Mark T. Smith Ph.D.

Personal Information

Institut för Tillämpad Informationsteknik
Kungliga Tekniska Högskolan
Electrum 418
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Sweden
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Citizenship: United States of America

Professional Interests

Sensors and sensor enabled systems, embedded systems, context aware systems, smart spaces, low power system architectures, mobile devices, mobile device communication, and architectures for multimedia and multiprocessor systems.

Education

Ph.D. Bioengineering, University of Utah, 1983
M.S. Bioengineering, University of Utah, 1978
B.A. Physiological Psychology, Department of Biology, University of California, Riverside, 1976
Note: Although the name looks like it has something to do with psychology, Physiological Psychology was concerned with topics in neurophysiology. It was part of the Biology Department.

Employment

Kungliga Tekniska Högskolan, Stockholm, Sweden

October 2005-Present   Professor of IT Product Development
- Department of Applied Information Technology
- School of Information and Communication Technology

Georgia Institute of Technology, Atlanta, Georgia

January 2004-May 2005   Visiting Professor, School of Electrical and Computer Engineering
- Visiting professor, Electrical and Computer Engineering, spring semester.
- Designing and teaching a graduate level class in embedded sensor systems.

- Research in low cost biometric sensors.
- Research in smart space devices and architectures for security applications.

Hewlett Packard Laboratories, Palo Alto, California

1999-2005   Department Manager, Appliance Platforms Department
- Founded new department in Hewlett Packard Laboratories, the Appliance Platforms Department, consisting of 27 members.
- Provided technical and managerial direction for four technology focus areas in the department:
    1. Information Technology Devices and Systems
    2. Context Aware Technologies
    3. Communicating Smart Spaces
    4. Low Power Algorithms and Systems
- Conducted research in next generation context aware, wearable and internet appliance systems, smart spaces, and connectivity.
- Expanded technology transfer and strategy planning activities of the department to include outside partners and customers in addition to HP's core businesses by working directly with Hewlett Packard's customer consulting groups.
- Department liaison to universities including MIT's Project Oxygen, Georgia Institute of Technology and University of Illinois.
- Direct collaboration in joint research projects with Professor Gerald Maguire Jr. at the Royal Institute of Technology, Sweden, and with Professor Luca Benini at the University of Bologna, Italy.
- Conducted consulting and joint product R&D on future embedded mobile systems with external industrial partners such as Nike, Volkswagen, Disney and the Swatch Group.

1997-1999   Project Manager, Visual Computing Department, Appliances and Streaming Media
- Initiated next generation internet client program at HP Labs. Supervised 3 people and conducted technical research in sensor based, context aware systems.
- Hewlett Packard member of 3 person design team for the *BadgePAD* series of wearable, low power, context aware platforms used for context sensing and low power algorithm studies at Hewlett Packard Laboratories and several collaborating universities.
- Provided organizational and managerial direction for 4 members of the Video Communication and Processing team. In conjunction with members of the internet client group, provided technical direction for video communication platform design.
- Coordinated all group efforts directly with Hewlett Packard product divisions, strategy groups, and legal teams to transfer technology and intellectual property to the company.

1993-1997   Technical Contributor, Printing Technology Department, Ultra Portable Peripherals

- Technical lead on a portable document capture device "Capshare", Hewlett Packard's first personal communicating imaging appliance product. Resulted in a new business unit in portable devices.
- Extensive design in digital signal processing, mixed systems, CCD systems and active pixel sensor systems
- Coinventor of a 2D all optical surface navigation system for use in scanners and printers and has lead to 5 patents. A derivative of this device forms the basis of many commercial optical mice of which millions of units have been sold.
- Technical consultant and electrical engineer in several design efforts in the areas of printing and portable display technology.

1991-1993   Project Manager, Visual Computing Department, Workstation Graphics Technologies
- Supervised 7 people and contributed to research in algorithms and architectures for advanced 3D graphics support.
- Supervised 3 people and contributed to research and advanced development of a high performance 3D graphics subsystem for an experimental wide word workstation architecture.
- Conducted research into multiprocessor based server architectures to support computer graphics, digital video, and image processing for networked clients.

1987-1991   Member of Technical Staff, Visual Computing Department, 3D Graphics
- Performed research and development on multiprocessor based accelerators for graphics and solid modeling applications.
- Developed parallel code for multiprocessor accelerators, including application code, support libraries, and parallel runtime support.
- Developed software for profiling and visualizing performance of core routines within HP MECAD software in order to identify areas for acceleration, and to characterize the performance of parallel applications running on the multiprocessor platform.

1984-1987   Member of Technical Staff, Design Technology Lab and Circuit Technology Group
- Performed research and development of hardware and software tools for circuit simulation in design automation systems.
- Designed and implemented a hardware switch level simulator supporting both unit delay and timing simulation, and based on a ternary simulation algebra. This algebra was extended to allow pass transistor circuits to be simulated.
- Developed software version of this switch level simulator which was incorporated in the Hewlett Packard "Chipbuster" IC design tool product set used company wide.

University of Utah, Salt Lake City, Utah

1983-1984   Visiting Assistant Professor, Electrical Engineering Department.

Proceedings

1. Amol Borkar, Monson Hayes, Mark Smith, *Robust Lane Detection and Tracking With Ransac and Kalman Filter,* 2009 International Conference on Image Processing, November 2009, Cairo, Egypt

2. Amol Borkar, Monson Hayes, Mark Smith, *Lane Detection and Tracking Using a Layered Approach,* Advanced Concepts for Intelligent Vision Systems, September 2009, Bordeaux, France

3. Amol Borkar, Monson Hayes, Mark Smith, *A Layered Approach To Robust Lane Detection At Night,* IEEE Workshop on Computational Intelligence in Vehicles and Vehicular Systems, March 2009, Nashville TN, USA

4. Mark Smith, *Reconciling ICT and Wearable Design: Ten Lessons from Working with Swatch*, Proceedings of the ISWC07 Workshop on the Role of Design in Wearable Computing, held in conjunction with the IEEE International Symposium on Wearable Computers, October 13 2007, Boston MA, USA

5. Jinwoo Kang, Amol Borkar, Angelique Yeung, Nancy Nong, Mark Smith, Monson Hayes, *Short Wavelength Infrared Face Recognition For Personalization"*, Proceedings of the International Conference on Image Processing, October 8-11, 2006, Atlanta, Georgia, USA

6. Mat Hans, April Slayden, Mark Smith, Banny Banerjee, Arvind Gupta, *Djammer, a New Digital, Mobile, Virtual Personal Musical Instrument*, Proceedings of the IEEE International Conference on Multimedia and Expo, July 6-8, 2005, Amsterdam, The Netherlands

7. Peter Hutterer, Mark Smith, John Ankcorn, Wayne Piekarski, Bruce Thomas, *A Lightweight UI Software Infrastructure for Wrist-based Displays*, Proceedings of the Third International Conference on Information Technology and Applications, 2005, Sydney, Australia

8. Peter Hutterer, Mark Smith, Bruce Thomas, Wayne Piekarski, John Ankcorn, *Lightweight User Interfaces for Watch Based Displays*, Proceedings of the Sixth Australasian User Interface Conference, 2005, Newcastle, Australia

9. Gail L. Rosen, Mark T. Smith, Paul E. Hasler, *Circuit Implementation of a 2-D Gradient Source Locallizer*, Proceedings of the Third IEEE Conference on Sensors, October 24-27 2004, Vienna Austria

10. Mat C. Hans, Mark T. Smith, *Interacting with Audio Streams for Entertainment and Communication*, Proceedings of the Eleventh ACM International Conference on Multimedia, November 2-8 2003, Berkeley CA, USA

11. Mat C. Hans, Mark T. Smith, *A Wearable Networked MP3 Player and "Turntable" for Collaborative Scratching*, Proceedings of the Seventh IEEE International Symposium on Wearable Computers, October 21-23 2003, White Plains NY, USA

12. Cyril Brignone, Salil Pradhan, John Grundback, Alan McReynolds, Mark Smith, *Websign: A Looking Glass for e-Services*, Proceedings of the Tenth IEEE International Workshops on

Enabling Technologies: Infrastructure for Collaborative Enterprises, June 20-22 2001, Cambridge MA, USA.

13. Theo Kanter, Gerald Q. Maguire Jr., Mark T. Smith, *Rethinking Wireless Internet with Smart Media*, Proceedings of the Nordic Radio Symposium 2001 (NRS '01), April 3-5 2001, Nynashamn, Sweden.

14. Mark T. Smith, *Information Appliances and Services*, NIST Pervasive Computing 2000, January 25-26 2000, Gaithersburg, Maryland.

15. H.W.P. Beadle, G.Q. Maguire Jr., M.T. Smith, *Location Based Personal Mobile Computing and Communication*, Proc. 9th IEEE Workshop on Local and Metropolitan Area Networks (LANMAN'98), pp. 23-24, Banff, Alberta, Canada, 17-20 May 1998.

16. H.W.P. Beadle, G.Q. Maguire Jr., and M.T. Smith, *Using Location and Environment Awareness in Mobile Communications*, Proc. EEE/IEEE ICICS'97, Singapore, September 1997.

17. Gerald Q. Maguire, Mark T. Smith, and Tomoki Osawa, *Walkstation II Project*, 2nd International Workshop on Mobile Multi-Media Communications, Bristol, England, April 1995.

18. G. Maguire, F. Reichert, and M. Smith, *A Multiport Mobile Internet Router*, Proceedings of the IEEE Vehicular Technology Conference `94, Volume 3, pages 1435-1439, Stockholm, Sweden, June 1994.

19. Klemets, G. Q. Maguire Jr., Frank Reichert, and M.T. Smith. *MINT - A Mobile Internet Router*, First IEEE International Symposium on Global Data Networking, pages 70-74, Institute of Electrical and Electronics Engineers, Cairo, Egypt, December 13-15, 1993. Note: Although this paper has the same title as the following one, they are quite different.

20. R. Hager, A Klemets, G. Q. Maguire Jr., M.T. Smith, and Frank Reichert, *MINT - A Mobile Internet Router*, Proceedings of the IEEE Vehicular Technology Conference `93, pages 318-321. Institute of Electrical and Electronics Engineers, May 18-20, 1993.

21. J. Yen, M. Smith, S. Spach, and F. Kitson, *Experiments in Parallel Processing for B-Spline Intersection Calculation*, SIAM Conference on Geometric Design, 1989.

22. M. Smith, J. Yen, and S. Spach, *A Transputer Based Architecture for Data Broadcasting*, Proceedings of the First Conference of the North American Transputer Users Group, 1989.

23. M. Smith, *A Hardware Switch Level Simulator for Large MOS Circuits*, IEEE Design Automation Conference, 1987.

24. M. Smith *Adaption of a Switch Level Model for Digital Circuits Utilizing Steering Logic*, Proceedings of the IEEE International Conference on Computer Design, 1985.

Journal Articles

1. Salil Pradhan, Cyril Brignone, Jun-Hong Cui, Alan McReynolds, Mark T. Smith, *Websigns: Hyperlinking Physical Locations to the Web*, IEEE Computer, August 2001, Volume 34, No. 8, pp. 42-48.

2. Tajana Simunic, Mark Smith, *Dynamic Power Management at Hewlett-Packard*, IEEE Design and Test of Computers, March-April 2001, Volume 18, No. 34, page 7.

3. Mark T. Smith, *Smart Cards: Integrating for Portable Complexity*, IEEE Computer, August 1998, pp. 110-112.

4. C. A. Brackett, A. S. Acampora, J. Sweitzer, G. Tangonan, M. T. Smith, W. Lennon, K. C. Wang, R. H. Hobbs, *A Scalable Multiwavelenngth Multihop Optical Network: A Proposal for Research on All-Optical Networks,* IEEE Journal of Lightwave Technology, May-June 1993, Volume 11 No. 5-6, pp. 736-752.

5. J. Yen, S. Spach, M. Smith, and R. Pulleyblank, *Parallel Boxing in B-Spline Intersection,* IEEE Computer Graphics and Applications, January 1991.

Internal Technical Reports

1. Mat Hans, Mark Smith, *Aggregating Rich Media Appliances Using SIP*, HP Labs Workshop on Appliance Aggregation, June 4-5, 2002

2. Chung-Tse Mar, Mat C. Hans, Mark T. Smith, Tajana Simunic, Ronald W. Schafer, *A High Quality, Energy Optimized, Real-Time Sampling Rate Conversion Library for the StrongARM Microprocessor,* HP Laboratories Technical Report, HPL-2002-159, June 3, 2002.

3. Salil Pradhan, Cyril Brignone, Jun-Hong Cui, Alan-McReynolds, Mark Smith, *Websign: Hyperlinks From a Physical Location to the Web,* HP Laboratories Technical Report, HPL-2001-140, June 11, 2001.

4. Jim Christy, Deven Kalra, Harry Nelis, Mark Smith, *The Super Workstation Graphics System,* HP Laboratories Technical Report, HPL-92-66, May, 1992.

Invited Tutorials

G.Q. Maguire and M. T. Smith, *Personal Computing and Communication*, International Zurich Seminar on Broadband Communications, February 18 2002, ETH Zurich, Switzerland.

G.Q. Maguire and M. T. Smith, *Personal Computing and Communication: Post-PC Internet Appliances*, System-On-Chip Design in Graz, April 18 2001, TU Graz, Graz Austria.

Invited Lectures

Mark T. Smith, *Devices in the Smart Space: The Technical Side of Context and its Role in HCI*, Keynote Presentation, Fourth Australasian User Interface Conference, February 4-7 2003, Adelaide, Australia.

Mark T. Smith, *Social Media*, First Georgia Tech Technology Symposium, November 8-9 2001, Georgia Institute of Technology, Atlanta, Georgia.

Mark T. Smith, *Client Design for Service Centric Architectures*, World Conference on the WWW and Internet, WebNet99, October 24-30 1999, Honolulu, Hawaii.

Mark T. Smith, *Sensors in Wearable Computing: Location and Environment Aware Clients*, The 1999 International Conference on Wearable Computing, June 9-11 1999, Stuttgart, Germany.

Mark T. Smith, *Sensors in Wearable Computing*, ATIP Workshop on Wearable Computing, February 24 1999, Tokyo, Japan.

Gerald Q. Maguire Jr., Mark T. Smith, and H. W. Peter Beadle, *SmartBadges: a wearable computer and communication system,* Stanford University, 8 May 1998, Stanford, California.

Mark T. Smith, *The Project Never Sleeps: Designing Systems Among Disruptive Technology*, Keynote Presentation, The Ericsson International Hardware Design Seminar, September 29 – October 1 1998, Gothenburg, Sweden.

Mark T. Smith, *Human Centered Personal Systems*, Royal Institute of Technology Lecture Series in Telecommunications, May 15 1998, Royal Institute of Technology, Stockholm, Sweden

Beadle, H.W.P., Maguire, G.Q., and Smith, M.T., *SmartBadges: A Wearable Computer and Communication System*, Sixth International Workshop on Hardware/Software Codesign (CODES/CASHE 98), March 15-18 1998, Seattle, Washington.

Gerald Q. Maguire Jr., Mark T. Smith, Tomoki Osawa, Walkstation II project, 2nd International Workshop on Mobile Multi-Media Communications Workshop, Bristol, England, April 1-13, 1995.

Colloquia

H.W.P. Beadle, G.Q. Maguire Jr., and M.T. Smith, Using Location and Environment Awareness in Mobile Communications, Proc. EEE/IEEE ICICS'97, Singapore, September 1997.

H.W.P. Beadle, G.Q. Maguire Jr., and M.T. Smith, Environment Aware Mobile Computing, Institut für Technische Informatik und Kommunikationsnetze and Physical Electronics Laboratory, ETH Zurich April 1997.

G. Q. Maguire Jr., F. Reichert, and M. T. Smith, A Multiport Mobile Internet Router, 44th IEEE Vehicular Technology Conference, Stockholm, Sweden, June 10, 1994.

A Klemets, G. Q. Maguire Jr., Frank Reichert, and M.T.Smith, MINT - A Mobile Internet Router, First IEEE International Symposium on Global Data Networking, Cairo, Egypt, December 13-15, 1993.

R. Hager, A Klemets, G. Q. Maguire Jr., M.T.Smith, Frank Reichert, MINT - A Mobile Internet Router, IEEE Vehicular Technology Conference '93, Secaucus, NJ, May 18-20, 1993.

Invited Courses and Course Modules

M. T. Smith, "Making it Small" (parts 1 and 2), lectures in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 2000.

M. T. Smith, "Making it Small" (parts 1 and 2), lectures in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 1999.

M. T. Smith, "Making it Small" (parts 1 and 2), lectures in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 1998.

M. T. Smith, "Making it Small" (parts 1 and 2), lectures in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 1997.

M. T. Smith, "Making it Small" (parts 1 and 2), lectures in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 1996.

M. T. Smith, "Making it Small", lecture in Mobile Personal Communication module of 2G1303 Telecommunication Systems, Royal Institute of Technology, Period 4, 1995.

M. T. Smith, "Personal Peripherals and Techniques for Building Personal Systems", lecture in Mobile Personal Communication module of 2G1303, Telecommunication Systems, Royal Institute of Technology, Period 4, 1995.

Special Issue

Bruce Thomas, Mark T. Smith (editors), "Special Issue of Personal and Ubiquitous Computing" Selected papers from the Sixth International Symposium on Wearable Computers, Springer-Verlag, London, Volume 7, No. 3, October 2003

Systems

DJammer
Co-inventor with one other member of HP Labs and acting as the hardware architect, the DJammer was designed to provide an interactive MP3 music experience by exploiting advanced sensor and

wireless communication technologies. This not only demonstrated to Hewlett Packard a new type of personal device, but also one that exploits emerging multimedia communication and interactive communication session management. Interactive MP3 functionality is provided by a virtual turntable model that allows MP3 music streams sent to the DJammer to be time shifted and manipulated in a manner similar to how a professional DJ manipulates or *scratches* music. The DJammer enables users to interact ("live-remix") with digital music from their MP3 players, and communicate & share in real-time the new experience with their associates. The virtual turntable model is driven by a sensor architecture platform that allows a wide variety of sensors to be mapped to virtual turntable events using custom signal processing algorithms. Session management is provided by exploiting the Session Initiation Protocol Standard (SIP) allowing the resulting output music stream to be sent to other DJammers or other devices with SIP and audio codec support such as laptop computers and advanced cell phones. The DJammer changes the 1-to-n creative process to a truly n-to-n collaborative experience.

Swatch WebWatch

In cooperation with the Swatch Group in Biel Switzerland, and acting as project designer and system engineer for Hewlett-Packard Labs in the joint study. The Swatch WebWatch project is an end to end mobile service and content delivery system for future personal devices that, unlike current computers and PDAs, are unconsciously portable such as smart phones and wristwatches. The WebWatch system provides hardware and software for connectivity, application, and infrastructure services such as web presence management, media caching, transcoding and personalization services. Part of this work was to collaborate with the Swatch Group on the design of the wristwatch to be used in this system. Swatch's vision of wrist worn internet devices is one where the wearer's expression of fashion and emotion is projected into the internet allowing new forms of human interaction though advanced mobile messaging involving multimedia. In addition to my technical, organizational and design role, I also was responsible for the legal and contractual processes for this collaboration. This resulted in prototypes of a wristwatch and smart wireless access point supporting both wireless LAN and Bluetooth.

WebSign

In combined effort with 4 other engineers and acting as the hardware architect, the WebSign system was designed as the first Hewlett Packard system that allow hand held computing appliances to exploit location and position aware applications within Hewlett Packard's Cooltown framework (http://www.cooltown.com). WebSign adds positioning and orientation capabilities to mobile appliances. When coupled with a web based architecture to map and detect hyperlinks from physical locations to internet resources, the WebSign system allows mobile users access to contextually relevant information about physical objects in their environment.

Environment Aware Mobile Computing: SmartBadge

In cooperation with Professor H. W. Peter Beadle at the Institute for Telecommunications Research, Electrical and Computer Engineering, University of Wollongong and with Professor G. Q. Maguire Jr. at the Royal Institute of Technology (KTH), constructed a series of devices which are aware of their environment. The first of these (the SmartBadge) has been used in classes at both KTH and the University of Wollongong. There are now 3 generations of these devices that have been used in end to end context aware and low power system research at Hewlett-Packard Labs and several universities. Full design details for all SmartBadge platforms have been placed on the web.

CapShare

Acting as lead hardware architect, the Hewlett Packard CapShare product was the company's first personal communicating imaging appliance product. The goal of this research project was to design a completely optical, hand held document scanner capable of capturing documents at 300 dots per inch, good enough for optical character recognition applications. Free hand, nonlinear motion was allowed at scanning rates up to 1 mile per hour. The architecture incorporated an advanced optical navigation system that did not use the information printed on the original document to determine the location of the scanners imager on the document surface. This resulted in scanned images that were spatially correct with respect to the original. A derivation of this navigation system is currently used in many commercial optical computer mice.

MINT router

In conjunction with Dr. G. Q. Maguire Jr. and his students at the Royal Institute of Technology, designed and implemented a mobile internet router, "MINT". The purpose of this device is to provide a framework for exploring wireless interfaces for mobile (IP and other protocol) networks.

Thesis Opponent

Åke Östmark, Doctorate, *"An Infrastructure for Service-Oriented Embedded Internet Systems"*, 2006, Opponent, Luleå University of Technology, Luleå, Sweden

Gustaf Juell-Skielse, Licentiate, *"ERP Adoption in Small and Medium Sized Enterprises"*, 2006, Opponent, Royal Institute of Technology, Stockholm, Sweden

Wei Li, Licentiate, *"Towards a Person-Centric Contet Aware System"*, 2006, Opponent, Royal Institute of Technology, Stockholm, Sweden

Anne Hong Ren, Licentiate, "*A Smart Network and Terminal Framework for Supporting Context-aware Mobile Internet and Personal Communications*", 2002, Opponent, Royal Institute of Technology, Stockholm, Sweden

Thesis Committees

Christopher M. Twigg, Ph.D., *"Floating-Gate Based Large-Scale Field-Programmable Analog Arrays for Analog Signal Processing"*, Member Advisory Committee, Georgia Institute of Technology.

Venkatesh Srinivasan, Ph.D., *"Programmable Analog Techniques for Precision Analog Circuits, Low-Power Signal Processing and On-Chip Learning"*, Member Advisory Committee, Georgia Institute of Technology.

Gail Rosen, Ph.D., "*Signal Processing for Biologically-Inspired Gradient Source Localization and DNA Sequence Analysis*", Member Advisory Committee, Georgia Institute of Technology.

Ravi Chawla, Ph.D., "*Power-efficient Analog Systems to Perform Signal Processing Using Floating-gate MOS Devices for Portable Applications"* 2004, Member Advisory Committee, Georgia Institute of Technology

David Abramson, M.S., "*MITE: Architectures for Reconfigurable Analog Arrays*" 2004, Member Advisory Committee, Georgia Institute of Technology.

Henrik Gustafsson, Licentiate, "*Dynamic Multi-Device Services*", Second Advisor, Royal Institute of Technology, Stockholm

Theo Kanter, Ph.D., "*Adaptive Personal Mobile Communication, Service Architecture and Protocols*", 2001, Second Advisor, Royal Institute of Technology, Stockholm

Peter Woo, M.S., "*An Accumulating Frame Buffer Architecture for a High-performance Graphics Engine*" 1991, Member Advisory Committee, MIT.

Conference Review

International Symposium on Wearable Computers, Program Committee 2008

Design Automation and Test in Europe, Program Committee 2007

Design Automation and Test in Europe, Program Committee 2006

International Symposium on Wearable Computers, Program Committee 2006

International Symposium on Wearable Computers, Program Committee co-chair 2004

IEEE Conference on Sensor Networks, Program Committee 2004

ACM Conference on Embedded Networked Sensor Systems, Program Committee 2003

International Conference on Ubiquitous Computing, Program Committee 2003

International Symposium on Wearable Computers, Program Committee co-chair 2002

International Symposium on Wearable Computers, Program Committee 2001

International Symposium on Micro-Architecture, guest reviewer

ACM Siggraph, guest reviewer

International Conference on Computer Design, guest reviewer

Advisory Boards

Member, Motorola Research Visionary Board

Charter Member, Computer Engineering Industrial Advisory Board, California Polytechnic State University Department of Computer Engineering

Co-member, Georgia Tech Broadband Institute Industrial Advisory Board, Georgia Institute of Technology

Industrial Advisor to California Polytechnic State University Society of Women Engineers, Team Tech effort, 2003 resulting in a national first place award. This is a 6 month national engineering competition sponsored by the Boeing Corporation and the Society of Women Engineers.

Courses Taught

Georgia Institute of Technology, School of Electrical and Computer Engineering

Course name	Semester
ECE-8883A Sensor Enabled Embedded Systems	Spring 2004, and Spring 2005

This course is an introduction to sensor enabled embedded systems and consists of both lecture and student project activities. Emphasis is placed on the technology and design tradeoffs between application requirements, performance, power requirements and cost. From a technology basis, the incorporation of sensors into embedded systems addresses sensor types and measurements, signal characteristics, processing algorithms and system requirements for successful sensor support. From a functional basis, the concepts of context awareness, dynamic persona, personalization, device aggregation, and other system advantages of sensor integration are addressed.

ECE-2025 Introduction to Signal Processing	Fall 2004, two recitation sections

Introduction to Signal Processing is a required course for all Computer Engineering majors at Georgia Tech. Topics covered in detail are continuous and discrete-time signals and systems, Sampling and Aliasing, Digital Filters and LTI systems, Z-transform methods and Fourier analysis.

University of Utah, Department of Electrical Engineering

Course name	Quarter
EE-537 Microcomputer System Design	Spring 1984
EE-536 Microcomputer System Design	Winter 1983
EE-535 Microcomputer System Design	Autumn 1983

The courses EE535-537 were designed as well as taught. This was the first year long course sequence taught at the University of Utah Electrical Engineering Department intended to address end to end microcomputer system architectures. This included hardware/software codesign, embedded systems, peripheral devices, I/O, graphics and memory systems at the chip and system level. The course series included a series of labs plus projects.

EE-200 Introduction to Digital Systems	Autumn 1983

University of Utah, Department of Bioengineering

Course name	Quarter
BE-601 Microprocessor Based Bioinstrumentation	Autumn 1982
BE-601 Microprocessor Based Bioinstrumentation	Autumn 1981
BE-601 Microprocessor Based Bioinstrumentation	Autumn 1980

Patents

1. *Hardware Switch Level Simulator for MOS Circuits*, US Patent 4907180
2. *Freehand Image Scanning Device Which Compensates for nonlinear Movement,* US Patent 5578813
3. *Navigation Technique for Detecting Movement of Navigation Sensors Relative to an Object*, US Patent 5644139
4. *Method and Device for Tracking Relative Movement by Correlating Signals From an Array of Photoelements*, US Patent 5729008
5. *Freehand Image Scanning Device Which Compensates for nonlinear Color Movement,* US Patent 5825044
6. *Self-Powered Network Access Point*, US Patent 6141763
7. *Optical Encoders Using Non-Patterned Targets*, US Patent 6246050
8. *Controlling an Imaging Array Not Having Black Cells Using an Array Controller that is Adapted to Imaging Arrays Having Black Cells,* US Patent 6661929
9. *Personal Identification Badge That Resets On the Removal of the Badge From the Wearer,* US Patent 6778066
10. *Access Control Through Secure Channel Using Personal Identification System*, US Patent 6836843
11. *Biometric Sensor*, US Patent 6965685
12. *Receiver and Correlator Used to Determine Position of Wireless Device*, US Patent 6975618
13. *Virtual Beacon System*, US Patent 7231441
14. *Creating a Virtual Link Between a Physical Location and its Web Representation,* US Patent 7299256