

Wayne Piekarski (PhD) – Expanded Academic CV

1 Personal information

Name: Wayne Piekarski

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Location	San Jose, California, USA

2 Experience

- [1] May 2023 to Present – **Reality Labs at Meta**, Burlingame, California - <https://about.meta.com/realitylabs>
Software Engineer
- [2] February 2014 to Present – **Google**, Mountain View, California - <http://google.com>
Staff Developer Advocate
- [3] September 2010 to February 2014 – **Qualcomm Bay Area R&D**, Santa Clara, California – <http://qualcomm.com>
Staff Engineer
- [4] July 2007 to September 2010 - **WorldViz LLC**, Santa Barbara, California - <http://www.worldviz.com>
Development manager
- [5] Jun 2007 to present - School of Computer and Information Science, **University of South Australia**
Adjunct Senior Research Fellow, completed supervision of three PhD students
- [6] March 2008 to September 2010 - Santa Barbara County Animal Shelter - <http://www.k9pals.org>
Volunteer adoption counsellor and dog trainer on weekends, maintain and develop web site
- [7] July 2003 to June 2007 - School of Computer and Information Science, **University of South Australia**
Senior Lecturer in Virtual Reality and Wearable Computers
Co-Director of the Wearable Computer Lab – <http://wearables.unisa.edu.au>
Course coordinator for Operating Systems and Computer Graphics
Lecturer for Object Oriented Data Modelling (HKBU) and Computer and Internet Technology.
- [8] 2004 to 2007 – Director of Research at **A-Rage Pty Ltd**
Spin off company to commercialise WCL/UniSA technology.
- [9] April 1999 to June 2003 - Postgraduate Research at the **University of South Australia**
PhD thesis title: *Interactive 3D Modelling in Outdoor Augmented Reality Worlds*
- [10] September 1999 to December 1999 - **University of North Carolina, Chapel Hill, USA**
Visiting researcher at the Department of Computer Science
- [11] April 1996 to May 2001 - **SE Network Access Pty Ltd**
Manager of Research and Development

3 Academic qualifications

- [1] PhD in Information Technology, University of South Australia, 2004.
Thesis title: *Interactive 3D Modelling in Outdoor Augmented Reality Worlds*.
<http://www.tinmith.net/wayne/thesis>
Supervised by Prof. Bruce Thomas. Awarded APA scholarship from the Australian government, Tall Poppy Science Award, Vice Chancellor’s Award for Innovation, and ITEE best publication awards.
- [2] Bachelor of Engineering in Computer Systems Engineering, University of South Australia, 1998.
First class honors. Ranked #1 in the CSE class of 1998. Awarded the Keith Johninke Medal, University of South Australia Medal, Chancellor’s Award List, Dean’s Merit List, six subject prizes, and scholarship.

4 Technical experience

Extensive experience both in academia and industry areas, with a wide range of skills in many diverse fields, as well as the ability to manage and work with teams of people, and to operate in a competitive environment. Also a highly flexible person and able to learn new skills very quickly.

4.1 Augmented reality, virtual reality, and computer graphics

- [1] Implementation of augmented reality and virtual reality applications on mobile wearable computers.
- [2] Design and construction of 3D input devices and techniques for interaction with VR and AR systems.
- [3] Development of applications for head-mounted, immersive CAVE, handheld, and watch-based displays.
- [4] Understanding of most 2D and 3D algorithms and mathematics, low-level frame buffer programming.
- [5] Development of complex clustered CAVE and HMD systems.

4.2 Programming and tools

- [1] Expert developer in C and C++ languages in Unix environments since 1996.
- [2] Writing Unix-based software using GNU software development tools, such as:
 - Makefiles, link farms, static and dynamic libraries, object file linking
 - Debugging tools like GDB, strace, custom code, malloc debuggers
 - Compiler optimisations and features
 - Profiling code to achieve maximum performance
- [3] Writing Android and ARM-based mobile phone/tablet devices using NDK/SDK tools.
- [4] Writing Windows-based software using Microsoft Visual Studio development tools.
- [5] Versioning control systems for software development, such as GIT, Subversion, and CVS.
- [6] Unix systems programming, including detailed understanding of memory protection, file systems, I/O, CPUs, and system calls, and how they affect the performance and operation of programs.
- [7] BSD sockets API, non-blocking complex TCP/IP client/server applications, and fixing network problems.
- [8] Writing graphical user interface programs using Android, Qt, OpenGL, Motif, and Xlib.
- [9] Building embedded Debian/Ubuntu Linux systems for use in mobile computers with no standard I/O devices.
- [10] Programming in Bash and Python scripting languages.
- [11] Administration of Linux, Windows, and OS X systems.
- [12] Development of toolkits for developing CGI-based web interfaces to SQL databases.
- [13] Familiar with ARM, Intel 80x86, Motorola 68000, Motorola 68HC11, and MOS 6502 assembly language
- [14] Familiar with Java, PHP, Sed, Awk, Javascript, Basic, and Pascal.

4.3 Electronics and hardware design

- [1] Recognized expert in the area of mobile outdoor wearable computing.
- [2] Development of the complete Tinmith augmented reality backpack with embedded computer and software.
- [3] Development of wireless Bluetooth input gloves for implementing 3D user interfaces outdoors.
- [4] Understanding of problems in the development of wearable and mobile computers to be used outdoors.
- [5] Design of simple circuits on printed circuit boards and also wire wrapping.
- [6] The design and construction of a working 68000-based computer with wire-wrapped motherboard.
- [7] Use of microcontrollers such as 68000, 68HC11, Basic Stamp, PIC, and MSP430.

4.4 Indoor and outdoor tracking

- [1] Wide range of experience in the use and deployment of 3D tracking devices for indoor and outdoor usage.
- [2] Complete understanding of how most types of tracking systems work, such as optical, magnetic, inertial, gyroscopic, GPS, and ultrasonic, in both indoor and outdoor environments.
- [3] Understanding the implementation of survey-grade GPS systems and obtaining the best accuracy.
- [4] Processing coordinates to perform datum and projection transformations, and distance and bearing computations.
- [5] Capture of buildings and other terrestrial data using currently available methods such as laser scanning and stereo photography.

5 Leadership

5.1 Google roles

- [1] Educate developers about Android, the Google Assistant, Android Wear, Android TV, Android Auto, and Glass.
- [2] Advocate for developers internally in the company, ensuring they have the right tools and information.

5.2 Qualcomm roles

- [1] Research into multi-core and heterogeneous computing problems on mobile Android-based devices.
- [2] Understand Qualcomm Snapdragon system-on-chip and provide guidance for hardware and software architecture.
- [3] Design software tools to simplify multi-core programming for C++ programmers.
- [4] Study WebKit and HTML5 browser technology to find possible multi-core optimizations.

5.3 WorldViz roles

- [1] Management, development, and testing of the Precision Position Tracker system, a 6DOF optical tracking system supporting multiple markers in large environments.
- [2] Customer application design, integration, and programming – designing solutions for large customer virtual reality installations, including CAVEs, HMDs, and motion capture systems, and leading integration amongst teams of vendors.
- [3] Provide leadership in software engineering and development methodologies for company programmers, and design and manage software source control repositories and backup systems.
- [4] Provide engineering and research experience to the sales and development teams, including contacts within the industry and academia.
- [5] Attend conferences and high-end customer sites to meet with current and potential customers, and perform software programming and installations.

5.4 University roles

- [1] Co-Director of the Wearable Computer Lab, Advanced Computing Research Centre, School of Computer and Information Science. 2006 to 2007.
- [2] Assistant Director of the Wearable Computer Lab, Advanced Computing Research Centre, School of Computer and Information Science. 2003 to 2006.
- [3] School of Computer and Information Science – Co-Manager of the CIS Hardware Workshop. 2005 to 2007.
- [4] University of South Australia, Academic Board Member. 2006 to 2007.
- [5] Division of Information Technology, Engineering and the Environment – Member of Divisional Research Grants Subcommittee. 2004 to 2007.
- [6] Division of Information Technology, Engineering and the Environment – Member of review committee for Information Technology Support Services. 2006.

- [7] School of Computer and Information Science – Chair of the Information Technology Advisory Committee. 2006 to 2007.
- [8] School of Computer and Information Science – Leader of the Programming Strand. 2006 to 2007.
- [9] School of Computer and Information Science – Acting Research Degrees Coordinator. Jan 2006.

5.5 Conference leadership

- [1] Program committee member for the IEEE Virtual Reality Conference in Walham, Ma, Mar 2010.
- [2] Program committee member for the IEEE Virtual Reality Conference in Lafayette, La, Mar 2009.
- [3] International program committee member for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Nara, Japan, Nov 2007.
- [4] *Conference co-chair and session chair for the Australasian User Interface Conference in Ballarat, Victoria, Jan 2007.
- [5] *Co-general chair and session chair for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Santa Barbara, Ca, Oct 2006.
- [6] International program committee member for the Annual Conference of the European Association for Computer Graphics, Prague, Czech Republic, Sep 2007.
- [7] Program committee member for the Eurographics Symposium on Virtual Environments and Immersive Projection Technology Workshop, Weimar, Germany, Jul 2007.
- [8] Program committee member for the IEEE International Workshop on Smart Appliances and Wearable Computing in Toronto, Canada, Jun 2007.
- [9] International program committee member for the ACM International Conference on Computer Graphics and Interactive Techniques in Kuala Lumpur, Malaysia, Nov 2006.
- [10] Program committee member and session chair for the International International Workshop on Mobile Geospatial Augmented Reality in Banff, Canada, May 2006.
- [11] *Conference chair and session chair for the Australasian User Interface Conference in Hobart, Tasmania, Jan 2006.
- [12] Program committee member and session chair for the IEEE International Workshop on Horizontal Interactive Human-Computer Systems, Adelaide, South Australia, Jan 2006.
- [13] Session chair at the Australasian User Interface Conference in Newcastle, Jan 2005.
- [14] *Asia-pacific area chair, program committee member, and session chair for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Vienna, Oct 2005.
- [15] *Asia-pacific area chair, program committee member, and session chair for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Washington DC, Oct 2004.
- [16] Program committee member and gadget show host for the IEEE International Symposium on Wearable Computers in Washington DC, Oct 2004.
- [17] Program committee member for the ACM International Conference on Advances in Computer Entertainment Technology, Singapore, Jun 2004.
- [18] Program committee member for the IEEE International Symposium on Wearable Computers in New York, Oct 2003.
- [19] Program committee member and discussion panellist at the IEEE AR Toolkit Workshop in Tokyo, Oct 2003.
- [20] International program committee member for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Tokyo, Oct 2003.
- [21] Program committee member, publicity chair, and gadget show host for the IEEE International Symposium on Wearable Computers in Seattle, Oct 2002.
- [22] International program committee member for the IEEE/ACM International Symposium on Mixed and Augmented Reality in Darmstadt, Oct 2002.

- [23] International program committee member for the IEEE/ACM Symposium on Augmented Reality in New York, Oct 2001.
- [24] *Journal reviewer for IEEE Computer Graphics and Applications (CG&A).
- [25] *Paper reviewer for ACM User Interface Software Technology (UIST).
- [26] *Paper reviewer for ACM Computer Human Interaction (CHI).
- [27] *Paper reviewer for IEEE Virtual Reality (VR).
- [28] Paper reviewer for IEEE Visualisation (VIS).
- [29] *Paper reviewer for IEEE Symposium on 3D User Interfaces (3DUI).
- [30] Paper reviewer for Advances in Computing Entertainment (ACE).
- [31] Journal reviewer for Interacting with Computers (IwC).
- [32] Journal reviewer for Electronics and Telecommunications Research (ETRI).
- [33] Journal reviewer for IEEE Transactions on Systems, Man, and Cybernetics Part B.

6 Research grants

- [1] *Thomas, B. and Piekarski, W. ARC Grant - Through Walls Collaboration to Support Command and Control Operations with Eyes and Ears in the Field. \$93,000. 2005 - 2007.
- [2] *Piekarski, W. Australian Defence Simulation Office - Development of augmented reality simulation hardware and software. ~\$120,000 to develop new backpacks, simulation software, and advanced demonstrations. 2005-2006.
- [3] Piekarski, W. ITEE Small Grants Scheme 2007 – Augmented Reality Applications For Mining Support. \$10,000 for construction costs to supplement funding from University of Melbourne. 2007.
- [4] *Rawling, T., Piekarski, W., and Ailleres, L. Melbourne University Early Career Researcher Grant Scheme – Augmented Reality Systems for the Mining and Mineral Exploration Industry. \$40,000 to develop test system for future ARC grants. 2006.
- [5] Piekarski, W. Nokia Research. 5,000 Euros to support development of mobile augmented reality applications using mobile phones. 2006.
- [6] Piekarski, W. Defence Science Technology Organisation – Project Strawman. \$25,000 for computer equipment and student scholarships for software engineering project to develop JOWST prototype. 2006.
- [7] Piekarski, W., Stafford, A., and Smith, R. ITEE Small Grants Scheme 2006 – Shoulder to shoulder collaborative modelling for remote communications. \$10,000 to buy equipment for our tabletop research initiatives. 2006.
- [8] Stafford, A., and Piekarski, W. Apple University Consortium - Streaming Video Infrastructure for Collaborative Outdoor Augmented Reality Applications. \$9,500 of Apple equipment to support our research. 2006.
- [9] Piekarski, W. MetaVR Inc - Military simulation software from MetaVR. US\$9,000 worth of software licenses to support or research. 2006.
- [10] Piekarski, W. Apple University Consortium - Apple Technologies To Improve Mobile Outdoor Augmented Reality Applications. \$10,000 of Apple equipment to support our research. 2005.
- [11] Piekarski, W. ITEE Small Grants Scheme 2005 - Robotic Sensor Platforms for Assisted Outdoor 3D Modelling and Situational Awareness. \$7,000 to support the development of outdoor robots to support existing projects. 2005.
- [12] Piekarski, W. ITEE Small Grants Scheme 2005 - Advanced Multimedia and Entertainment Prototypes for Mobile Augmented Reality. \$3,000 to support research student over summer vacation. 2004.
- [13] Piekarski, W. ITEE Small Grants Scheme 2004 – Collaborative Environments for Outdoor Augmented Reality Research. \$10,000 to support new equipment, and software/hardware development, 2004.
- [14] Piekarski, W. and Wigley, G. ITEE Small Grants Scheme 2004 – Mobile Hand Tracking for Augmented Reality Using Field Programmable Gate Arrays. \$3,000 to support research student over summer vacation. 2004.

- [15] Piekarski, W. and Thomas, B. Trimble Navigation Via HIT Lab New Zealand. \$50,000 worth of real-time kinematic GPS equipment donated to the WCL. Sep 2003.
- [16] Thomas, B. and Piekarski, W. Singapore DSTA - Ubiquitous Computing for Soldier Platform. \$30,000 for software development and research. 2003.
- [17] Thomas, B. and Piekarski, W. DSTO Research Agreement – Augmented Reality Applications for Command and Control. \$15,000 for equipment and software development, plus resources for backpack redesign. 2002.
- [18] Piekarski, W. and Thomas, B. ITEE Small Grants Scheme 2001 – Modelling Outdoor Structures Using Augmented Reality and 3D Tracking Devices. \$10,000 for purchase of equipment. 2001.
- [19] Thomas, B. and Piekarski, W. DSTO Research Agreement – Concept Demonstration of Augmented Reality Techniques. \$15,000 for software development. 2000.

7 Awards

- [1] South Australian Young Tall Poppy Science Award, awarded for outstanding achievements in the area of science to new researchers. 2004.
- [2] Finalist - ACS Pearcey Foundation State Award. Awarded to an individual early in their career who has demonstrated innovative and pioneering achievement and contribution to research and development within the IT&T industry. 2004.
- [3] UniSA Vice Chancellor's Awards for Innovation - Product Category. Awarded to the Tinmith augmented reality project from the Wearable Computer Lab, for the most innovative new research product developed at the university. 2003.
- [4] National Finalist - Fresh Science. Fresh Science provides a national forum for 16 young scientists to explain their work to the public and interact with the media, to make science interesting, relevant, and accessible. 2003.
- [5] Finalist – University of South Australia Postgraduate Student of the Year. Awarded to the most outstanding postgraduate student in the division of Information Technology, Environment, and Engineering. 2003.
- [6] National finalist - Australian Museum Eureka Prize for ICT Innovation. Awarded to an individual, team or organisation for outstanding innovation in the research, design, development or implementation of projects related to the Information and Communications Technology (ICT) industry. 2002.
- [7] Best Student Paper - Australian User Interface Conference. Awarded to the best student paper at the Australian User Interface Conference, decided by the program committee of the conference. 2002.

8 Publications

Copies of publications as PDFs are available from <http://www.tinmith.net/wayne/publications.htm>

8.1 Patents

- [1] Smith, R., Thomas, B. H., Piekarski, W., Digital Foam. In US Patent 2010/0225340-A1, Sep 2010.

8.2 Internationally refereed conference papers

- [2] Cascaval, C., Fowler, S., Montesinos-Ortego, P., Piekarski, W., Reshadi, M., Robotmili, B., Weber, M., Bhavsar, V., ZOOMM: A Parallel Web Browser Engine for Multicore Mobile Devices. In 18th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming. Shenzhen, China. Feb 2013.
- [3] Smith, R. T., Thomas B. H., and Piekarski, W., Digital Foam Interaction Techniques for 3D Modelling. In 15th ACM Symposium on Virtual Reality Software and Technology. Bordeaux, France. Oct 2008.
- [4] Avery, B., Thomas, B., and Piekarski, W. User Evaluation of See-Through Vision for Mobile Outdoor Augmented Reality. In 7th Int'l Symposium on Mixed and Augmented Reality. pp 69-72. Cambridge, UK. Sep 2008.
- [5] Stafford, A., Thomas, B. H., and Piekarski, W. Efficiency of Techniques for Mixed-Space Collaborative Navigation. In 7th Int'l Symposium on Mixed and Augmented Reality, pp 181-182, Cambridge, UK, Sep 2008.

- [6] Smith, R. T., Thomas, B. H., and Piekarski, W. Tech Note: Digital Foam. In IEEE Symposium on 3D User Interfaces, Reno, NV, Mar 2008.
- [7] Stafford, A., Piekarski, W. and Thomas, B. H., HOG on a WIM. In IEEE Virtual Reality 2008, pp 289-290, Reno, NV, Mar 2008.
- [8] Avery, B., Piekarski, W., and Thomas, B. Visualizing Occluded Physical Objects in Unfamiliar Outdoor Augmented Reality Environments. In 6th Int'l Symposium on Mixed and Augmented Reality. pp 285-286. Nara, Japan. 2007.
- [9] Piekarski, W. and Smith, R. Robust Gloves For 3D Interaction In Mobile Outdoor AR Environments. In 5th Int'l Symposium on Mixed and Augmented Reality, Santa Barbara, Ca, Oct 2006.
- [10] Stafford, A., Piekarski, W., and Thomas, B. H. Implementation of God-like Interaction Techniques For Supporting Collaboration Between Indoor and Outdoor Users. In 5th Int'l Symposium on Mixed and Augmented Reality, Santa Barbara, Ca, Oct 2006.
- [11] Piekarski, W. Simple Collaborative Indoor-Outdoor Modelling Using Mobile Augmented Reality. In 1st Int'l Workshop on Mobile Geospatial Augmented Reality, Banff, Canada, May 2006.
- [12] King, G. R., Piekarski, W., and Thomas, B. ARVino - Outdoor Augmented Reality Visualisation of Viticulture GIS Data. In 4th Int'l Symposium on Mixed and Augmented Reality, Vienna, Austria, Oct 2005.
- [13] Phillips, K. and Piekarski, W. Possession Techniques for Interaction in Real-time Strategy Augmented Reality Games. In ACM Int'l Conference on Advances in Computer Entertainment Technology, Valencia, Spain, Jun 2005.
- [14] *Piekarski, W., Avery, B., Thomas, B. H., and Malbezin, P. Integrated Head and Hand Tracking for Indoor and Outdoor Augmented Reality. In IEEE Virtual Reality Conference, Chicago, IL, Mar 2004.
- [15] Piekarski, W., Smith, R., Wigley, G., Thomas, B., and Kearney, D. Mobile Hand Tracking Using FPGAs for Low Powered Augmented Reality. In 8th Int'l Symposium on Wearable Computers, Arlington, Va, Oct 2004.
- [16] *Piekarski, W. and Thomas, B. H. Augmented Reality Working Planes: A Foundation for Action and Construction at a Distance. In 3rd Int'l Symposium on Mixed and Augmented Reality, Arlington, Va, Oct 2004.
- [17] Piekarski, W., Smith, R., and Thomas, B. H. Designing Backpacks for High Fidelity Mobile Outdoor Augmented Reality. In 3rd Int'l Symposium on Mixed and Augmented Reality, Arlington, Va, Oct 2004.
- [18] *Piekarski, W. and Thomas, B. H. Interactive Augmented Reality Techniques for Construction at a Distance of 3D Geometry. In Immersive Projection Technology / Eurographics Virtual Environments, Zurich, Switzerland, May 2003.
- [19] Piekarski, W. and Thomas, B. H. ThumbsUp: Integrated Command and Pointer Interactions for Mobile Outdoor Augmented Reality Systems. In HCI International, Crete, Greece, June 2003.
- [20] Piekarski, W., Avery, B., Thomas, B. H., and Malbezin, P. Hybrid Indoor and Outdoor Tracking for Mobile 3D Mixed Reality. In 2nd Int'l Symposium on Mixed and Augmented Reality, Tokyo, Japan, Oct 2003.
- [21] *Piekarski, W. and Thomas, B. H. An Object Oriented Software Architecture for 3D Mixed Reality Applications. In 2nd Int'l Symposium on Mixed and Augmented Reality, Tokyo, Japan, Oct 2003.
- [22] Piekarski, W. and Thomas, B. H. Software Architectures for the Development of Interactive Augmented Reality Modelling Applications. In International Workshop on Software Technology for Augmented Reality Systems, Tokyo, Japan, Oct 2003.
- [23] Piekarski, W. and Thomas, B. H. Augmented Reality User Interface and Techniques for Outdoor Modelling. In ACM SIGGRAPH Symposium on Interactive 3D Graphics, Monterey, Ca, Apr 2003.
- [24] Piekarski, W. and Thomas, B. H. Tinmith-Hand: Unified User Interface Technology for Mobile Outdoor Augmented Reality and Indoor Virtual Reality. In IEEE Virtual Reality, Orlando, FL, Mar 2002.
- [25] Piekarski, W. and Thomas, B. H. Using ARToolKit for 3D Hand Position Tracking in Mobile Outdoor Environments. In 1st Int'l Augmented Reality Toolkit Workshop, Darmstadt, Germany, Sep 2002.
- [26] Piekarski, W. and Thomas, B. H. Bread Crumbs: A Technique for Modelling Large Outdoor Ground Features. In Int'l Symposium on Mixed and Augmented Reality, Darmstadt, Germany, Oct 2002.

- [27] Piekarski, W. and Thomas, B. H. Tinmith-Metro: New Outdoor Techniques for Creating City Models with an Augmented Reality Wearable Computer. In 5th Int'l Symposium on Wearable Computers, pp 31-38, Zurich, Switzerland, Oct 2001.
- [28] Piekarski, W. and Thomas, B. H. Tinmith-evo5 - An Architecture for Supporting Mobile Augmented Reality Environments. In 2nd Int'l Symposium on Augmented Reality, pp 177-178, New York, NY, Oct 2001.
- [29] Piekarski, W., Thomas, B., Hepworth, D., Gunther, B., and Demczuk, V. An Architecture for Outdoor Wearable Computers to Support Augmented Reality and Multimedia Applications. In 3rd Int'l Conference on Knowledge-Based Intelligent Information Engineering Systems, pp 70-73, Adelaide, SA, Aug 1999.
- [30] Piekarski, W., Gunther, B., and Thomas, B. Integrating Virtual and Augmented Realities in an Outdoor Application. In 2nd Int'l Workshop on Augmented Reality, pp 45-54, San Francisco, Ca, Oct 1999.
- [31] Malbezin, P., Piekarski, W., and Thomas, B. H. Measuring ARToolKit Accuracy in Long Distance Tracking Experiments. In 1st Int'l Augmented Reality Toolkit Workshop, Darmstadt, Germany, Sep 2002.
- [32] Thomas, B. H., Krul, N., Close, B., and Piekarski, W. Usability and Playability Issues for ARQuake. In 1st Int'l Workshop on Entertainment Computing, Tokyo, Japan, May 2002.
- [33] Thomas, B., Close, B., Donoghue, J., Squires, J., De Bondi, P., Morris, M., and Piekarski, W. ARQuake: An Outdoor/Indoor Augmented Reality First Person Application. In 4th Int'l Symposium on Wearable Computers, pp 139-146, Atlanta, Ga, Oct 2000.
- [34] Thomas, B. H., Demczuk, V., Piekarski, W., Hepworth, D., and Gunther, B. A Wearable Computer System With Augmented Reality to Support Terrestrial Navigation. In 2nd Int'l Symposium on Wearable Computers, pp 168-171, Pittsburg, Pa, Oct 1998.
- [35] Slay, H., Thomas, B., Vernik, R., and Piekarski, W. A Rapidly Adaptive Collaborative Ubiquitous Computing Environment to Allow Passive Detection of Marked Objects. In Asia Pacific CHI, Rotorua, New Zealand, Jun 2004.
- [36] Toney, A., Mulley, B., Thomas, B. H., and Piekarski, W. Minimal Social Weight User Interactions for Wearable Computers in Business Suits. In 6th Int'l Symposium on Wearable Computers, Seattle, Wa, Oct 2002.

8.3 Internationally refereed journals

- [1] Piekarski, W. and Thomas, B. H. Through-Walls Collaboration. *IEEE Pervasive Computing*, Vol. 8, No. 3, pp 42-49, 2009.
- [2] *Piekarski, W. 3D Modelling with the Tinmith Mobile Outdoor Augmented Reality System. *IEEE Computer Graphics and Applications*, Vol. 26, No. 1, pp 14-17, 2006.
- [3] *Piekarski, W. and Thomas, B. H. ARQuake: The Outdoor Augmented Reality Gaming System. *Communications of the ACM*, Vol. 45, No. 1, pp 36-38, 2002.
- [4] Piekarski, W. and Thomas, B. H. The Tinmith System - Demonstrating New Techniques for Mobile Augmented Reality Modelling. *Journal of Research and Practice in Information Technology*, Vol. 34, No. 2, pp 82-97, 2002.
- [5] Thomas, B. H., Quirchmayr, G., and Piekarski, W. Through Walls Communication for Medical Emergency Services. *International Journal of Human Computer Interaction*, 2002.
- [6] Thomas, B. H., Close, B., Donoghue, J., Squires, J., De Bondi, P., and Piekarski, W. First Person Indoor/Outdoor Augmented Reality Application: ARQuake. *Personal and Ubiquitous Computing*, Vol. 6, No. 2, 2002.
- [7] Thomas, B. H. and Piekarski, W. Glove Based User Interaction Techniques for Augmented Reality in an Outdoor Environment. *Virtual Reality: Research, Development, and Applications*, Vol. 6, No. 3, 2002.
- [8] Toney, A., Mulley, B., Thomas, B. H., and Piekarski, W. Social weight: designing to minimise the social consequences arising from technology use by the mobile professional. *Personal and Ubiquitous Computing*, Vol. 7, No. 5, pp 309-320, 2003.
- [9] Thomas, B. H., Piekarski, W., and Gunther, B. Using augmented reality to visualize architecture designs in an outdoor environment. *Int'l Journal of Design Computing*, Vol. 2, 2000.

8.4 Nationally refereed conference papers

- [1] Stafford, A., Thomas, B. H., and Piekarski, W. Comparison of Techniques for Mixed-Space Collaborative Navigation. In 10th Australasian User Interface Conference, Wellington, New Zealand, Jan 2009.
- [2] Stafford, A., and Piekarski, W. User evaluation of god-like interaction techniques. In 9th Australasian User interface conference, Wollongong, NSW, Jan 2008.
- [3] Smith, R. T., and Piekarski, W. Public and Private Workspaces on Tabletop Displays. In 9th Australasian User Interface Conference, Wollongong, NSW, Jan 2008.
- [4] Avery, B., Piekarski, W., Warren, J., and Thomas, B. H. Evaluation of User Satisfaction and Learnability For Outdoor Augmented Reality Gaming. In 7th Australasian User Interface Conference, Hobart, Tas, Jan 2006.
- [5] Avery, B., Thomas, B. H., Velikovskiy, J., and Piekarski, W. Outdoor Augmented Reality Gaming on Five Dollars a Day. In 6th Australasian User Interface Conference, Newcastle, NSW, Jan 2005.
- [6] Hutterer, P., Smith, M. T., Thomas, B. H., Piekarski, W., and Ankcorn, J. Lightweight User Interfaces for Watch Based Displays. In 6th Australasian User Interface Conference, Newcastle, NSW, Jan 2005.
- [7] Hutterer, P., Smith, M. T., Ankcorn, J., Piekarski, W., and Thomas, B. H. A Lightweight UI Software Infrastructure for Wrist-based Displays: If Your Microwave Oven Could Talk To Your Watch, What Would It Say? In 3rd Int'l Conference on Information Technology and Applications, Sydney, NSW, Jul 2005.
- [8] Smith, R., Piekarski, W., and Wigley, G. Hand Tracking For Low Powered Mobile AR User Interfaces. In 6th Australasian User Interface Conference, Newcastle, NSW, Jan 2005.
- [9] Piekarski, W. and Thomas, B. H. The Tinmith System - Demonstrating New Techniques for Mobile Augmented Reality Modelling. In 3rd Australasian User Interfaces Conference, Melbourne, Vic, Jan 2002.
- [10] Piekarski, W., Hepworth, D., Demczuk, V., Thomas, B., and Gunther, B. A Mobile Augmented Reality User Interface for Terrestrial Navigation. In 22nd Australasian Computer Science Conference, pp 122-133, Auckland, NZ, Jan 1999.

8.5 Editing, book chapters, and theses

- [1] Avery, B., Smith, R. T., Piekarski, W., and Thomas, B. H. Chapter 11 – Designing Outdoor Mixed Reality Hardware Systems. In *The Engineering of Mixed Reality System*. Eds, Dubois et al. Springer-Verlag. 2010.
- [2] Piekarski, W. and Plimmer, B. Editors. *Proceedings of the 8th Australasian User Interface Conference. Conferences in Research and Practice in Information Technology*, Vol. 64, 2007.
- [3] Piekarski, W. Real-Time 3D Design Modelling of Outdoor Structures Using Mobile Augmented Reality Systems. In *Emerging Technologies of Augmented Reality - Interfaces and Design*. Eds, Haller, M., Billinghamurst, M., and Thomas, B. 2007.
- [4] Piekarski, W. and Thomas, B. H. Outdoor Augmented Reality Technology and the Military. In *Space Time Play - On the Synergy between Computer Games, Architecture, and Urbanism*. Birkhäuser Publishing, 2007.
- [5] Piekarski, W. and Thomas, B. H. Tinmith Mobile Outdoor 3D Modelling Using Augmented Reality. In *Space Time Play - On the Synergy between Computer Games, Architecture, and Urbanism*. Birkhäuser Publishing, 2007.
- [6] Thomas, B. H. and Piekarski, W. ARQuake. In *Space Time Play - On the Synergy between Computer Games, Architecture, and Urbanism*. Birkhäuser Publishing, 2007.
- [7] Piekarski, W. Editor. *Proceedings of the 7th Australasian User Interface Conference. Conferences in Research and Practice in Information Technology*, Vol. 50, 2006.
- [8] Piekarski, W. and Thomas, B. H. Future Use of Augmented Reality for Environmental and Landscape Planners. In E. Lange and I. Bishop, *Visualization In Landscape and Environmental Planning*, Taylor and Francis Books Ltd, 2005.
- [9] Piekarski, W. *Interactive 3D Modelling In Outdoor Augmented Reality Worlds*. PhD Thesis, School of Computer and Information Science, University of South Australia, Adelaide, SA, 2004.

8.6 Technical reports and other publications

- [1] Piekarski, W. Hacking Your Own Virtual Reality For Fun And Profit. In 6th Australian Linux Conference, Canberra, ACT, Jan 2005.
- [2] Piekarski, W. Hacking Your Own Virtual Reality For Fun And Profit. In 5th Australian Linux Conference, Adelaide, SA, Jan 2004.
- [3] Piekarski, W. and Thomas, B. H. ARQuake - Modifications and Hardware for Outdoor Augmented Reality Gaming. In 4th Australian Linux Conference, Perth, WA, Jan 2003.
- [4] Piekarski, W. and Thomas, B. H. Tinmith-evo5 - A Software Architecture for Supporting Research Into Outdoor Augmented Reality Environments. Technical Report, University of South Australia, Adelaide, SA, Report No. CIS-02-001, Jan 2002.
- [5] Piekarski, W. and Thomas, B. H. Unifying Augmented Reality and Virtual Reality User Interfaces. Technical Report, University of South Australia, Adelaide, SA, Jan 2002.
- [6] Piekarski, W. and Thomas, B. H. Tinmith - Augmented Reality With Wearable Computers Running Linux. In 2nd Australian Linux Conference, Sydney, NSW, Jan 2001.

8.7 Invited keynotes and presentations

- [1] Invited panellist at the ACM Symposium on Virtual Reality Software and Technology, Newport Beach, CA, Nov 2007.
- [2] Keynote speaker at the International Workshop on Mobile Geospatial Augmented Reality in Banff, Canada, May 2006.
- [3] Invited speaker at NICTA HxI workshop in Sydney, NSW. Aug 2006.
- [4] Invited speaker at the Australian Linux Conference - Sydney 2001, Brisbane 2002, Perth 2003, Adelaide 2004, Canberra 2005, and Dunedin 2006.
- [5] Invited speaker at Rixc new media conference in Riga, Latvia. May 2003.
- [6] Invited speaker at Campus Party 2002 in Valencia, Spain. Aug 2002.
- [7] Riku Suomela. June 2006. PhD Opponent – Tampere University of Technology, Tampere, Finland. Thesis title: *Constructing and Examining Location-Based Applications and Their User Interfaces by Applying Rapid Software Development and Structural Analysis.*

8.8 Intellectual property

- [1] Piekarski, W. Tinmith software architecture for outdoor augmented reality on wearable computers. Licensed to Australian Defence Simulation Office, 2005.
- [2] Piekarski, W. Software library for processing GPS positions and POSIX serial ports. Licensed to A-Rage Pty Ltd through ITEK, 2004.

9 Teaching

9.1 PhD research students

Primary supervisor for the following PhD students:

- [1] Aaron Stafford – Started 2004, graduated 2008. Thesis title: *Shoulder-to-shoulder 3D modelling for remote communication*.
- [2] Ben Avery – Started 2005, graduated 2009. Thesis title: *Interaction and visualisation techniques for multiple remote telepresence vehicles in outdoor augmented reality environments*.
- [3] Ross Smith – Started 2005, graduated 2009. Thesis title: *Digital Foam: A 3D input device*.

Associate supervisor for the following PhD student:

- [1] Peter Hutterer – Started 2005, graduated 2008. Primary Supervisor: Bruce Thomas. Thesis title: *Tools to support multi presence groupware*.

9.2 Course coordination and lecturing

- [1] Course coordinator and lecturer, Computer Graphics COMP 4015 - 2006 SP5, 2005 S2, 2004 S2.
- [2] Course coordinator and lecturer, Operating Systems EEET 3024 - 2007 SP2, 2006 SP2.
- [3] Course coordinator and lecturer, Computer Systems Architecture EEET 3024 - 2005 S1, 2004 S1.
- [4] Course lecturer, Engineering Programming COMP 1015 - 2006 SP2, 2005 S1, 2004 S1.
- [5] Course moderator, Virtual Reality, 2006 SP5, 2005 S2, 2004 SP2.
- [6] Course moderator, Data and Web Engineering, 2006 SP2, 2005 S1, 2004 S1.
- [7] Course lecturer, Data Modelling and Database Design INFS 2004 - Hong Kong 2006.
- [8] Course lecturer, Object Oriented Data Modelling INFS 2004 - Hong Kong 2005, 2004, 2003, 2001.
- [9] Course coordinator and lecturer, Computer and Internet Technology, 2001 S1, 2000 S2, 2000 S1.