

# **Curriculum Vitae**

## **Judith Challenger, Ph.D.**

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### **Current Status & Interests:**

I am an Assistant Professor at CSU Chico. I also do occasional programming and consulting on a contract basis through Pacific Media Technologies, a privately held company established in 1990. I have extensive experience programming everything from real-time embedded software to highly sophisticated supercomputing systems. My programming experience includes nontrivial implementations in Java, C++, C, Fortran, Pascal, and assembly language. I have been involved with commercial product specification, design, and development. My particular areas of interest and expertise are in computer graphics, graphical user interfaces, client/server systems, networking protocols, parallel processing, video, distance learning, and educational software. I am a proponent of the use of object-oriented analysis and design techniques. I am always eager to learn new technologies, and thus enjoy projects that require me to keep current with evolving tools. I also enjoy database applications and Web related work. I regularly use both Linux and Windows systems, and perform all of the system administration tasks on a Linux server that runs http and email servers, a listserv, and provides shell accounts for users.

### **Education:**

**Ph.D. in Computer and Information Sciences**  
University of California, Santa Cruz, 1993

**M.S. in Computer and Information Sciences**  
University of California, Santa Cruz, 1990

**B.S. in Computer Science, minor in Mathematics**  
California State University, Sacramento, 1983

## **Professional History:**

### **Assistant Professor - California State University, Chico**

August 1999--Present

Teaching in both the Computer Science Department and in the Electrical and Computer Engineering Department:

- Lower division
  - Programming and Algorithms I
  - Assembly Language Programming
  - Processor Architecture & Assembly Language Programming
- Upper division
  - Computer Architecture
  - Computer Graphics Programming
  - Graphical User Interface Implementation
  - Web Programming Fundamentals
  - Programming Languages
- Graduate
  - Software Engineering (part of the graduate core)
  - Computer Graphics
  - Advanced Topics in Computer Graphics
  - Digital Image Processing
  - Special Topic - Mobile/Wireless Programming with Java ME
  - Special Topic - The .NET Framework

### **Consultant - Pacific Media Technologies, Vina, California**

June 2001—September 2002

Design and implement a cross-platform virtual control panel system for a broadcast-quality, video routing system manufactured by Quartz. The software design is a client/server architecture written in Java. The server uses the Java Communications API to communicate with the router and supports multiple network connections by virtual control panels wishing to control the router. The user may interactively customize the virtual control panels. This work uses many Java features including Swing GUI, client/server communications, multithreading, and RS232 serial port communication.

**Consultant - Pacific Media Technologies, Vina, California**

June 2000--September 2000

Investigation of WebDVD technology for the delivery of educational materials. In conjunction with Pacific Media Technologies, established a fully functioning DVD authoring studio. WebDVD combines high-quality video with web-enabled instructional technology. Produced a portion of a graduate course in Digital Image Processing as a WebDVD technology demonstration.

**Consultant - Worlds, Inc. - SF, California**

January 1995--January 1997, March 1998--September 1998

Design and implementation of servers for a highly scalable, networked, 3D multi-user simulation environment. Object-oriented design techniques were utilized; the implementation language was C++. The resulting servers run on various systems including Sun, SGI, IBM RS6000, Linux, SCO, and Windows. For much of the time I was with Worlds, I was the only person working on the servers. User information is maintained via a server connection to an Oracle 7 database using Oracle Call Interface. Secure network communications are supported using the BSAFE Cryptographic Toolkit from RSA Data Security. I wrote and maintained a large set of documentation for the servers in the form of HTML documents, and interfaced with the Client Development, Online, Production, QA, and Marketing and Sales teams. Assisted in the development of a patent application for several key components of the client/server architecture. Co-inventor on Patent #6,219,045, awarded April 17, 2001.

**Lecturer - Cabrillo College - Aptos, California**

August 1994--December 1994

Taught one course in object-oriented programming using C++.

**Dissertation Research - University of California, Santa Cruz**

September 1990--December 1993

My dissertation work involved the design and implementation of algorithms allowing the remote visualization of very large volumetric datasets, especially nonrectilinear datasets. The parallel volume-rendering software, based on an object-oriented design and written in C++, executes on a remotely-located massively parallel supercomputer. The graphical

user interface executes on a local workstation (SGI) and utilizes the X window system with Motif widgets.

I was a participating guest with the National Energy Research Supercomputing Center at Lawrence Livermore National Laboratories from 1989 through 1993 studying the efficiency of various techniques for direct volume rendering on a 128 processor BBN TC2000, a multiple-instruction, multiple-data (MIMD) architecture which utilizes a distributed, shared memory. During this time I held a U.S. Department of Energy Q Clearance.

**Research Assistant - University of California, Santa Cruz**

March 1989--June 1989 and March 1990--June 1990

Research Assistant to Professor Jane Wilhelms, studying computer graphics algorithms for isosurface generation in volumetric datasets.

**Teaching Assistant - University of California, Santa Cruz**

September 1989--December 1989

Teaching assistant for an upper-division undergraduate class in computer graphics.

**Consultant - Ardent Computer - Sunnyvale, California**

September 1988--May 1989

Visualization research project, concentrating on the visualization of volumetric scientific data. Code development was in C on the Titan super graphics workstation utilizing the Dore graphics library. During this time Ardent placed a four-processor Titan in the Computer Graphics Lab at UCSC for use in my research, and for general use by other students and faculty.

**Staff Member - Lawrence Livermore National Laboratories - Livermore, California**

May 1987--September 1988

Staff member of the National Magnetic Fusion Energy Computer Center (now called the National Energy Research Supercomputing Center), specializing in computer graphics. Assisted computer center users (4,000 worldwide) in visualizing results of scientific computations. Designed and implemented a distributed graphics editor. This application,

which was distributed between a Cray and a personal computer, allowed the user to interactively create and/or edit a computer graphics metafile. During this time I held a US Department of Energy Q Clearance.

**Consultant - Grass Valley Group - Grass Valley, California**

January 1987--May 1987

As part of a team of three software engineers, designed and developed real-time (video rate) control software for the GVG Model 200, a broadcast-quality video production switcher.

**Consultant - Grass Valley Group - Grass Valley, California**

June 1986--December 1986

Software development and debug of mathematically intensive routines to control Kaleidoscope, a high-end, broadcast-quality digital video effects system. Operations included real-time, three-dimensional scale, skew, translation, and rotation, with perspective, of live video images. Code development was entirely in Intel 80286/80287 assembly language for speed.

**Consultant - Intergroup Video Systems - Gainesville, Florida**

January 1985--June 1986

Consultant on the design, and documentation, of various parts of the human and machine interfaces for a broadcast-quality television production switcher. Development of real-time control software of same.

**Software Engineer - Grass Valley Group - Grass Valley, California**

January 1984--January 1985

Software engineer in the Production Systems Division. As part of the original design team for Kaleidoscope, a high-end digital video effects system, helped design, document, and develop the control panel and human interface for this complex system. Designed and developed software for the real-time control of the digital video processing hardware. Designed and developed matte generation software, including legal color limiting, for both NTSC and PAL versions of the Model 100 video production switcher. Code development was in C and Intel 80286/80287 assembly language.

**Software Engineer - Sound Imaging - Folsom, California**

June 1982--January 1984

Member of the research and development staff. Designed and developed real-time systems software for a diagnostic medical ultrasound imaging instrument. Created specialized software to meet specific hardware testing requirements, and to enhance the development environment. Developed software simulations of various parts of the hardware being designed in order to verify theoretical aspects of the design. Code was a combination of Pascal, FORTRAN, and Motorola 68000 assembly language.

**Scholarship:**

J. Challenger and R. Teasdale, "VisIT - Visualization and Information Technology - A Multi-tier System for Interdisciplinary Experiences in Data Collection and Visualization", Proceedings of the 2007 ASEE Annual Conference & Exposition, June 2007. This paper was presented by J. Challenger at the conference in Honolulu, Hawaii.

J. Challenger, "Efficient Use of Robots in the Undergraduate Curriculum", ACM SIGCSE Bulletin, Proceedings of the 36th SIGCSE technical symposium on Computer science education, Volume 37 Issue 1, February 2005. This paper was presented at the symposium in St. Louis, Missouri.

J. Challenger, "Scalable Parallel Direct Volume Rendering for Nonrectilinear Computational Grids", Technical Report No. UCSC-CRL-93-47, PhD Thesis, University of California, Santa Cruz, 1993.

J. Challenger, "Scalable Parallel Volume Raycasting for Nonrectilinear Computational Grids", Proceedings of the 1993 Parallel Rendering Symposium, ACM SIGGRAPH, October 1993. This paper was presented at the symposium in San Jose, California.

J. Challenger, "Parallel Volume Rendering for Curvilinear Volumes", Proceedings of the Scalable High Performance Computing Conference, IEEE Computer Society Press, April 1992. This paper was presented at SHPCC-92 in Williamsburg, Virginia.

J. Challenger, "Interactive Graphical Exploration of Multidimensional Nonlinear Dynamical Systems", International Journal of Bifurcation and Chaos, Vol. 2, No. 2, 1992.

J. Challenger, "Highly Parallel Direct Volume Rendering", The 1992 MPCII Yearly Report: Harnessing the Killer Micros, Massively Parallel Computing Initiative, Lawrence Livermore National Laboratory, UCRL-ID-107022-92.

J. Challenger, "Parallel Volume Rendering on a Shared-Memory Multiprocessor", Technical Report No. UCSC-CRL-91-23, University of California, Santa Cruz, 1991.

J. Wilhelms, J. Challenger, et al., "Direct Volume Rendering of Curvilinear Volumes", Computer Graphics, Vol. 24, No. 5, November 1990.

J. Challenger, "Object-Oriented Volume Rendering of Volumetric and Geometric Primitives", Technical Report No. UCSC-CRL-90-26, Master's Thesis, University of California, Santa Cruz, 1990.

J. Milton (Challenger), "CGMEdit - A Distributed Graphics Editor", Proceedings of the Cray User's Group, 1988. This paper was presented at the Cray User's Group meeting in Montauk, New York.

## **Grants and Awards:**

2006-2008: Invited to serve as an Adjunct Member of the CSUC Institute for Research in Intelligent Systems (IRIS) Board of Directors.

2005-2008: Appointed to represent the College of Engineering, Computer Science, and Construction Management on the CSUC Academic Senate during the 05-06, 06-07, and 07-08 academic years.

2006: Invited to serve on the Chico Science Fair Foundation Board of Directors.

2005-2008: Received 0.2 assigned time during the 05-06, 06-07, and 07-08 academic years for the position of Director of the Chico Science Fair.

2004: Grant from Microsoft for the development of the ACM JETT workshops, providing training for teachers of high school advanced placement courses in computer science.

2004: CSU Research Award for a one-month summer stipend for the proposal "Establishment of a Research Program on Cooperating Autonomous Mobile Robots."

2004: Faculty Development Award for 0.2 assigned time for the proposal "Exploring Our New Robotics Lab for Research Proposal Development and Classroom Use."

2001: Co-inventor on Patent #6,219,045 - "Scalable virtual world chat client-server system."

1989-1993: Participant in the CSU Forgivable Loan/Doctoral Incentive Program. Selected from among more than 200 applicants nominated by California State campuses in 1989.

1989: Institute for Scientific Computing Research, Lawrence Livermore National Laboratories Grant Award No. ISCR 89-20, "Interactive Graphical Comparison of 3D Scalar Datasets."

1989-1991: Awarded use of a four-processor Titan super graphics workstation, specifically for my research in the Computer Graphics Lab at UCSC, as well as for general use by other faculty and students.

### **Professional Organizations:**

- Association for Computing Machinery
  - Special Interest Group in Computer Graphics (SIGGRAPH)
  - Special Interest Group in Computer Science Education (SIGCSE)
- Institute of Electrical and Electronic Engineers, Computer Society
- Upsilon Pi Epsilon, Honor Society for the Computing Sciences