**, *Pennsylvania State University— University Park*, University Park, PA, USA.
Thesis Title: *A presentation of the semantics and formal properties of C3L, an event-driven distributed control language*

▬▬ Current Appointment

Title Lecturer in Interactive Visualisation

Institution La Trobe University

College of Science, Health, and Engineering

School of Engineering and Mathematical Sciences

Department of Computer Science and IT

Description Since June of 2018, I have been a lecturer in the Department of Computer Science & IT at La Trobe University. In this role, I have been subject lecturer and coordinator for a new subject, Virtual Reality (CSE4VR), as well as an existing subject, C Programming for Engineers and Scientists (CSE1PES/CSE5CES), which I have redesigned. I am also subject coordinator for LTU's introductory Java subjects, Object-Oriented Programming Fundamentals (CSE1OOF/CSE4OOF). I currently serve as the department's curriculum development coordinator. I am also active as a researcher, collaborating with other LTU researchers in myriad disciplines, including psychology, archaeology, physiology, microbiology, and philosophy.

▬▬ Research interests

○ Virtual environments   ○ Human computer interaction

○ Mixed display environments   ○ Immersive analytics

Dissertation

Title *Plausibility illusion in virtual environments*

Supervisors Mary C. Whitton and Frederick P. Brooks, Jr.

Description In 2009, Professor Mel Slater first proposed that in addition to *presence*, the feeling of "being there" in a virtual environment, researchers also need to consider the feeling that the events depicted in the VE appear real. He coined the terms *Place Illusion* (PI) and *Plausibility Illusion* (Psi), respectively, to refer to these subjective feelings. I investigated Psi over the course of several experiments, demonstrating that Psi can be detected using existing presence measures including questionnaires and physiological metrics, that inconsistent behavior of virtual objects causes increased heart rate in participants, that Psi is affected by individual differences (as is presence), and that it is feasible to determine a rank ordering of VE factors that affect Psi in VEs, with the presence of the virtual body being most important of those factors tested. **Selected as the 2018 IEEE VGTC Virtual Reality Best Dissertation honorable mention**

Publications

Shiva Pedram, Stephen Palmisano, **Richard Skarbez**, Pascal Perez, and Matthew Farrelly. (2020). *Investigating the process of mine rescuers' safety training with immersive virtual reality: A structural equation modelling approach.* Computers & Education, Volume 153, 103891. 30 pages. DOI: 10.1016/j.compedu.2020.103891

Richard Skarbez, Frederick P. Brooks, Jr, and Mary C Whitton. (2020). *Immersion and Coherence: Research Agenda and Early Results.* IEEE Transactions on Visualization and Computer Graphics. 12 pages. DOI: 10.1109/TVCG.2020.2983701

Xi Cao, **Richard Skarbez**, Zhen He, and Henry Been-Lirn Duh. (2019). *A Content-Aware Approach for Analysing Eye Movement Patterns in Virtual Reality.* Poster. 2019 ACM Virtual Reality Software and Technology (VRST), Sydney, Australia. 2 pages. DOI: 10.1145/3359996.3364723

Richard Skarbez, Nicholas F. Polys, J. Todd Ogle, Chris North, and Doug A. Bowman. (2019). *Immersive analytics: Theory and research agenda.* Frontiers in Robotics and AI - Virtual Environments. 15 pages. DOI: 10.3389/frobt.2019.00082

Richard Skarbez and Mary C. Whitton. (2019). *Check Your Work: Evaluating VE Effectiveness Using Presence.* Book chapter in *VR Developer Gems*, edited by William R. Sherman. 15 pages.

Richard Skarbez, Frederick P. Brooks, Jr., and Mary C. Whitton. (2018). *Immersion and coherence in a stressful virtual environment.* ACM Virtual Reality Software and Technology (VRST) conference. 2018 ACM Virtual Reality Software and Technology (VRST), Tokyo, Japan. 11 pages. DOI: 10.1145/3281505.3281530 **Best paper honorable mention**

Richard Skarbez, Frederick P. Brooks, Jr., and Mary C. Whitton. (2017). *A survey of presence and related topics.* ACM Computing Surveys, 50(6), Article 96. 39 pages. DOI: 10.1145/3134301

Richard Skarbez, Solène Neyret, Frederick P. Brooks, Jr., Mel Slater, and Mary C. Whitton. (2017). *A psychophysical experiment regarding the components of plausibility illusion.* IEEE Transactions on Visualization and Computer Graphics (TVCG), 23(4), pp. 1369-1378. DOI: 10.1109/TVCG.2017.2657158

Richard Skarbez, Frederick P. Brooks, Jr., and Mary C. Whitton. (2017). *Immersion and coherence in a visual cliff environment.* Poster. IEEE Virtual Reality conference. 2017 IEEE Virtual Reality (VR), Los Angeles, pp. 397-398. DOI: 10.1109/VR.2017.7892344

Richard Skarbez, Greg Welch, Frederick P. Brooks, Jr., and Mary C. Whitton. (2017). *Coherence changes gaze behavior in virtual human interactions.* 2017 IEEE Virtual Reality (VR), Los Angeles, pp. 287-288. DOI: 10.1109/VR.2017.7892289

Richard Skarbez. (2016). *Plausibility illusion in virtual environments.* Doctoral dissertation. The University of North Carolina at Chapel Hill. 122 pages. [Download from UNC libraries]

Richard Skarbez, Aaron Kotranza, Frederick P. Brooks, Jr., Benjamin Lok, and Mary C. Whitton. (2010). *An initial exploration of conversational errors as a novel method for evaluating virtual human experiences.* Poster. 2010 IEEE Virtual Reality (VR), Singapore, pp. 243-244. DOI: 10.1109/VR.2011.5759489

Richard Skarbez and Mary C. Whitton. (2009). *Enabling distributed collaboration among heterogeneous devices.* Presentation & extended abstract. ACM CHI 2009 Workshop on the Changing Face of Digital Science, Boston, MA, USA. 4 pages. [Download]

Tyler Johnson, Florian Gyarfas, **Richard Skarbez**, Herman Towles, and Henry Fuchs. (2007). *A personal surround environment: projective display with correction for display surface geometry and extreme lens distortion.* 2007 IEEE Virtual Reality (VR), Charlotte, NC, USA, pp. 147-154. DOI: 10.1109/VR.2007.352475

Tyler Johnson, Florian Gyarfas, **Richard Skarbez**, Patrick Quirk, Herman Towles, and Henry Fuchs. (2006). *Multi-projector image correction on the GPU.* Poster. Workshop on Edge Computing, Chapel Hill, NC, USA. [Download]

Patrick Quirk, Tyler Johnson, **Richard Skarbez**, Herman Towles, Florian Gyarfas, and Henry Fuchs. (2006). *RANSAC-assisted display model reconstruction for projective display.* IEEE Virtual Reality 2006 Workshop on Emerging Display Technologies, Alexandria, VA, USA. 4 pages. DOI: 10.1109/VR.2006.115

Mendel Schmiedekamp, **Richard Skarbez**, and Shashi Phoha. (2006). *Formal methods for verification and validation of distributed interacting devices.* 10th Annual IASTED International Conference on Software Engineering Applications, Dallas, TX, USA.

Richard Skarbez. (2004). *A presentation of the semantics and formal properties of C3L, an event-driven distributed control language.* Honors thesis. The Pennsylvania State University. [Download]

Research and Development Experience

2017–2018 **Postdoctoral Associate**, *Virginia Tech Department of Industrial and Systems Engineering*, Blacksburg, VA, USA.
- Designed, engineered, and carried out a series of human participants experiments
- Created and edited 3D models using 3ds Max and the Unity game engine
- Developed a series of virtual reality experiences for the Oculus Rift using C# and the Unity game engine
- Supervised teams of undergraduate researchers
- Analyzed experimental results using custom Python tools
- Wrote technical reports

2016–2017 **Systems Programmer**, *iRODS Consortium*, Chapel Hill, NC, USA.
- Implemented the iRODS Python rule engine plugin and its test rules
- Carried out performance evaluation on the iRODS 4.2 release
- Redesigned and re-implemented iRODS code to improve performance
- Wrote blog posts and other supporting documentation

2014–2016 **Graduate Student Researcher**, *National Consortium for Data Science*, Chapel Hill, NC, USA.
- Designed and implemented metadata template functionality for iRODS in Java (Jargon)
- Installed, configured, and maintained NCDS iRODS and Dataverse installations
- Wrote, revised, and helped prepare materials for NSF site review
- Curated a variety of large datasets for the NCDS

2011 **Graduate Research Assistant**, *Avatar project–UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Designed experiments to evaluate the effectiveness of novel display technologies
- Wrote documents for and interacted with UNC's Institutional Review Board
- Conducted experiments and interviews with experimental participants
- Processed and analyzed experimental data using Python, MATLAB, and SPSS

2008–2009 **Graduate Research Assistant**, *NC-FIRST*, Chapel Hill, NC, USA.
- Developed a mobile web interface for the NC-FIRST weather site
- Contributed to several proposals regarding the use of sensor networks and mobile computing devices in emergency response applications

2008 **SDET Intern**, *Microsoft Corporation*, Redmond, WA, USA.
- Designed and implemented in Python a framework for automating multi-computer test scripts for the Mac Messenger test team
- Wrote test plans for new Messenger features

2005–2007 **Graduate Research Assistant**, *Wide Area Visuals project–UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Developed software in C++ and MATLAB for calibration of projector-camera systems
- Contributed to posters and papers published by the WAV research group

2004–2005 **Student Researcher**, *Applied Research Laboratory*, University Park, PA, USA.
- Wrote the semantics for the Command, Control, and Communications Language (C3L) developed at the ARL
- Developed components of the C3L interpreter, including a pathology checker

2002 **Intern–End-of-line processing**, *IBM Corporation*, Endicott, NY, USA.
- Developed a procedure for automatic generation of drill machine programs from test data identifying circuit panel defects
- Performed panel testing and drill machine programming

2001 **Intern–Digital Video Products Group**, *IBM Corporation*, Endicott, NY, USA.
- Implemented a relational database to store test procedures and results
- Performed hardware and software validation testing

Teaching Experience

2010 **Graduate Teaching Assistant–COMP 116 (Introduction to Scientific Programming)**, *UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Acted as lead TA for the course
- Lectured weekly in recitation sections
- Assisted students during office hours
- Coordinated work among myself and other TAs
- Graded programming assignments and exams

2009 **Graduate Teaching Assistant–COMP 110 (Introduction to Programming–Java) and COMP 401 (Foundations of Programming)**, *UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Acted as lead TA for the courses
- Led recitation sections
- Wrote exams, assignments, and lecture materials
- Assisted students during office hours
- Coordinated work among myself and other TAs
- Graded programming assignments, written assignments, and exams

2008 **Instructor of Record–COMP 575 (Computer Graphics)**, *UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Had full responsibility for designing, teaching, and grading the course
- Developed a new syllabus for the course
- Wrote all assignments, exams, and lecture materials
- Graded all course materials and assigned final grades

2006 **Graduate Teaching Assistant–COMP 872 (Introduction to Virtual Worlds)**, *UNC Department of Computer Science*, Chapel Hill, NC, USA.
- Helped plan scheduling, assignments, and lecture topics
- Familiarized students with the hardware and software used for course projects
- Provided technical help for students

Activities and Honors

Honors

- 2018 IEEE VGTC Virtual Reality Best Dissertation Honorable Mention
- 2018 ACM VRST Best Paper Honorable Mention

Professional associations

- Association for Computing Machinery (ACM)
- Institute of Electrical and Electronics Engineers (IEEE) Computing Society

Organizing experience

- 2020 ACM Symposium on Applied Perception (Program committee)
- 2020 IEEE Virtual Reality Journal Track (Program committee)
- 2020 IEEE Workshop on Perceptual and Cognitive Issues in AR (PERCAR) (Co-organizer)
- 2019 ACM Symposium on Virtual Reality Software and Technology (VRST) (Demos co-chair)
- 2019 IEEE Workshop on Perceptual and Cognitive Issues in AR (PERCAR) (Co-organizer)
- 2018 IEEE Workshop on Perceptual and Cognitive Issues in AR (PERCAR) (Co-organizer)

Editing experience

- Frontiers in Virtual Reality (Review Editor - Virtual Reality and Human Behaviour)
- 2020 ACM Symposium on Applied Perception (Program committee)
- 2020 IEEE Virtual Reality Journal Track (Program committee)

Session chair experience

- 2020 IEEE VR (Papers session 15: Embodiment 2)
- 2019 IEEE VR (Papers session 24: Medical Applications Training)
- 2018 IEEE VR (Papers session 1: Avatars and Virtual Humans)

Reviewing experience

- Frontiers in Psychology
- Frontiers in Virtual Reality
- IEEE Transactions on Applied Perception
- IEEE Transactions on Visualization and Computer Graphics
- Elsevier Computers & Graphics
- Elsevier International Journal of Human-Computer Studies
- PRESENCE: Teleoperators and Virtual Environments
- IEEE Virtual Reality (VR) conference
- IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
- IEEE Symposium on 3D User Interfaces (3DUI)
- ACM Symposium on Virtual Reality Software and Technology (VRST)
- ACM Conference on Human Factors in Computing Systems (CHI)

Invited talks

- "Cognitive Illusions in Virtual Reality: What do I mean? And why should you care?", SMART Seminar Series, University of Wollongong, 4 March 2019
- "Perception in SUMO: Justification and Experimental Results", The Scene Understanding and Modeling Challenge (Workshop at 2018 Asian Conference on Computer Vision (ACCV)), 3 December 2018
- "Augmented and Virtual Reality for Teaching and Learning", La Trobe Technology in Teaching Innovators group, 3 October 2018
- "Cognitive Illusions in VR: What Do I Mean? And Why Should You Care?", MelbourneVR meetup, 13 September 2018
- "Immersive Archaeology", La Trobe Archaeology department seminar, 23 August 2018
- "Usability in VR and AR", Virginia Tech, March 27 2018
- "Making virtual reality more real", Davidson College, February 22 2018
- "Making virtual reality more real", ICAT Playdate, Virginia Tech, February 16 2018

Student activities

- Team leader, UNC Effective Virtual Environments research group, 2011–2015
- President, UNC Computer Science Student Association, 2007–2008
- Coordinator, UNC Computer Science Graphics Lunch, 2005–2009
- President/Editor-in-chief, PHROTH (Penn State's Humor Magazine), 2003–2004
- Penn State Debate Team
- HKN Electrical and Computer Engineering Honors Society
- Golden Key National Honors Society

Technical

Programming Languages
○ C ○ C++
○ Java ○ C Sharp
○ Python ○ MATLAB

Statistics and analysis
○ SPSS ○ SAS
○ R

Game engines
○ Gamebryo ○ Unity

Other
○ LaTeX ○ git

Media appearances

Appeared on the Voices of VR podcast, episode 130, "Richard Skarbez on Immersion & Coherence being the two key components of Presence in Virtual Reality" [link]. This episode was chosen by host Kent Bye as #1 of his top 10 episodes for getting started in VR [link].

Also appeared on the Voices of VR podcast, episode 555, "VR Presence Researcher Finds Full Embodiment to be Key Component in Plausibility" [link].

Appeared on the Beyond the Headset podcast, episode 5, "How We Fool Ourselves into Thinking We're Somewhere Else" [link].

Was interviewed by Bushra Anjum for ACM Ubiquity as part of its *Innovation Leaders* series, "The Elements of Compelling Virtual (Immersive) Experiences" [link].