

# Curriculum Vitae

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## ALLEN C. CHENG, PH.D.

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### School Address

Department of Electrical and Computer Engineering  
333 Benedum Hall  
University of Pittsburgh  
Pittsburgh, PA 15261

### Contact Information

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### Appointments

#### Assistant Professor (2006 – Present)

- Department of Electrical and Computer Engineering, Swanson School of Engineering
- Department of Computer Science, School of Arts and Sciences, Secondary Appointment
- Department of Bioengineering, Swanson School of Engineering, Secondary Appointment
- Department of Neurological Surgery, School of Medicine, Secondary Appointment
- University of Pittsburgh

#### Lecturer (2006)

- College of Engineering
- University of Michigan at Ann Arbor

#### Assistant Research Staff (2004 – 2005)

- Bio-Imaging Center, Pfizer Global Research and Development
- Pfizer Inc., Ann Arbor, MI

### Education

#### Ph.D. in Computer Science and Engineering (2006)

- The University of Michigan, Ann Arbor, MI

#### M.S. in Computer Science and Engineering (2003)

- The University of Michigan, Ann Arbor, MI

#### B.S. in Computer Engineering with Minor in Japanese, *Summa Cum Laude* (2001)

- North Carolina State University, Raleigh, NC
- Studied abroad: International Christian University, Tokyo, Japan (1999)

### Citizenship

U.S. Citizen

### Research Interests

- Biomedical and healthcare computing systems
- Low-power and energy-efficient computer architecture and microarchitecture
- High-performance and resilient computing
- Reconfigurable embedded computing
- Machine learning

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## Awarded Research Grants

- Project: ECCS/IHCS-SGER: Exploring Artificial Neural Networks to Develop Self-Adaptive Threat Detection Techniques for Bio-Implantable System-on-Chip
  - Role: Principal Investigator (PI)
  - Co-Investigator(s): None
  - Sponsor: National Science Foundation (NSF) – Directorate for Engineering (ENG) / Electrical, Communications and Cyber Systems (ECCS)  
(<http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0832990>)
  - Program: Integrative, Hybrid & Complex Systems (IHCS)
  - Award: \$75,000
  - Duration: September 2008 – August 2009
  - Project Summary: *The objective of this exploratory research is to develop a cyber-enabled autonomic threat-management system aimed at transforming today's vulnerable bio-implants into resilient bio-implantable systems-on-chip. The goal is to realize next-generation bio-implantable systems that are capable of dynamic reconfiguration to react to unexpected threats in the complex and unpredictable human body. The research explores how to model unexpected threats and how a bio-implant knows that there is a threat. To this end, the research focuses on threat modeling and injection schemes using statistical and probabilistic approaches and self-adaptive threat detection schemes using biologically-inspired artificial neural network techniques. With respect to intellectual merit, this research aims to reproduce the inherent threat resilience of the central nervous system, which handles unpredictable threats via self-adapting mechanisms. Specifically, the proposed artificial neural network technique is intended to mimic its biological counterpart in the human brain by capturing the brain's highly parallel and self-organizing nature and the brain's ability to recognize complex non-linear relationships among different manifestations of unexpected threats in a dynamical human-implant system.*
- Project: A Mobile Platform for Continuous Real-Time Monitoring and Automatic Detection of Cardiovascular Disease
  - Role: Principal Investigator (PI)
  - Co-Investigator(s): None
  - Sponsor: Microsoft Research  
([http://research.microsoft.com/en-us/um/redmond/about/collaboration/awards/cellphone-healthcare\\_awards.aspx#EHC](http://research.microsoft.com/en-us/um/redmond/about/collaboration/awards/cellphone-healthcare_awards.aspx#EHC); <http://research.microsoft.com/en-us/collaboration/focus/health/hearttogo.aspx>)
  - Program: Cell Phone as a Platform for Healthcare
  - Award: \$100,000
  - Equipment Donation: \$16,200 (fair market value)
  - Duration: January 2008 – Present
  - Project Summary: *Cardiovascular Disease (CVD) is by far the leading cause of death in the world for both women and men of all ethnic backgrounds. The Electrocardiogram (ECG) is the most widely adopted clinical tool that measures and records the electrical activity of the heart from the body surface. This electrical activity is related to the impulse that travels through the heart, which determines its rate and rhythm. The overarching goal of this research seeks to establish a cell phone-based wearable ECG platform capable of performing continuous ambulatory monitoring and recording of ECG in real time, generating individualized cardio health summary report in plain language, and automatically detecting CVD signs at any place and anytime.*
- Project: A Low-Cost Custom Processor Synthesis Framework for Designing Complex System-on-a-chip in the Very Deep Nanoscale Era
  - Role: Principal Investigator (PI)
  - Co-Investigator(s): None
  - Sponsors: University of Pittsburgh Office of the Provost and Office of Research

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- Program: Central Research Development Fund (CRDF)
- Award: \$16,000
- Duration: July 2007 – June 2009
- Project Summary: *To counteract the skyrocketing cost associated with staggering complexity, stringent physical design, and manufacturing challenges posted by very deep nanometer System-on-Chip (SoC) designs, this research proposes a platform-based design automation framework that can raise the entire industry's electronic design automation support from current lower gate level and register-transfer level to higher architecture level as the need in exploring electronic system-level (ESL) designs is outgrowing the interest in scaling legacy RTL designs. In this research, we are interested in simultaneously addressing all first-class design constraints, such as power, speed, area, cost, and time-to-market, of synthesizing efficient SoC processors in the very deep nano-scale era with minimal human efforts involved. Specifically, we propose an architecture-compiler synergistic technology that can automatically turn an economical commercial off-the-shelf processor into a tailored processor capable of delivering the level of performance and energy efficiency that is close to full custom application-specific integrated circuit while still retaining single-chip fabrication advantages that allow large NRE cost to be amortized over high volume production.*
  
- Project: A Curriculum/Laboratory Co-Renovation for Innovative Embedded System Engineering in the 21st Century
  - Role: Principal Investigator (PI)
  - Co-Investigator(s): None
  - Sponsor: ARM Ltd.
  - Program: ARM University Program
  - Equipment Donation: \$183,451 (fair market value estimated based on current and historical values similar in nature.)
  - Duration: November 2008 – Present
  
- Project: Facilitating Rapid Biomedical Computing Design Space Exploration and Fast Full-System Prototyping via Cutting-Edge FPGA Technologies
  - Role: Principal Investigator (PI)
  - Co-Investigator(s): None
  - Sponsor: Xilinx Inc.
  - Program: Xilinx University Program
  - Equipment Donation: \$11,325 (fair market value) / \$25,002 (full commercial value)
  - Duration: October 2008 – Present

## Publications

### Journal Publications

- Chia-Lin Chang, Zhanpeng Jin, Hou-Cheng Chang, Allen C. Cheng, “From Neuromuscular Activation to End-point Locomotion: An Artificial Neural Network-based Technique for Neural Prostheses,” **Journal of Biomechanics**, 42(8):982-988, May 2009. [**Impact Factor: 2.897, ranked in top 6 in the specialty of Biomedical Engineering**]
- Zhanpeng Jin and Allen C. Cheng, “Evolutionary Benchmark Subsetting,” **IEEE Micro**, 28(6):20–36, November/December 2008.
- Zhanpeng Jin and Allen C. Cheng, “ImplantBench: Characterizing and Projecting Representative Benchmarks for Emerging Bio-Implantable Computing,” **IEEE Micro**, 28(4):71–91, July/August 2008.
- Allen C. Cheng and Gary Tyson, “High-Quality ISA Synthesis for Low-Power Cache Designs in Embedded Microprocessors,” **IBM Journal of Research & Development (IBM JRD)** (*invited paper for the Special Issue on Exploratory Systems*), 50(2/3):299-309, March/May 2006.

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- Allen C. Cheng and Gary Tyson, “An Energy Efficient Instruction Set Synthesis Framework for Low Power Embedded System Designs,” **IEEE Transactions on Computers (IEEE TC)** (Special Issue on Energy Efficient Computing), 54(6):698-713, June 2005.

### *Conference and Workshop Proceedings (full papers)*

- Zhanpeng Jin, Yuwen Sun, and Allen C. Cheng, “Predicting Cardiovascular Disease from Real-Time Electrocardiographic Monitoring: An Adaptive Machine Learning Approach on a Cell Phone,” In Proceedings of the 31<sup>th</sup> **International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)**, pp. 6889–6892, September 2009, Minneapolis, MN.
- Yuwen Sun, Shimeng Huang, Joseph Oresko, John Kraiss, and Allen C. Cheng, “A Programmable Implementation of Neural Signal Processing on a Smartdust for Brain-Computer Interfaces,” In Proceedings of the 15<sup>th</sup> **IEEE International Symposium on Low Power Electronics and Design (IEEE ISLPED)**, pp. 351–354, August 2009, San Francisco, CA. [**Acceptance Rate: 35% or 72 out of 208 submitted papers**]
- Shimeng Huang, Joseph Oresko, Yuwen Sun, and Allen C. Cheng, “Programmable Neural Processing on a Smartdust,” In Proceedings of the 46<sup>th</sup> **ACM/IEEE Design Automation Conference (ACM/IEEE DAC)**, pp. 619-620, July 2009, San Francisco, CA. [**Acceptance Rate: 16% or 8 out of 49 submitted papers**]
- Joseph Oresko, Jun Cheng, Zhanpeng Jin, Heather Duschl, and Allen C. Cheng, “Detecting Cardiovascular Diseases via Real-Time Electrocardiogram Processing on a Smartphone,” In Proceedings of the **Workshop on Biomedicine in Computing: Systems, Architectures, and Circuits (BiC)**, in conjunction with the 36<sup>th</sup> **ACM/IEEE International Symposium on Computer Architecture (ACM/IEEE ISCA)**, pp. 13–16, June 2009, Austin, TX.
- Zhanpeng Jin, Joseph Oresko, Shimeng Huang, and Allen C. Cheng, “A Personalized Medicine Technology for Cardiovascular Disease Prevention and Detection,” In Proceedings of the 4<sup>th</sup> **IEEE/NIH 2009 Life Science Systems and Applications Workshop (IEEE/NIH LiSSA)**, pp. 80–83, April 2009, Bethesda, MD. [**Acceptance Rate: 18% or 12 out of 64 submitted papers selected for oral presentation**]
- Chia-Lin Chang, Zhanpeng Jin, and Allen C. Cheng, “Predicting End-Point Locomotion from Neuromuscular Activities of People with Spina Bifida: A Self-Organizing and Adaptive Technique for Future Implantable and Non-invasive Neural Prostheses,” In Proceedings of the 30<sup>th</sup> **International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC)**, pp. 4203–4207, August 2008, Vancouver, Canada.
- Zhanpeng Jin and Allen C. Cheng, “Improve Simulation Efficiency Using Statistical Benchmark Subsetting – An ImplantBench Case Study,” In Proceedings of the 45<sup>th</sup> **ACM/IEEE Design Automation Conference (ACM/IEEE DAC)**, pp. 970–973, June 2008, Anaheim, CA. [**Acceptance Rate: 23% or 147 out of 639 submitted papers**]
- Allen C. Cheng, “Amplifying Embedded System Efficiency via Automatic Instruction Fusion on a Post-Manufacturing Reconfigurable Architecture Platform,” In Proceedings of the 9<sup>th</sup> **IEEE International Symposium on Quality Electronic Design (IEEE ISQED)**, pp. 744–749, March 2008, San Jose, CA. [**Acceptance Rate: 30% or 90 out of 300 submitted papers**]
- Allen C. Cheng, “A Software-to-Hardware Self-Mapping Technique to Enhance Program Throughput for Portable Multimedia Workloads,” In Proceedings of the 4<sup>th</sup> **IEEE International Symposium on Electronic Design, Test and Applications (IEEE DELTA)**, pp. 356–361, January 2008, Hong Kong, China. [**Acceptance Rate: 41% or 88 out of 210 submitted papers**]
- Allen C. Cheng, “Accelerating Embedded Multimedia Applications with Versatile and Reconfigurable Instruction Fusion,” In Proceedings of the 9<sup>th</sup> **IEEE International Symposium on Multimedia (IEEE ISM)**, pp. 318 – 325, December, 2007, Taichung, Taiwan. [**Acceptance Rate: 24% or 38 out of 156 submitted papers**]

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- Allen C. Cheng, “Toward Ubiquitous Biomedical Implantable Computing Chips - An Energy-Efficient Low-Power Architecture,” In Proceedings of the 10<sup>th</sup> **IEEE International Symposium on Low-Power and High-Speed Chips (IEEE COOL Chips)**, pp. 263–277, April 2007, Yokohama, Japan. [Acceptance Rate: 36%]
- Allen C. Cheng, Gary Tyson, and Trevor Mudge, “PowerFITS: Reduce Dynamic and Static I-Cache Power Using Application Specific Instruction Set Synthesis,” In Proceedings of the 5<sup>th</sup> **IEEE International Symposium on Performance Analysis of Systems and Software (IEEE ISPASS)**, pp. 32–41, March 2005, Austin, TX. [Acceptance Rate: 29% or 27 out of 92 submitted papers]
- Allen C. Cheng and Gary Tyson, “Application Specific Instruction Set Synthesis to Reduce Instruction Cache Power in Embedded Processors,” In Proceedings of the 1<sup>st</sup> **IBM Watson Conference on Interaction between Architecture, Circuits, and Compilers (IBM P=AC2)**, pp. 83–92, October 2004, Yorktown Heights, NY. [Acceptance Rate: 46%]
- Allen C. Cheng, Gary Tyson, and Trevor Mudge, “FITS: Framework-based Instruction-set Tuning Synthesis for Embedded Application Specific Processors,” In Proceedings of the 41<sup>st</sup> **ACM/IEEE Design Automation Conference (ACM/IEEE DAC)**, pp. 920–923, June 2004, San Diego, CA. [Acceptance Rate: 20% or 163 out of 785 submitted papers]
- Allen C. Cheng, Gary Tyson, and Trevor Mudge, “FITS: Increasing Code Density for Embedded Systems with a Cost-effective 16-bit ISA Synthesis Technique,” In Proceedings of the 2<sup>nd</sup> **IEEE/ACM Workshop on Optimizations for DSP and Embedded Systems (IEEE/ACM ODES)**, in conjunction with the **International Symposium on Code Generation and Optimization (ACM/IEEE CGO)**, pp. 4–23, March 2004, San Jose, CA.

## Conference and Workshop Proceedings (extended abstracts)

- Joseph Oresko, Jun Cheng, Heather Duschl, Allen C. Cheng, “Transplanting a Resting ECG Machine to a Cell Phone for Real-Time ECG Acquisition, Feature Extraction, and Statistical Cardiac Summary Reports,” In Proceedings of the **2009 Biomedical Engineering Society Annual Scientific Meeting (BMES)**, pp. 118, October 2009, Pittsburgh, PA.
- Zhanpeng Jin and Allen C. Cheng, “Increasing Heart Attack Survival via a Wearable Smartphone-based Real-Time Monitoring System,” In Proceedings of the **Massachusetts Institute of Technology (MIT) Microsystems Technology Laboratories (MTL) Workshop on Next-Generation Medical Electronic Systems (invited)**, pp. 36, December 2008, Cambridge, MA.
- Zhanpeng Jin and Allen C. Cheng, “Portable Diagnostic ECG Platform for Continuous Real-Time Monitoring and Automatic Detection of Cardiovascular Disease,” In Proceedings of **2008 Microsoft eScience Workshop**, in conjunction with the 4<sup>th</sup> **IEEE International Conference on e-Science (IEEE e-Science)**, pp. 151, December 2008, Indianapolis, IN.

## **Invited Presentations**

### Conference and Workshop Presentations

- Allen C. Cheng, “Real-Time Cardiovascular Diseases Detection on a Smartphone,” **Foundation for the National Institutes of Health mHealth Summit 2009 (mHealth Summit 2009)**, October 2009, Washington DC.
- Allen C. Cheng, “Designing Next-Generation DSP and Embedded Systems for Emerging Bio-Medical Electronic Applications,” In Proceedings of the 7<sup>th</sup> **IEEE/ACM Workshop on Optimizations for DSP and Embedded Systems (IEEE/ACM ODES) (invited Keynote Lecture)**, in conjunction with **IEEE/ACM International Symposium on Code Generation and Optimization (IEEE/ACM CGO)**, pp. 16, March 2009, Seattle, WA.
- James Hoe, Ken Mai, and Allen C. Cheng, “Brain-Implantable Computing Platforms for Emerging Neuroscience Applications,” 14<sup>th</sup> **ACM International Conference on Architectural Support for**

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**Programming Languages and Operating Systems (ACM ASPLOS)**, the Wild and Crazy Idea Session VII, March 2009, Washington DC.

- Zhanpeng Jin, Joseph Oresko, Shimeng Huang, and Allen C. Cheng, “HeartToGo: A Smartphone-based Mobile Platform for Continuous and Real-Time Cardiovascular Disease Monitoring,” **Microsoft External Research Symposium 2009**, March 2009, Redmond, WA.
- Robert J. Sclabassi, Gary K. Fedder, James C. Hoe, Xin Li, Ken Mai, Jeyanandh Paramesh, Yoed Rabin, Allen C. Cheng, Xinyan Cui, Andrew Schwartz, Mingui Sun, Wei Wang, Douglas J. Weber, Donald Whiting, “Brain-Implantable Computer Platform,” 2<sup>nd</sup> **Unither Nanomedical & Telemedical Technology Conference**, February 2009, Quebec, Canada.
- Zhanpeng Jin and Allen C. Cheng, “CardioPro: A Mobile Platform for Continuous Real-Time Monitoring and Automatic Detection of Cardiovascular Diseases,” **Microsoft Research Faculty Summit 2008**, Redmond, WA, July, 2008.

## *External Lectures and Seminars*

- Allen C. Cheng, “Bio-Implantable Computing Systems: Vision, Challenges, and Opportunities,” **Department of Computer Science (CS), National Tsing Hua University (NTHU), Hsinchu, Taiwan**, May 2009.
- Allen C. Cheng, “Bio-Implantable Computing Systems: Vision, Challenges, and Opportunities,” **Department of Electronics Engineering (EE), National Chiao Tung University (NCTU), Hsinchu, Taiwan**, May 2009.
- Allen C. Cheng, “Bio-Implantable Computing Systems: Vision, Challenges, and Opportunities,” **Institute of Information Science (IIS), Academia Sinica, Taipei, Taiwan**, April 2009.
- Allen C. Cheng, “Bio-Implantable Computing Systems: Vision, Challenges, and Opportunities,” **SoC Technology Center (STC), Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan**, April 2009.
- Allen C. Cheng, “Bio-Implantable Computing Systems: Vision, Challenges, and Opportunities,” **Department of Computer Science and Information Engineering (CSIE), National Taiwan University (NTU), Taipei, Taiwan**, April 2009.
- Allen C. Cheng, “Initial Steps Toward Ubiquitous Biomedical Implantable System-on-Chip – An Architectural Perspective,” **Institute of Information Science (IIS), Academia Sinica, Taipei, Taiwan**, December 2007.
- Allen C. Cheng, “Accelerating Embedded Multimedia Applications with Versatile and Reconfigurable Instruction Fusion,” **SoC Technology Center (STC), Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan**, December 2007.
- Allen C. Cheng, “Initial Steps Toward Ubiquitous Biomedical Implantable System-on-Chip – An Architectural Perspective,” **Department of Electrical and Computer Engineering (ECE), Carnegie Mellon University (CMU)**, October 2007.
- Allen C. Cheng, “A Post-Fabrication Reconfigurable Platform for Low-Power High-Performance Implantable Computing – An Architecture/Compiler Synergy,” **SoC Technology Center (STC), Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan**, July 2007.
- Allen C. Cheng, “A Post-Fabrication Reconfigurable Platform for Low-Power High-Performance Implantable Computing – An Architecture/Compiler Synergy,” **Department of Computer Science and Information Engineering (CSIE), National Taiwan University (NTU), Taipei, Taiwan**, July 2007.
- Allen C. Cheng, “A Post-Fabrication Reconfigurable Platform for Low-Power High-Performance Implantable Computing – An Architecture/Compiler Synergy,” **Department of Computer Science (CS), National Tsing Hua University (NTHU), Hsinchu, Taiwan**, July 2007.
- Allen C. Cheng, “Low-Power High-Performance Reconfigurable Computing - An Architecture/Compiler Synergy,” **Fujitsu Research Lab (Kawasaki Main Office), Tokyo, Japan**, April 2007.

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## University of Pittsburgh Seminars

- Allen C. Cheng, “Opportunities in Biomedical Computing Research – What, Why, and How?” **Department of Electrical and Computer Engineering (ECE) Undergraduate Seminar**, University of Pittsburgh, April 2008.
- Allen C. Cheng, “A Post-Fabrication Reconfigurable Platform for Low-Power High-Performance Implantable Computing – An Architecture/Compiler Synergy,” **Department of Computer Science (CS), University of Pittsburgh**, September 2007.
- Allen C. Cheng, “A Comprehensive Treatment for Designing Embedded Systems,” **Department of Electrical and Computer Engineering (ECE) Undergraduate Seminar, University of Pittsburgh**, January 2007.
- Allen C. Cheng, “Designing Portable and Implantable Computers,” **IEEE University of Pittsburgh Research Seminar**, November 2006.
- Allen C. Cheng, “Designing Computers for Embedded Systems - Challenges and Research Opportunities,” **Department of Electrical and Computer Engineering (ECE) Graduate Seminar, University of Pittsburgh**, October 2006.
- Allen C. Cheng, “Embedded Systems – What and Why,” **Department of Electrical and Computer Engineering (ECE) Undergraduate Seminar, University of Pittsburgh**, September 2006.

## **Doctoral Thesis**

- Thesis: Application Specific Architecture Framework for High-Performance Low-Power Embedded Computing
- Dissertation Committee
  - Professor Trevor N. Mudge, Co-Chair
  - Professor Gary S. Tyson, Co-Chair
  - Professor Marios C. Papaefthymiou
  - Associate Professor Scott A. Mahlke
  - Associate Professor Dennis Sylvester
- Contributions
  - Pioneered an original application-specific processor framework for embedded systems
  - Established a novel instruction set synthesis paradigm
  - Developed efficient low-power microarchitecture
  - Explored effective compiler optimization techniques for specialized on-chip memories

## **Academic Research Experience**

**University of Pittsburgh, Pittsburgh, PA (8/2006 – Present)**

**Assistant Professor, Department of Electrical and Computer Engineering**

**Assistant Professor, Department of Bioengineering, *Secondary Appointment***

**Assistant Professor, Department of Neurological Surgery, *Secondary Appointment***

**Assistant Professor, Department of Computer Science, *Secondary Appointment***

- Research Area: Energy-Efficient, High-Performance, Resilient, Embedded, and Biomedical Computing Systems

**The University of Michigan, Ann Arbor, MI**

**Graduate Research Assistant**

- Advisors: Trevor Mudge and Gary Tyson (9/2002 – 12/2005)

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- Research Area: Low-Power High-Performance Application-Specific Architectures and Micro-architectures

## **The University of Michigan, Ann Arbor, MI**

### **University of Michigan Rackham Graduate School Summer Research Fellowship**

- Mentor: Todd Austin (5/2002 – 8/2002)
- Research Area: Continuous Real-Time Speech Recognition and Natural I/O Applications
- Developed multithreaded embedded processor simulator based on the *SimpleScalar* toolset.

## **North Carolina State University, Raleigh, NC**

### **National Science Foundation - MGE Undergraduate Research Program**

- Mentor: Alexander Dean (10/2000 – 7/2001)
- Research Area: Software Thread Integration
- Developed static timing analysis for the *Thrint* compiler.

## **Industrial Experience**

### **Pfizer Inc., Ann Arbor, MI**

#### **Assistant Research Staff, BioImaging Center**

#### **Pfizer Global Research and Development (PGRD) (1/2004 – 4/2005)**

- Developed a file format framework to streamline preclinical image analysis workflow
- Implemented image conversion engines to integrate in-vivo modalities into the drug discovery process
- Mentored and trained a new employee to increase employer's overall efficiency and productivity

### **eLand Technologies Co., Ltd., Taipei, Taiwan**

#### **R&D Engineer Intern: Department of Research and Development (6/2000 – 8/2000)**

- Developed an online ANSI-to-CSS codec in Java for internet forums and maintained NNTP news servers
- Facilitated employer's enterprise solutions for large-scale knowledge management

## **Academic Teaching Experience**

### **University of Pittsburgh, Pittsburgh, PA**

#### **Assistant Professor, Department of Electrical and Computer Engineering**

#### **ECE 2161/1161 – Embedded Computer System Design (1/2009 – 4/2009)**

#### **Department of Electrical and Computer Engineering**

- Exposed graduate students and advanced undergraduate students to advanced system concepts and design techniques of high-performance, low-power, real-time, networked, and multiprocessing embedded computer systems. Hands-on laboratory is included as an integrated component.

### **University of Pittsburgh, Pittsburgh, PA**

#### **Assistant Professor, Department of Electrical and Computer Engineering**

#### **ECE 2160/1160 – Introduction to Embedded System Design (8/2008 – 12/2008, 8/2009 – 12/2009)**

#### **Department of Electrical and Computer Engineering**

- Exposed graduate students and advanced undergraduate students to the concepts and techniques of embedded computer system design including requirements, specifications, design implementation and testing. Hands-on laboratory is included as an integrated component.

### **University of Pittsburgh, Pittsburgh, PA**

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## **Assistant Professor, Department of Electrical and Computer Engineering**

### **ECE 2195 – Emerging Technologies in Computer Architecture (1/2008 – 4/2008)**

- Exposed graduate students and advanced undergraduate students to explore the principles of architecting next-generation nanoscale computing systems as we are entering the age of nanoelectronic regime.

## **University of Pittsburgh, Pittsburgh, PA**

### **Assistant Professor, Department of Electrical and Computer Engineering**

#### **ECE 2195 – Biomedical Computing (8/2007 – 12/2007)**

- Exposed graduate students and advanced undergraduate students to the state-of-the-art and cutting-edge computing research for biomedical applications.

## **University of Pittsburgh, Pittsburgh, PA**

### **Assistant Professor, Department of Electrical and Computer Engineering**

#### **ECE 2195 – Advanced Computer Architecture (8/2006 – 12/2006)**

- Exposed graduate students and advanced undergraduate students to the state-of-the-art and futuristic computer architecture research.

## **The University of Michigan, Ann Arbor, MI**

### **Lecturer, College of Engineering**

#### **ENGR 101 – Introduction to Computers and Programming (1/2006 – 4/2006)**

- Taught C++, C and Matlab programming to ~225 undergraduate engineering students
- Supervised a team of 3 graduate student teaching assistants and graders

## **The University of Michigan, Ann Arbor, MI**

### **Graduate Student Instructor, Department of Electrical Engineering and Computer Science**

- EECS 497 – EECS Major Design Projects (1/2004 – 4/2004)
- EECS 496 – Major Design Experience Professionalism (5/2005 – 6/2005)
- EECS 470 – Computer Architecture (9/2002 – 12/2002)
- EECS 370 – Introduction to Computer Organization (1/2003 – 4/2003, 1/2005 – 4/2005, and 9/2005 – 12/2005)
- EECS 270 – Introduction to Logic Design (1/2002 – 4/2002)
- EECS 181 – Introduction to Computer Systems (9/2004 – 12/2004)

## **North Carolina State University, Raleigh, NC**

### **Lab Instructor and Teaching Assistant, Department of Computer Science**

- CSC 114 – Introduction to C++ Programming (8/1998 – 12/1998, 1/1999 – 5/1999, and 8/1999 – 12/1999)

## **North Carolina State University, Raleigh, NC**

### **Designated Mathematics Tutor, Department of Disability Services for Students**

- Weekly tutored 3 to 4 students, one-on-one, with mental and/or physical disabilities on the following mathematic courses (1/1998 – 5/1998, 5/1998 – 8/1998, and 8/1998 – 12/1998)
- MA 141 – Calculus I
- MA 241 – Calculus II
- MA 242 – Calculus III
- MA 301 – Introduction to Differential Equations
- MA 302 – Numerical Applications to Differential Equations
- MA 305 – Elementary Linear Algebra

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## Awards

### *Research Awards, Scholarships, and Fellowships*

- Microsoft Research Cell Phone as a Platform for Healthcare Award (2008)
- The University of Michigan Rackham Graduate School Summer Research Fellowship (2002)
- US Department of Education Graduate Assistance in Areas of National Need (GAANN) Fellowship (2001 – 2002)
- NSF Minority Graduate Education (MGE) Research Trainee Award (2000 – 2001)
- MCI Corporation Outstanding Computer Engineering Scholarship (1999)

### *Career Development and Travel Grants*

- University of Pittsburgh Swanson School of Engineering Faculty Development Grant (2008)
- University of Pittsburgh University Center of International Study (UCIS) Hewlett International Grant Program (2007)
- University of Pittsburgh Swanson School of Engineering Faculty Development Grant (2007)
- University of Pittsburgh Swanson School of Engineering Faculty Development Grant (2006)
- The University of Michigan Rackham Graduate School Travel Grant (2005)
- International Conference Travel Grant by Ministry of Education, Taiwan, ROC (2005)
- The University of Michigan Rackham Graduate School Travel Grant (2004)
- International Conference Travel Grant by Ministry of Education, Taiwan, ROC (2004)
- ACM/IEEE Design Automation Conference (DAC) Speaker Travel Grant (2004)

## Honors

- Keynote Speaker, 7<sup>th</sup> IEEE/ACM Workshop on Optimizations for DSP and Embedded Systems (IEEE/ACM ODES), in conjunction with IEEE/ACM International Symposium on Code Generation and Optimization (IEEE/ACM CGO), March, 2009.
- Microsoft Research New Faculty Fellowship Award Nominee of University of Pittsburgh (one nominee per institution) (2008)
- North Carolina State University *Summa Cum Laude* Honor Graduate (2001)
- Eta Kappa Nu (HKN) International Honor Society for Electrical Engineers (2000 – Present)
- Phi Eta Sigma Freshman National Honor Society (1997 – Present)
- Golden Key National Honor Society (1999 – Present)
- North Carolina State University Scholar (1997 – 2001)
- North Carolina State University Dean's List (1997 – 2001)

## Professional Service and Contributions

### *External Service and Contributions*

- Editorial Review Board
  - International Journal of Multimedia Data Engineering and Management (IJMDEM 2008 – Present)
- National Science Foundation (NSF) Grants Review Panelist
  - Computer Systems Research (CSR), 2007
- Organizing Committee for International Conferences and Workshops

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- Student Volunteer Chair, ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2010)
- Demo Co-Chair, IEEE International Symposium on Multimedia (ISM 2008)
  
- Technical Program Chair/Co-Chair for International Conferences and Workshops
  - Co-Chair, Workshop on Biomedicine in Computing: Systems, Architectures, and Circuits (BiC), in conjunction with the 36th International Symposium on Computer Architecture (ISCA), 2009. Co-Organized with Prof. Ken Mai at Carnegie Mellon University.
  
- Technical Program Committee for International Conferences and Workshops
  - ACM/IEEE International Conference on Algorithms and Architectures for Parallel Processing (ICA3PP 2010)
  - International Workshop on Multimedia Information Processing and Retrieval (MIPR 2009), in conjunction with IEEE International Symposium on Multimedia (IEEE ISM 2009)
  - IEEE International Conference on Computer Design (ICCD 2009)
  - IEEE International Conference on Computer and Information Technology (CIT 2009)
  - IEEE/ICME International Conference on Complex Medical Engineering (CME 2009)
  - IEEE/IARIA International Conference on Advances in Multimedia (MMEDIA 2009)
  - IEEE International Conference on Computer Design (ICCD 2008)
  - International Workshop on Multimedia Information Processing and Retrieval (MIPR 2008), in conjunction with IEEE International Symposium on Multimedia (IEEE ISM 2008)
  - IEEE International Conference on Computer and Information Technology (CIT 2008)
  - IEEE International Conference on Computer Design (ICCD 2007)
  - IEEE International Conference on Computer and Information Technology (CIT 2007)
  
- Session Chair for International Conferences and Workshops
  - IEEE International Conference on Computer Design (ICCD 2009)
  - IEEE International Symposium on Multimedia (ISM 2007)
  
- Professional Association Technical Committee Membership
  - IEEE Circuits and Systems Society (CAS) Life Science Systems and Applications (LiSSA) Technical Committee (2009 – Present)
  - IEEE Task Force on Human Centered Information System (TFHIS) (2007 – Present)
  - IEEE Task Force on Nanoelectronic, Nanoarchitecture, and Nanocomputing (2007 – Present)
  - IEEE Task Force on Embedded System Codesign (TFESC) (2007 – Present)
  - IEEE Technical Committee on Computer Architecture (TCCA) (2007 – Present)
  - IEEE Computer Society Technical Committee (2004 – Present)
  
- Technical Reviewer for Journals
  - IEEE Micro (Micro 2008)
  - IEEE Transactions on Circuits and Systems (TCAS 2008)
  - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD 2008)
  - IEEE Transactions on VLSI Systems (TVLSI 2008)
  - IEEE Transactions on Circuits and Systems (TCAS 2007)
  - IEEE Transactions on Computers (TC 6/2005)
  - International Journal of Computer Languages, Systems And Structures (COMLAN 2/2007)
  - Journal of Information Science and Engineering (JISE 2009)
  
- Technical Reviewer for Conferences
  - Design Automation Conference (DAC 2004, 2005)

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- Design Automation and Test in Europe (DATE 2007)
- International Symposium on Computer Architecture (ISCA 2004, 2005, 2008)
- International Symposium on Microarchitecture (MICRO 2004)
- International Symposium on High Performance Computer Architecture (HPCA 2004)
- International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES 2005)
- International Conference on Computer-Aided Design (ICCAD 2008)
- International Symposium on Circuits and Systems (ISCAS 2009)
- International Conference on Parallel Architectures and Compilation Techniques (PACT 2005)
- International Symposium on Low Power Electronics and Design (ISLPED 2004, 2005)
- Workshop on Optimizations for DSP and Embedded Systems (ODES 2004, 2005)
  
- Professional and Honor Society Membership
  - IEEE Member (1998 – Present)
    - IEEE Computer Society Member (2006 – Present)
    - IEEE Engineering in Medicine and Biology Society Member (2007 – Present)
    - IEEE Systems, Man, and cybernetics Society Member (2007 – Present)
    - IEEE Circuits and Systems Society Member (2008 – Present)
  - ACM Member (2006 – Present)
  - AAAS Member (2006 – Present)
  - Eta Kappa Nu (HKN) Member (2000 – Present)
  - Phi Eta Sigma Member (1997 – Present)
  - Golden Key Member (1999 – Present)

## University of Pittsburgh Service and Contributions

- Faculty, Computer Engineering Program (2007 – Present)
  - Department of Computer Science
  - Department of Electrical and Computer Engineering
  
- Coordinator, Computer Architecture Reading Seminar (2007 – 2009)
  - Departments of Computer Science and Electrical and Computer Engineering
  
- University of Pittsburgh Graduate Faculty (2008 – Present)
  
- University of Pittsburgh Central Research Development Fund (CRDF), Grant Reviewer, 2008
  
- Electrical and Computing Engineering Administrative Service
  - ECE Graduate Committee (2008 – Present)
  - ECE Undergraduate Committee (2007 – 2008)
  - ECE Technical Area Committee in Computer Engineering (2006 – Present)
  
- Undergraduate and Minority Mentoring and Outreach
  - Faculty Mentor, Mentoring Program for Excellence in Engineering (MPE2), Pitt EXCEL Program, Office of Diversity, Swanson School of Engineering, University of Pittsburgh (2006 – Present)
  
- Ph.D. Thesis Committee Served
  - Shen Chih Tung, Ph.D., Thesis: An Architectural Approach for Reducing Power and Increasing Security of RFID Tags, 2008: awarded. (Advisor: Prof. Alex Jones)

# Curriculum Vitae

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- Cheng-Chun Chang, Ph.D., Thesis: Coding Perspective to the Wireless Multiple Access Relay Networks, 2008: awarded. (Advisor: Prof. Heung No Lee)
- Jian Xu, Ph.D. Candidate, Thesis: Human Perception based Video Preprocessing, 2009: awarded. (Advisor: Prof. Mingui Sun)
- Steven Hackworth, Ph.D. Candidate, Thesis: Design, Optimization, and Implementation of a Volume conduction Powering and Communication Platform for Implantable Devices: in progress. (Advisor: Prof. Mingui Sun)
- Gayatri Mehta, Ph.D. Candidate, Thesis: Energy-efficient Reconfigurable fabric for Embedded Computing, 2009: awarded. (Advisor: Prof. Alex Jones)
  
- M.S. Thesis Committee Served
  - J. Ryan Warner, M.S., Thesis: Real Time 3-D Graphics Processing Hardware Design Using Field-Programmable Gate Arrays (FPGAs), 2008: awarded. (Advisor: Prof. Tom Cain)

## Research Student Advisees - Current

### Graduate Students

- Zhanpeng Jin, Ph.D. Student
  - University of Pittsburgh Rath Fellow, 2007
  - Intern, Microsoft Research, Redmond WA, Summer 2009
  - B.S. & M.S. (Computer Engineering), Northwestern Polytechnical University, PRC
- Yuwen Sun, M.S./Ph.D. Student
  - B.S. (Information Science and Electrical Engineering), Zhejiang University, PRC
- Shimeng Huang, M.S./Ph.D. Student
  - B.S (Automation), Tsinghua University, RPC
- Joseph J. Oresko, M.S. Student
  - Intern, Concurrent Technologies Corporation, Pittsburgh PA, Summer 2009
  - B.S (Double Major: Electrical Engineering & Mechanical Engineering), University of Pittsburgh at Johnstown
- Jun Cheng, M.S. Student
  - University of Pittsburgh Swanson School of Engineering Dean's Fellow, 2009
  - B.S. & M.S. (Electrical Engineering), University of Electronic Science and Technology of China, PRC.

### Undergraduate Students (independent study projects)

- Project: Smartphone-based Mobile Cardiovascular Diseases Monitoring System, 2008 – Present
  - Heather L. Duschl, Computer Engineering & Japanese (Double major)
- Project: Brain-implantable Computing, 2008 – Present
  - John J. Kraiss, Bioengineering

### Undergraduate Students (senior design projects)

- Project: Collapsing Neural Processing Data Flow Subgraphs via Instruction Fusion, 2009
  - Anthony J. Talak

## Research Student Advisees - Alumni

### Graduate Students

- Kingsley Adeoye, "High Performance Reconfigurable Fuzzy Logic Device for Medical Risk Evaluation," M.S. 2009 (First Employment: Intel Corp.)

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- Daniel Z. Zeevi, “Replacing Traditional ALUs with Versatile Instruction Processing (VIP) Units for Embedded Multimedia Processors,” M.S. 2007 (First Employment: Respironics Inc.)

## Visiting Graduate Students

- Kailash Toshniwal, “Parallelizing Neural Signal Processing Applications on Chip Multiprocessors,” University of Pittsburgh Pre-PhD Scholars Program, Summer 2009.
  - M.S. Student, University of North Carolina at Charlotte (UNCC)

## Undergraduate Students (independent study projects)

- Project: Developing a Cellular Phone-based Electrocardiogram with Diagnostic Capabilities  
**PITT EXCEL Mentoring Program for Excellence in Engineering (MPE2) Award, 2007**
  - Timothy Sestrich, Computer Engineering & Bioengineering (Minor)
    - Software Engineering Intern, Medrad Inc., PA., 2008
- Project: Encryption Algorithms for Low-Power Embedded Systems, 2009
  - Gregory Hartman, Computer Engineering.
  - Chun-Ming Wang, Computer Engineering.
- Project: Power Saving Technologies in Consumer Electronics, 2008
  - Taylor Holmes
  - Adam Sparacino
- Project: Benchmarking Implant Chips, 2007
  - Walter C. Impellicceiri Jr

## Undergraduate Students (senior design projects)

- Project: Wireless Security for Enterprise Networks, 2008
  - Vanessa L. Anderson
  - Clyde E. Nelson
  - Mladen Sarac
- Senior Design Project: VPU Instruction Fusion and Parallelization, 2007
  - David E. Bitel
  - Trevor W. Patrie
  - Brett L. Rettura
- Senior Design Project: Thumb-2 Architecture Design and Simulation, 2007
  - Benjamin W. Johnson
  - Don P. Koenig

## **Professional References**

### **Professor Trevor N. Mudge**

Bredt Family Professor of Engineering, Department of Electrical Engineering and Computer Science  
The University of Michigan, Ann Arbor, MI 48109  
(734) 764-0203  
tnm AT eecs DOT umich DOT edu  
<http://www.eecs.umich.edu/~tnm/>

### **Professor Gary S. Tyson**

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# Curriculum Vitae

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## **Professor James C. Hoe**

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<http://www.ece.cmu.edu/~jhoe/>

## **Professor Mingui Sun**

Professor, Department of Neurological Surgery  
Director, Center for Clinical Neurophysiology  
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(412) 648-9095  
drsun AT pitt DOT edu  
<http://www.neurosurgery.pitt.edu/faculty/sun.html>