

# John S. Seng

<http://www.csc.calpoly.edu/~jseng>

Computer Science Department  
California Polytechnic State University  
One Grand Avenue  
San Luis Obispo, CA 93407

jseng@calpoly.edu  
(805) 756-5536

## Education

Ph.D. in Computer Engineering, University of California, San Diego, June 2003.  
Dissertation: *Optimizing Processor Architectures for Power-Efficiency*  
Thesis adviser: Dean Tullsen.  
M.S. in Computer Engineering, University of California, San Diego, June 1999.  
B.S. in Computer Engineering, Northwestern University, June 1997.

## Academic Experience

Professor, California Polytechnic State University; August 2015 – present.  
Visiting Scholar, University of Pennsylvania; August 2016 – December 2016.  
Associate Professor, California Polytechnic State University; July 2009 – July 2015.  
Assistant Professor, California Polytechnic State University; September 2003 – June 2009.  
Research Assistant, University of California, San Diego; 1998 – 2003.  
Modified the SMTSIM architecture-level performance simulator to include an architecture-level power model. Utilized this power/performance simulator study architectural techniques which reduce the power consumption of general purpose microprocessors.  
Teaching Assistant, Advanced Computer Architecture (graduate), University of California, San Diego; Spring 2002.  
Teaching Assistant, Introduction to Computer Programming (undergraduate), University of California, San Diego; Winter 2002.  
Teaching Assistant, Computer Architecture (undergraduate), University of California, San Diego; Winter 1999.

## Professional Experience

Intel Corporation, Santa Clara, CA; June 1999 – September 1999.  
Added an x86 instruction decoding front end to a RISC multithreading processor simulator (SMTSIM) - enabling the simulator to execute unmodified x86 Linux binaries. Modified the processor simulator to simulate x86 instructions as multiple RISC-like instructions. Incorporated an architecture-level power model, which was a part of the SimpleScalar simulator, into the x86 processor simulator.  
Qualcomm Corporation, San Diego, CA; June 1998 – September 1998.  
Wrote test benches in VHDL for a base station ASIC for wireless signal demodulation. These test benches exercised small functional blocks and verified the blocks functioned according to the required specifications. Developed test programs in C which exercised portions

of the ASIC via an embedded ARM core.

Compaq Computer Corporation, Houston, TX; June 1996 – August 1996.

Tested remote paging and utilization monitors of Compaq server management software, Compaq Insight Manager version 3.10. This software allowed a single computer to monitor, over the network, the health and status of multiple servers. Was involved in the testing and debugging of a beta version of software to automate software testing.

IBM Corporation, Costa Mesa, CA; June 1995 – September 1995.

Configured hardware and software (AIX 3.2.5 and 4.1.3) on RS/6000 machines and delivered them to customer locations. Compiled sales statistics used in determining regional workstation sales status and customer demand. Provided technical support at customer locations for RS/6000 servers and workstations.

## Awards

- Outstanding CPE Professor of the Year, 2012-2013, 2013-2014, 2015-2016, 2017-2018
- University Housing - Living Learning Program Award of Honor 2015-2016
- High Impact Paper Award, International Conference on Computer Design 2012
- IEEE Faculty Appreciation nomination 2006
- Outstanding CPE Instructor for 2005-2006, 2006-2007
- Outstanding Club Advisor, College of Engineering 2006
- UC MICRO fellowship, 1997-1998

## Professional Activities

Member of IEEE.

## Conferences and Workshops Attended

- The 2012 International Conference on Computer Design, October 2012  
**Presented:** *Retrospective on "Power-Sensitive Multithreaded Architecture"*
- The 2008 Frontiers in Education Conference, October 2008  
**Presented:** *Robotics Competition: Providing Structure, Flexibility, and an Extensive Learning Experience.*
- The 2008 Consortium for Computer Sciences in the Colleges - Southwestern Regional Conference, April 2008  
**Presented:** *Sidewalk Following Using Color Histograms.*
- The 2006 International Conference on Frontiers in Education: Computer Science and Computer Engineering, June 2006  
**Presented:** *PolyBot Board: a Controller Board for Robotics Applications and Education.*
- Second Value-Prediction and Value-Based Optimization Workshop, October 2004.  
**Presented:** *Exploring Perceptron-Based Register Value Prediction.*

- Semiconductor Research Corporation Contract Review, March 2004.  
**Invited Presentation:** *Power-Efficient Architecture of High Performance Processors.*
- Power-Aware Computing Systems, December 2003.  
**Presented:** *Exploring the Potential of Architecture-Level Power Optimizations.*

### Invited Presentations

- “Teach Robotics with the ‘Jet’ Teaching Kit for Educators”, The 2016 Frontiers in Education Conference, October 2016
- “Robotics Teaching Kit with ‘Jet’ for Educators”, The 2016 NVIDIA GPU Technology Conference, May 2016
- “Retrospective on Power-Sensitive Multithreaded Architecture”, International Conference on Computer Design, October 2012
- “Power-Efficient Architecture of High Performance Processors”, Semiconductor Research Corporation Contract Review, March 2004
- “Reducing Processor Power Using Critical Path Information”, University of San Diego, Computer Science Colloquium, Winter 2003
- “The Power-Efficiency of Multithreaded Architectures”, Workshop on Complexity -Effective Design 2000

### Publications (Peer-Reviewed)

- **Book Chapters**

- H. Assal, F. Kurfess, K. Pohl, E. Schwarz\*, and **J. Seng**, “Enhancing Information Extraction with Context and Inference - The ODIX Platform”, *Ontology-Driven Web Mining - Concepts and Techniques*, IGI Global, 2012

- **Journal Articles**

- **J. Seng** and D. Tullsen, “Architecture-Level Power Optimizations – What are the Limits?,” *Journal of Instruction Level Parallelism*, vol. 7, 2005.

- **Conference Proceedings**

- **J. Seng**, “Building a Music Player: Teaching Operating Systems Concepts via an Arduino-Powered Music Player”, In *Frontiers in Education*, October, 2018
- L. Hodzic\*, K. Ly\*, A. Keen, **J. Seng**, “The Bumblebee: A Robot Controller Board for STEM Education”, In *ASEE Pacific Southwest Conference*, April, 2016
- C. Citron\*, B. Gomberg\*, **J. Seng**, “The Aithon Board: A Case Study in Commercialization of a Student Project”, In *The 2014 Consortium for Computing Sciences in Colleges - Southwestern Regional Conference*, March 2014
- **J. Seng**, D. Tullsen, and G. Cai, “Retrospective on Power-Sensitive Multithreaded Architecture”, *International Conference on Computer Design*, October 2012
- H. Assal, **J. Seng**, F. Kurfess, E. Schwarz\*, and K. Pohl., “Semantically Enhanced Information Extraction,” *The 2011 IEEE Aerospace Conference*, March 2011.

- H. Assal, **J. Seng**, F. Kurfess, E. Schwarz\*, and K. Pohl., “Partnering Enhanced-NLP with Semantic Analysis in Support of Information Extraction,” *The 2nd International Workshop on Ontology-Driven Software Engineering*, October 2010.
- J. Grimes and **J. Seng**, “Robotics Competition: Providing Structure, Flexibility, and an Extensive Learning Experience,” *The 2008 Frontiers in Education Conference*, October 2008.
- **J. Seng** and T. Norrie\*, “Sidewalk Following Using Color Histograms,” *The 2008 Consortium for Computer Sciences in the Colleges - Southwestern Regional Conference*, April 2008.
- T. Norrie\* and **J. Seng**, “Team-Based Project Design of an Autonomous Robot,” *The 2007 International Conference on Frontiers in Education: Computer Science and Computer Engineering*, June 2007.
- **J. Seng**, “PolyBot Board: a Controller Board for Robotics Applications and Education,” *The 2006 International Conference on Frontiers in Education: Computer Science and Computer Engineering*, June 2006.
- **J. Seng** and D. Tullsen, “Exploring the Potential of Architecture-Level Power Optimizations,” *Power-Aware Computing Systems*, December 2003. Also published in *Lecture Notes in Computer Science*, Volume 3164, December, 2004.
- **J. Seng** and D. Tullsen, “The Effect of Compiler Optimizations on Pentium 4 Power Consumption,” *Interaction between Compilers and Computer Architectures*, February 2003.
- **J. Seng**, E. Tune, and D. Tullsen, “Reducing Power with Critical Path Information,” *International Symposium on Microarchitecture*, December 2001.
- **J. Seng**, D. Tullsen, G. Cai, “Power Sensitive Multithreaded Architecture,” *International Conference on Computer Design*, September 2000.
- D. Tullsen and **J. Seng**, “Storageless Value Prediction Using Prior Register Values,” *International Symposium on Computer Architecture*, May 1999.

#### • Workshop Proceedings

- D. Franklin and **J. Seng**, “Experiences with the Blackfin Architecture for Embedded Systems Education,” *Twelfth Workshop on Computer Architecture Education*, June 2005.
- A. LeBeau\*, J. Fields\*, R. Lavering\*, D. Franklin, and **J. Seng** , “Improving Non-Stationary Data Retrieval in Wireless Sensor Networks,” *Second International Workshop on Mobile and Wireless Ad Hoc Networking*, June 2005.
- **J. Seng** and G. Hamerly, “Exploring Perceptron-Based Register Value Prediction,” *Second Value-Prediction and Value-Based Optimization Workshop*, October 2004.

#### Publications (Not Peer-Reviewed)

- **J. Seng**, “PolyBot Board: A Robot Controller Board Using the Atmel ATMega32,” *Atmel Applications Journal*, June 2006.
- Intel Corporation Whitepaper: “Optimizing Embedded System Performance– Impact of Data Prefetching on a Medical Imaging Application”, 2006
- Intel Corporation Whitepaper: “Optimizing Software for Multi-core Processors”, 2006

#### Grant Activity

- **Awarded:** Sukhman Marok\*, Angelique Bonilla\*, Amanda Krysl\*, Daniel Jones\*, **John Seng** (PI), \$2,917 CP Connect 2019, *Herbie: A Platform for Reaching Cal Poly Students and Local Schools*

- NVIDIA gift in-kind, Jetson AGX Xavier embedded computer for robotics applications (\$700)
- **Awarded: John Seng** (PI), \$2,280 Cal Poly R-IDC, *Support for Robotics Research Platform*
- **Awarded: John Seng** (PI), Jeremy Kerfs\*, \$10,350 NVIDIA Corp., *Robotics Teaching Kit*
- **Awarded:** Sukhman Marok\*, Kyle Wuerch\*, **John Seng** (PI), \$1,350 CPCConnect 2018, *Autonomous Golf Cart*
- **Awarded:** Michael Roberts\*, Kyle Kruse\*, Drew Schulz\*, Ramon Santos\*, Gerik Kubiak\*, Justin Ng\*, Taewan Kim\*, Ian Wilson\*, Ryan Wang\*, Louie Thiros\*, Sonia Mannan\*, Erol Leon\*, Randy Fung\*, **John Seng**, \$3,502.96 CP Connect 2014, *IGVC- The Autonomous Golf Cart Project*
- **Awarded: John Seng** (Co-PI), Omar Arriaga\*, Gretchen Gilman\*, Cale Glisson\*, Lana Hodzic\*, Kevin Ly\*, Aaron Keen (CSC), \$4,519 CPCConnect 2014, *Robotics Design System for Elementary School Students*
- **Awarded: John Seng** (PI), Jeffrey Forrester\*, Nathan Lucero\*, Erik Nelson\*, Sean Willis\*, \$2,200 CPCConnect 2012, *Autonomous Mobile Mapping Robot*
- **Awarded: John Seng** (PI), Connor Citron\*, Brian Gomberg\*, Chris MacKenzie\*, Troy Weber\*, \$1,375 CPCConnect 2012, *Arm-Based Embedded Controller Board for Robotics Projects*
- **Awarded: John Seng** (PI), \$51,929 Cal Poly C3RP ONR 2008-2009 Grant, *Path Following Algorithms and Performance Optimization*
- **Awarded:** George Bekey (PI), Chris Clark, William Durgin, Art MacCarley, Robert MacDonald, Bryan Mealy, Saeed Niku, Mohammad Noori (PI), **John Seng**, Lynne Slivovsky, \$297,081 NSF REU Site Proposal, *Summer Internships In Robotics And Autonomous Systems*
- **Awarded: John Seng** (PI), \$5,000 Cal Poly Honors' Research Project Grant 2006-2007, *Solar Powered Wireless Access Point*
- **Awarded: John Seng** (PI), Diana Franklin, \$40,000 Cal Poly C3RP ONR 2005-2006 Renewal Grant, *Large-Scale Distributed Wireless Networks*.
- **Awarded: John Seng** (Co-PI), Diana Franklin, \$14,000 Bloom Industry Partnership, *Wireless Sensor Network Database*
- **Awarded: John Seng** (PI), \$5,000 Cal Poly State Faculty Support Grant 2005-2006 Grant, *Using Dynamic Prediction to Eliminate Unnecessary Instructions in Programs*
- **Awarded: John Seng** (PI), Diana Franklin, \$45,000 Cal Poly C3RP ONR 2004-2005 Grant, *Large-Scale Distributed Wireless Networks*.

## Industrial Consulting

- CDM Technologies Corp. (6/09-6/10) – developed knowledge extraction system
- CDM Technologies Corp. – (3/08-9/08) – developed proof-of-concept machine vision application for change detection in video
- Dilithium Networks Corp. (6/07-9/07) – developed client/server software which supported the RMCP protocol for system status monitoring
- Intel Corp. (6/06-9/06) – improved performance of a medical imaging application on a multi-core Intel processor
- Roxorgames Corp. (1/05-9/05) – developed board layout and code for a multi-player wireless game controller

- ShipOK Corp. (5/05-6/05) – developed a system architecture proposal for a fault-tolerant and high-availability system for package shipping

### **Teaching Activity**

- CPE101 - Fundamentals of Computer Science
- CPE123 - Introduction to Computing
- CPE315 - Computer Architecture
- CPE416 - Autonomous Mobile Robotics
- CPE350/CPE450 - Computer Engineering Capstone
- CPE453 - Introduction to Operating Systems
- CPE515 - Graduate Computer Architecture

### **Service Activity**

- RoboRodentia Faculty Advisor (9/03 - present)
  - Advise student groups participating in the contest
  - Develop the rules for the annual contest
  - Contact industry sponsors to raise funds
- Computer Engineering Society Co-Advisor (9/03 - present)
- Cal Poly Asian American Christian Fellowship Co-Advisor (1/03 - 6/14)