

# Curriculum Vitae

## Jeffrey Jacobson, Ph. D

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### **Education**

**Ph.D.**, (April) 2008, Information Science at the University of Pittsburgh.

**MS**, 1997, Information Science at the University of Pittsburgh.

**BA**, 1986, Computer Science, University of Texas at Austin.

**AS**, 1984, Physics, Austin Community College.

**AA**, 1984, Economics, Austin Community College.

### **Museum Installations**

**Carnegie Museum of Natural History**, Pittsburgh, PA. **The Virtual Egyptian Temple**. (September, **2006, to the present**) Jacobson, J.; Darnell, M.; Holden, L.; Handron, K.; and Kuehne, R. The temple is installed in the museum's Earth Theater, which seats sixty people within the arc of a single curved screen, measuring 210 degrees in the horizontal. The temple itself is a navigable 3D model suitable for guided tours. The installation depends upon three open-source freeware projects that I managed: CaveUT, VRGL, and the virtual Egyptian Temple itself. All are available at [www.PublicVR.org](http://www.PublicVR.org). For all three projects, I provided the design, day-to-day management, testing and evaluation, documentation, recruitment, web hosting, the very earliest versions of the artwork, and the earliest version of the code. See the Leadership section for details. The temple is tied thematically to the museum's Walton Hall of Egyptology, with virtual duplicates of certain objects in the virtual space.

**Gulf Coast Explorium Science Center**, Mobile, Alabama. **Virtual Pompeii in A Day In Pompeii**. (January-June **2007**) Jacobson, J.; Polo, V.; Weis, A.; et al. The Virtual Pompeii exhibit, which was shown at the DeYoung Museum (see reference below) was incorporated into a larger show, A Day in Pompeii. Since that time, I had converted the 3D artwork to VMRL format, and Polo made significant improvements to it. Weis and I also provided supporting historical information and advice on how to present the 3D model to audiences. The Science Center showed the 3D model in its **Digital Theater**, a partial-cylinder display measuring 120 degrees in the horizontal and seating approximately 30 people. Both Virtual Pompeii and its host exhibit went on tour to three other museums. For details, see <http://artscool.cfa.cmu.edu/~hemef/pompeii/>.

**DeYoung Museum**, San Francisco, California, October (August, **1995**, to January, **1996**). **Virtual Pompeii**. Burgess, L.; Loeffler, C.; Jacobson J.; Vadnal, J.; Polo, V.; Jackson, N.; Stiel, H.; Nemeč, P.; Chick, R.; Marinelli, D.; Schussler, T.; Mount, M.; Goldwasser, D.;

Knepper, R.; Brodt, J.; Jacobs, S.; Salzer, E.; Dohm, N.; Allen, A.; Hudak, L.; Pietri, R.; and Sickles, D. (1995). A virtual reconstruction of part of the ancient Roman city of Pompeii, specifically the Temple of Isis, the Grand Theater, and the Triangular Forum. A human tour guide brought the audience through the virtual space, explaining it and answering questions along the way. One patron saw the virtual environment on a Head-Mounted Display (HMD), and the rest saw it on a large projection screen. I was both project manager and technical manager for the project, which was staffed almost completely with undergraduate students from various departments. I oversaw all stages of all components of the 3D model, sound, and animation, and actually did parts of the work when the students were unable or unavailable. See Jacobson (2005), "The Virtual Pompeii Project."

**Guggenheim Museum Soho**, New York, New York. **Virtual Reality: A New Artistic Medium**. (September to November, 1993) Burgess, L.; Loeffler, C.; Holden, L.; Jacobson, J.; Jackson, N.; and Yates, J. Users explored the Temple of Horus, an early virtual environment, which supported networked interaction between users. I did all the 3D artwork, shaping and texturing the temple in the virtual space. This was part of the Virtual Ancient Egypt project at the Studio for Creative Inquiry at Carnegie Mellon University.

## **Publications**

Jacobson, J. and Preussner, G. (2010). Virtually Immersive Theater With CaveUT 2.5, *World Conference on Educational Media (ED-Media)*, Toronto, Canada, June, 2010.

Johnston, A. and Jacobson, J. (2010). Virtual Temple, Virtual Priest, Real Experience, *Teacher's College Educational Technology Conference (TCETC)*, New York, NY, May, 2010.

Jacobson, J. (2010). Digital Dome Versus Desktop Computer in a Learning Game for Religious Architecture. *Annual Meeting of the American Educational Research Association (AERA)*, Denver, CO, April-May, 2010.

Jacobson, J., Weis, A., Twigg, A., and Tucker, S. (2010). CuratorVM, An Open Source Template for Virtual Museums. *Computer Applications in Archaeology (CAA)*, Granada, Spain, April, 2010.

Troche, J. and Jacobson, J. (2010). An Exemplar of Ptolemaic Egyptian Temples. *Computer Applications in Archaeology (CAA)*, Granada, Spain, April, 2010.

Weis, A., Jacobson, J., and Darnell, M. (2010). The Virtual Theater District of Pompeii. *Computer Applications in Archaeology (CAA)*, Granada, Spain, April, 2010.

Gillam, R., Innes, C., and Jacobson, J. (2010). Performance and Ritual in the Virtual Egyptian Temple. *Computer Applications in Archaeology (CAA)*, Granada, Spain, April, 2010

Jacobson, J., Handron, K., and Holden, L. (2009). Narrative and Content Combine in a Learning Game for Virtual Heritage, *Computer Applications in Archaeology*, Williamsburg, VA, 2010. Accepted for publication in the peer-reviewed hardcopy proceedings.

Jacobson, J. (2008). *Ancient Architecture in Virtual Reality; Does Immersion Really Aid Learning?* **Doctoral Dissertation**, School of Information Sciences, University of Pittsburgh. <http://planetjeff.net/Jacobson2008.pdf>, URN: etd-04222008-172117.

Henden, C., Champion, E., Muhlberger, R., and Jacobson, J. (2008). Sharing the Magic Circle with Spatially Inclusive Games, SIGGRAPH Asia, (publisher) December, 2008.

Henden, C., Champion, E., Muhlberger, R., and Jacobson, J. (2008). A Surround Display Warp-Mesh Utility to Enhance Player Engagement, *International Conference on Entertainment Computing*, September, 2008, Pittsburgh, PA.

Jacobson, J. and Holden L. (2007). Virtual Heritage: Living in the Past, *Techné: Research in Philosophy and Technology*, V10, No 3.

Duncan, M., Kelley, M., and Jacobson, J. (2006). High School Graduate Refines Gyromouse Interface For Virtual Reality; Preteens Play Crucial Role. *Computer Graphics Quarterly*, Vol. 40, No. 2, ACM SIGGRAPH (publisher), August, 2006.

Jacobson, J. and Lewis, L. (2005i). Game Engine Virtual Reality With CaveUT, *IEEE Computer*, 38, pp. 79-82.

Cavazza, M., Lugin, J., Hartly, S., Renard, M., Nandi, A., Jacobson, J., and Crooks, S. (2005). Intelligent Virtual Environments for Virtual Reality Art, *Computers and Graphics* 29(6): pp. 852-861.

Jacobson, J. and Vadnal, J. (2005p). The Virtual Pompeii Project, *World Conference on E-Learning in Corporate, Government, Health Care, and Higher Education (E-Learn)*, Vancouver, Canada, October 24 to 28, 2005.

Jacobson, J., Kelley, M., Ellis, S., and Seethaler, L. (2005c). Immersive Displays for Education Using CaveUT, *World Conference on Educational Multimedia, Hypermedia & Telecommunications*, Montreal, Canada, June 27 to July 2, 2005.

Jacobson, J. and Holden, L. (2005e). The Virtual Egyptian Temple, *World Conference on Educational Media, Hypermedia & Telecommunications (ED-MEDIA)*, Montreal, Canada, June 27 to July 2, 2005.

Lewis, M. and Jacobson, J. (2002a). Game Engines In Scientific Research, *Communications of the ACM*, 45, pp. 27-31.

Jacobson, J. and Hwang, Z. (2002b). Unreal Tournament for Immersive Interactive Theater, in Lewis, C. and Jacobson, J. (2002a), *Game Engines for Scientific Research, Communications of the ACM*, January, 2002.

Whitney, S., Sparto, P., Brown, K., Furman, J., Jacobson, J., and Redfern, M. (2002). The Potential Use of Virtual Reality in Vestibular Rehabilitation: Preliminary Findings With the BNAVE, *Neurology Report*, Vol. 26, No. 2, 2002.

Jacobson, J. (2002c). Configuring Multi-screen Immersive Displays With Existing Computer Equipment, *Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting*, Baltimore, Maryland, pp. 760-765, September 30 to October 4, 2002.

Jacobson, J., Redfern, M., Furman, J., Whiney, S., Sparto, P., Wilson, J., and Hodges, L. (2001). Balance NAVE: A Virtual Reality Facility for Research and Rehabilitation of Balance Disorders, *Proceedings of the Virtual Reality Software and Technology Meeting*, Banff, Canada, November, 2001 (paper).

Jacobson, J. and Vadnal, J. (1999). Multimedia in Three Dimensions for Archeology: Information Retrieval With Interactive Models, *Proceedings of the SCI '99/ISAS '99 Conference*, Orlando, Florida, August 3, 1999.

Jacobson, J. and Vadnal, J. (1998). Learning in a Highly Interactive, Low-Resolution Virtual Environment: The Tomb of Lady Hao, *Proceedings of the 1998 IEEE International Conference on Systems, Man, and Cybernetics*, Orlando, Florida, October 11-14. ISBN: 0-7803-4778-1

Jacobson, J. and Lewis, M. (1997a). An Experimental Comparison of Three Methods for Collision Handling in Virtual Environments, *Proceedings of the Human Factors and Ergonomics Society, 41st Annual Meeting*, September 22 to 26, 1997, Albuquerque, New Mexico, Vol. 2, p. 1273.

Jacobson, J. and Lewis, M. (1997b). Collision Handling in Virtual Environments: Facilitating Natural User Motion, *Proceedings of the 1997 IEEE International Conference on Systems, Man, and Cybernetics*, Orlando, Florida, October 12 to 15, 1997.

Lewis, M., Lenox, T., Roth, E., Roberts, L., Shern, R., Rafalski, T., and Jacobson, J. (1997c), Support of Teamwork in Human-agent Teams, *Proceedings of the 1997 IEEE International Conference on Systems, Man, and Cybernetics*, Orlando, Florida, October 12-15.

Helsel, S. and Jacobson, J. (1994). *The VR Marketplace Directory*, Mecklermedia, Inc. (book)

## **Panels, Posters, Talks, and Demonstrations**

Jacobson, J. and Chadwick, W.A. (2010). Reconceptualizing “Virtual Reality”: What is VR?, *IEEE Virtual Reality 2010*, March, MA, USA (Panel, Moderators),

Jacobson, J. (2010), Digital Archaeology at Pompeii; Our Contribution to the Historical Record, *Computer Applications in Archaeology*, Granada, Spain, April, 2010. (Round-Table, Moderator),

Jacobson, J. (2010). Survey of Experimental Research in Learning With CAVE-like, HMD, Digital Dome Displays, *Media Grid Summit*, Boston, MA, April, 2010 (Talk).

Jacobson, J. (2010). Virtual Reality Technology and the Virtual Egyptian Temple, *Axiom Gallery*, Boston, MA, February, 2010 (Talk and Demonstration).

Jacobson, J. (2010). Virtual Communities, *Ensemble Pavilion*. Second Life, March, 2010.

Jacobson, J., Troche, J., Johnston, A., Billinski, K., Hopkins, D., Kamenetskaya, K., Korch, M., and Perry, J., (2010). PublicVR Spring Student Show, *GASP Gallery*, April, 2010 (Demonstration, Talk, Live Performance).

Handron, K., Jacobson, J., and McJunkin, S. (2010). Learning in Immersive Virtual Environments, *American Association for the Advancement of Science (AAAS 2010)*, February, 2010, San Diego, CA, USA (Poster).

Burgess, L., Holden, L., and Jacobson, J. (2006). Muses in the Library II: The reality of the Virtual, *Digital Libraries Colloquium Series*, Carnegie Museum of Natural History, Pittsburgh, PA, September, 2006 (Talk and Demonstration).

Handron, K. and Jacobson, J. (2007). VR Projects in the Earth Theater at the Carnegie Museum of Natural History, *International Conference on Entertainment Computing*, September, 2007, Pittsburgh, PA. (Poster and Demonstration).

Handron, K. and Jacobson J. (2007). Virtual Exhibits in the Planetarium, *Conference Proceedings of the Great Lakes Planetarium Association Report*, Winter 2007, Pittsburgh, PA, USA.

Jacobson, J. (2007 and 2005). CaveUT, *Virtual Theater at the University of Pittsburgh's iSchool*. May. Demonstrated CaveUT to Autistic teenagers in a summer program at La Roche College, who then went on to construct their own two-walled partial cave, using instructions on my website, and produced a number of virtual environments and artifacts (Talk and Demonstration).

Jacobson, J. (2007). CaveUT, *Simulation and Modeling Collaboration Group*, University of Pittsburgh, PA. (Talk).

Jacobson, J. (2007 and 2005). CaveUT, *Digital Imagers group*, University of Pittsburgh, PA. (Talk).

Jacobson, J. (2003a). Common Office Equipment and CaveUT: Make a Cheap Portable Cave, *IEEE Virtual Reality Conference 2003 (VR 2003)*, March 22 to 26, 2003, Los Angeles, CA. ISBN 0-7695-1882-6 (Demonstration).

Jacobson, J. (2003b). Using CaveUT to Build Immersive Displays With the Unreal Tournament Engine and a PC Cluster, *ACM SIGGRAPH 2003 Symposium on Interactive 3D Graphics*, Monterrey, California, April, 2003. (Demonstration).

Jacobson, J. (2002d). CaveUT: Game-Engine Software for CAVE-like displays: a Walk-in Demonstration at the *Conference on Human Factors in Computing Systems*, Minneapolis, MN, April, 2002. (Walk-in demonstrations are not peer-reviewed and do not appear in the proceedings.)

Jacobson, J., Lewis, M., and Sycara, K. (2002e). COTS Multi-screen Displays, *Proceedings*

*of the Workshop on Intelligent Human Augmentation and Virtual Environments, UNC, October, D-37. (Poster).*

Jacobson J., Redfern M., Furman, J., Whitney, S., Sparto P., Wilson J., and Hodges L. (2001). Balance NAVE: A Virtual Reality Facility for Research and Rehabilitation of Balance Disorders, *Medicine Meets Virtual Reality 2001*, Newport Beach, CA, US, January, 2001 (Poster)

Collaboration Group at the University of Pittsburgh, in December, 2007, about immersive visualization with CaveUT.

## ***Selected Awards, Grants, and Contracts***

**Virtual Egyptian Temple in Unity Format** (2009-2010). PublicVR subcontracted with the Carnegie Museum of Natural History to produce a version of the temple using Unity ([www.unity3d.com](http://www.unity3d.com)) and suitable for display on a portable dome. Under NSF award 0916098, MyDome – Defining Computational and Cognitive Potential of Interactive Simulations in an Immersive Dome Environment, PublicVR was in the initial grant application.

**Virtual Theater** Upgrade (2009-2010). PublicVR subcontracted with the iSchool at the University of Pittsburgh under Dr. Michael Lewis’s direction to redesign the CaveUT-based “Virtual Theater” there and directed the implementation.

**Egyptian Ritual Films** (2009-2010). Small contract for PublicVR with Christopher Innes, the Canada Chair for Research in Theater, York University, Canada. Take films of Egyptian performances and rituals, acted by Robyn Gillam’s students in front of a bluescreen and merge them with background from the Virtual Egyptian Temple.

**BNAVE** contract (2007) to extend the CaveUT freeware to eliminate screen update lag problems, add treadmill support, and add user location logging. Also created a Virtual Grocery Store and showed them how to improve on it using CAD tools and student labor.

**CaveUT** (2005). Represented the University of Pittsburgh in the Educational Category of the “Make Something Unreal Contest” sponsored by Epic Games. The prize was five high-end desktop computers for student use. Market value at the time was approximately \$15,000.

**Smooth Navigation** Through Cluttered Virtual Environments With Only a Mouse and Screen (1999), Link Foundation Fellowship in Advanced Simulation and Training, \$20,000.

## ***Teaching***

**Program Supervisor and Technical Manager** (2009 – present) for internships at PublicVR, where students from local area colleges (Art Institutes of New England, Berklee College of Music, and Brown University) come to PublicVR to work on our projects as members of a professional team, all interns. We constitute a new team each semester and briefly re-hire some of the previous term’s students to train the new interns. Since summer

2009, we have had 2 or 3 students per semester from the modeling and animation program at the Art Institutes of New England, two from the Berklee College of Music in Spring, 2010, and one from the department of Egyptology at Brown University in the 2009-2010 academic year. So far, they have constructed a completely new version of the Virtual Egyptian Temple, repaired structural problems in the Virtual Theater District of Pompeii model, and composed music and ambient sound for temple rituals. We showcase and credit their work in the PublicVR website and (so far) in four conference papers regarding these projects (Weis, 2010; Gillam, 2010; Troche, 2010; Johnston, 2010). I interview, select, and evaluate all interns. I instruct them on the projects, provide training materials for them to study, obtain expert help for them as needed, maintain their hardware and software work environments, and generally manage the operation. Neil Leonard at Berklee helped supervise the Berklee students.

**Independent Study Supervisor** (2010) for Amber Johnston, Christopher Dede's Masters level student in Education at Harvard University. I instructed her in the pedagogical and dramatic structure of live tours and shows at museums (science demonstrations, collections tours, and virtual tours). I also instructed her in the content and meaning of the Virtual Egyptian Temple with the help of Julia Troche (see next teaching item, below). Amber wrote a narrative for our virtual Egyptian priest, and performed it live at the PublicVR spring show. I helped her write a paper about the project, which was published at Teachers College Education Technology Conference (Johnston, 2010).

**Internship Supervisor** (2009-2010) for Julia Troche, a doctoral student at the Department of Egyptology and Western Asian Studies at Brown University. Introduced her to the use of virtual reality for cultural heritage and the virtual Egyptian temple. Her main task was to study the Virtual Egyptian Temple, help us make it more historically accurate, and write a paper describing the temple's scholarly underpinnings. The paper was accepted for publication at the conference of Computer Applications in Archeology (Troche, 2010).

**Program Co-Supervisor** (2006-2007, 2009) with Robyn Gillam, Lynn Holden, Julia Troche, Ricardo Washington, Jeff Zehnor. Students from the Art Institute of Pittsburgh (AIP) made (3D virtual) objects for the **Virtual Egyptian Temple**. Some of the objects are duplicates of objects in Walton Hall at the Carnegie Museum of Natural History (CMNH), Pittsburgh, which contains a collection of Egyptian artifacts. I managed documentation and access to historical and technical information, requirements for the temple project, and integration with the museum show. The better artifacts became part of the official Virtual Egyptian Temple and are now showing at the museum as part of the temple. This was the starting point for an ongoing collaboration between the CMNH and AIP, in which students produce shows for the Earth Theater with help and input from the museum staff. One of these shows, Virtual Seneca Village, is currently showing to audiences of children in the CMNH's educational program. For the AIP students, it is work experience and portfolio-building.

**Instructed** docents (2006-2007) at the Carnegie Museum of Pittsburgh on how to give a tour of the Virtual Egyptian Temple in the Earth Theater. Trained them to navigate physically while presenting and narrating, all the while taking full dramatic/informational advantage of the very wide display.

**Internship Co-Supervisor** (2006) with Matthew Kelley, *for* Matthew Duncan, a graduating high-school senior. Department of Information Science, University of Pittsburgh, PA. Mr. Duncan conducted a formative evaluation of navigation in VR with the Gyromouse. I designed half of his curriculum, arranged needed software and hardware, and instructed him on immersive-display usability design and introductory research design. I helped him write a magazine article, published in *Computer Graphics Quarterly* (Duncan, 2006).

**Co-Instructor** (2001) with Lowry Burgess and Lynn Holden on **Interactive Ancient Egypt** (ART 62425), an upper-division course in the Department of Fine Arts at Carnegie Mellon University. Students from diverse majors collaborated in groups to produce educational mixed-media applications on the topic of ancient Egypt. I produced the technical portion of the curriculum and did one-third of the teaching. Pittsburgh, PA, Fall, 2001.

**Independent Study Supervisor** (2001) for Zimmy Hwang, Departments of Information Science and Otolaryngology, University of Pittsburgh. Mr. Hwang earned a full semester of course credit assisting me, as I designed and programmed the first version of CaveUT (Jacobson, 2002b). Pittsburgh, PA, Spring 2001.

**Teaching Assistant** (1999) for **Research Methods** (PSY 0035L) Department of Psychology, University of Pittsburgh, PA, Fall, 1999.

## **Leadership**

**Executive Director** (1994–present) of PublicVR, a 501c3 organization dedicated to free software and research in Virtual Reality for Education and Human Factors. The corporation has a board of directors and officers, but no actual membership. It provides a legal umbrella for project teams to bid on grants, sign agreements (i.e., nondisclosure), enforce distribution agreements, process donations, and distribute their works. We also support the dissemination of knowledge on this topic by funding demonstrations, public events, museum installations, and publications. All intellectual property produced under PublicVR’s legal umbrella or donated to us is free for any use, with the only requirement being acknowledgement. PublicVR holds a non-exclusive copyright to all such works. See <http://publicvr.org>.

**Local Events Chair** (2010) for the conferences of Virtual Reality, Waltham, MA, March, 2010.

**Project and Technical Manager** (2000–present) for the following open-source freeware projects. As technical manager, I write the requirements and high-level design, test and integrate the system components provided by specialists, write the initial documentation, and research relevant technical trends. As project manager, I promote the projects, support the efforts of project contributors, and answer questions from the user community. I also personally perform all of the software testing, quality assurance, and configuration management. Following are the project descriptions:

- **CaveUT** (see Jacobson, 2010, June) modifies Unreal Tournament 2004 so that a single user’s view is spread across multiple screens. This allows the designer to

configure visually immersive displays using low-cost desktop computers and digital projectors.

- **VRGL** (see Jacobson, 2005) is a modified OpenGL® library which can introduce linear or spherical transformations in the display window. VRGL allows CaveUT to support much more complex multi-screen displays and curved screen displays (i.e., planetarium domes or partial cylinder screens).
- **Virtual Egyptian Temple** (see Troche, 2010) is a minimal three-dimensional model of an archetypal temple, an exemplar for most such houses of worship in ancient Egypt. It is intended for informal and museum learning environments. We have version compatible with CaveUT and Unity.
- **Gates of Horus** is an educational game based on the Virtual Egyptian Temple. Students interact with a pedagogical agent (a virtual priest) and the temple itself to unlock its secrets. The game logs all user activity and comes with supporting materials, such as a book with relevant historical information. It is compatible with CaveUT.
- **Virtual Theater District** of Pompeii (see Weis, 2010) is an historically accurate reconstruction of the Theater District in the ancient Roman city of Pompeii, in Unity format. It is intended for use by museums, educators, and historians.
- **CuratorVM** (see Jacobson, 2010, April) is an authoring tool for basic websites, with special optimizations and features for virtual museums. When it is ready, we will distribute it to the public, as we did with CaveUT. We are using the early alpha version to produce the Virtual Theater District.

**Technical Support** (2001-present) for all software and artwork produced by PublicVR, but especially CaveUT. See my 2010 paper for ED-Media for a list of CaveUT projects.

**Technical Lead**, (2000–2002), The BNAVE Project, Department of Otolaryngology, University of Pittsburgh. Under Dr. Larry Hodges’s supervision, I designed the Balance NAVE, (a CAVE-like Device) based on the NAVE (NAVE Automatic Virtual Environment) at the Graphics Visualization and Usability Center of the Georgia Institute of Technology. I conducted information-gathering and design meetings with the end-users, researchers, and therapists specializing in human balance disorders. I also codified requirements for the BNAVE itself, including software, experimental setup, and general work-processes at the lab. My responsibilities included working with all suppliers, supervising construction of the BNAVE, and setting up the lab where it resides. I worked with Dr. Patrick Sparto, who handled the sensors and data-gathering hardware and software.

**Project and Technical Manager** (1995–1996) of the Pompeii Project, Studio for Creative Inquiry at Carnegie Mellon University, March to December, 1995. I directed professionals and students to build a virtual reconstruction of a part of the ancient Roman city of Pompeii. See Museum Installations, above.)

**Lead Artist and Project Manager** (Summers of 1993, 1994, and 1995) of the Virtual Ancient Egypt Project and Polis 2.0, Studio for Creative Inquiry at Carnegie Mellon University. I directed professionals and students to build an historically accurate virtual Egyptian temple

**Configuration Manager and System Software Engineer** (1987–1991) at Honeywell's Secure Computing Technology Center. I worked on the LOCK Project, an integrated hardware and software environment that provides high-level computer security. I implemented policies for storage and access of all baseline versions of all software modules, security-related proofs and official documents. I wrote software tools to help implement policy, and co-authored the Subject-Manager, which handles the complete life cycle of all processes on the system. I designed both the device driver for LOCK's security reference monitor and the Build File System Application that runs with special privileges to create hierarchically secured files. My responsibilities also included testing and debugging many other software modules.