

KEYNOTE SPEAKERS

Tuesday, 7 December 2010 • 8:30 – 9:30 • Room: James L Knight Center - 3rd Floor



Dr. Regina E. Dugan

Director, Defense Advanced Research Projects Agency (DARPA), USA

Appointed by Secretary of Defense, Robert M. Gates, and announced by the Director, Defense Research and Engineering, Zachary Lemnios, Dr. Regina E. Dugan was sworn in as the 19th director of the Defense Advanced Research Projects Agency (DARPA) on July 20, 2009. Founded in 1958 as a response to the Soviet Union's launch of Sputnik, DARPA's mission is to prevent strategic surprise for the United States as well as create strategic surprise for our adversaries. From its founding more than 50 years ago to current day, this mission implies one imperative for the Agency: radical innovation for national security. Today DARPA is the principal agency within the Department of Defense for research, development and demonstration of high-risk, high-payoff projects for the current and future combat force.

Experienced in counterterrorism and defense against explosive threats, Dr. Dugan first served the Nation as a DARPA program manager from 1996 to 2000. During this first tour with the Agency, she directed a diverse \$100 million portfolio of programs including the "Dog's Nose" program, an effort focused on the development of an advanced, field-portable system for detecting the explosive content of land mines. In 1999, Dr. Dugan was named DARPA Program Manager of the Year for her efforts, and in 2000 she was awarded the prestigious Bronze deFleury medal by the Army Engineer Regiment. She is also the recipient of the Office of the Secretary of Defense Award for Exceptional Service and the Award for Outstanding Achievement.

Dr. Dugan's contributions to the United States military are numerous. She led a counterterrorism task force for the Deputy Secretary of Defense in 1999 and, from 2001 to 2003, she served as a special advisor to the Vice Chief of Staff of the Army, completing a Quick Reaction Study on Countermeasures for Enduring Freedom. The results of this study were subsequently briefed to joint senior military leadership and successfully implemented in the field.

Prior to her appointment as director of DARPA, Dr. Dugan co-founded Dugan Ventures, a niche investment firm, where she served as President and CEO. In 2005, Dugan Ventures founded RedXDefense, LLC, a privately held company devoted to innovating solutions for combating explosive threats, where she also served as President and CEO. From private industry, Dr. Dugan brings a wealth of management, finance, product development, and marketing experience to the Agency.

Wednesday, 8 December 2010 • 8:30 – 9:30 • Room: James L Knight Center - 3rd Floor



Dr. Sachio Semmoto

Founder & Chairman, Representative Director, eAccess Ltd., Japan
Director, EMOBILE Ltd., Japan

Dr. Semmoto founded eAccess Ltd in 1999. eAccess is Japan's first true entrepreneurial and global IP/telecom company that provides high-speed broadband telecommunication services using xDSL technology. eAccess has grown to a leading broadband IP operator in Japan, and completed its Initial Public Offering at the Tokyo Stock Exchange Mothers in October 2003 and moved to the Tokyo Stock Exchange First Section (TSE1) in November 2004. This is considered to be the fastest listing in the TSE1 whose market capitalization was approximately US\$1.5 billion.

Additionally he founded EMOBILE Ltd. which was awarded 3G spectrum license in 2005 and entered into the mobile broadband market in 2007. EMOBILE completed its financing, total US\$4.4 billion, which includes \$1.7 billion for equity and \$2.7 billion for debt financing, to roll out the nationwide mobile network. EMOBILE launched its data service in March 2007 and then the voice service in March 2008. EMOBILE's high speed, flat rate and reasonable pricing mobile data communications service dramatically changed the existing mobile scene, creating a "broadband revolution" in the mobile industry.

Dr. Semmoto is a Fellow of the IEEE. He is a director and the board of Thomson Reuters Founders Share Company (London, UK), International Christian University (ICU) (Tokyo, Japan), and a member of the Network of Global Agenda Councils, World Economic Forum and the Trilateral Commission. He is a member of Royal Swedish Academy of Engineering Sciences. He serves Vice President of Fulbright Association in Japan. He published numerous academic papers and books on both telecommunication technologies and high technology corporate management.

Thursday, 9 December 2010 • 8:30 – 9:30 • Room: James L Knight Center - 3rd Floor



Dr. Frederica Darema

Director, Air Force Office of Scientific Research, USA

Dr. Darema, a member of the Senior Executive Service, is the Director of the Mathematics, Information and Life Sciences Directorate at the Air Force Office of Scientific Research, Arlington, Va. She provides executive direction in the planning, conduct and coordination of broad, frequently large-scale and critical basic research and development program activities in such areas as advanced mathematical and computational methods for dynamic systems, information and decision systems, bio-systems, human cognition and socio-cultural systems.

From 1996 – 1998, she completed a two-year assignment at the Defense Advanced Research Projects Agency (DARPA) where she initiated a new thrust for research on methods and technology for performance-engineered systems. Dr. Darema has given numerous keynotes and other invited presentations in professional forums. Most recently Dr. Darema has held executive level positions at the National Science Foundation (NSF) as Senior Science and Technology Advisor and Senior Science Analyst in the Computer and Information Science and Engineering Directorate.

Dr. Darema was elected as an Institute of Electrical and Electronics Engineers (IEEE) Fellow for proposing the Single-Program-Multiple-Data (SPMD) computational model that has become the predominant model for programming parallel and distributed computers. Dr. Darema's interests and technical contributions span the development of parallel applications, parallel algorithms, programming models, environments and performance methods and tools for the design of applications and of software for parallel and distributed systems. At NSF, Dr. Darema developed initiatives and programs that changed the landscape of computer science research and included novel research directions in systems software and the Dynamic Data Driven Applications Systems (DDDAS) paradigm. She also led initiatives on research at the interface of neurobiology and computing, and other across-departmental and cross-agency initiatives such as the Information Technology Research and Nanotechnology Science and Engineering Initiative, the Scalable Enterprise Systems Initiative and the Sensors Programs Initiative.

PLENARY SPEAKERS

Tuesday, 7 December 2010 • 14:00 – 15:30 • Room: Hibiscus

Session I: Optical & Information Theory

Chair: Haitao Xia, LSI Corporation, USA



Vincent W. S. Chan

(IEEE/OSA Fellow)

Joan and Irwin Jacobs Professor, MIT, USA

Optical Flow Switching – A Faster, Greener and More Frugal Network Transport

Abstract: Present-day networks are being challenged by dramatic increases in bandwidth demand of emerging applications. We will explore a new network architecture, “optical flow switching,” that will enable significant data rate growth, power-efficiency and cost-effective scalability of next-generation networks. In particular, we will address the most important remaining open problem of an implementable optical flow switching architecture: the scalable control plane.

Biography: Vincent W. S. Chan, the Joan and Irwin Jacobs Professor of EECS, MIT, received his BS (71), MS (71), EE (72), and Ph.D. (74) degrees in EE all from MIT. From 1974 to 1977, he was an assistant professor, EE, at Cornell University. He joined MIT Lincoln Laboratory in 1977 and had been Division Head of the Communications and Information Technology Division until becoming the Director of the Laboratory for Information and Decision Systems (1999 – 2007). In 2008, he helped formed and is currently a member of the Claude E. Shannon Communication and Network Group at the Research Laboratory of Electronics of MIT.

In July 1983, he initiated the Laser Intersatellite Transmission Experiment Program and in 1997, the follow-on GeoLITE Program. In 1989, he formed the All-Optical-Network Consortium among MIT, AT&T and DEC. He also formed and served as PI the Next Generation Internet Consortium, ONRAMP among AT&T, Cabletron, MIT, Nortel and JDS, and a Satellite Networking Research Consortium formed between MIT, Motorola, Teledesic and Globalstar. He has founded in 2009 and is serving as the Editor-in-Chief of a new IEEE/OSA Journal: Journal of Optical Communications and Networking. He has served on the boards and technical advisory boards of many commercial companies and government agencies and is currently a Member of the Corporation of Draper Laboratory. He is also an elected member of Eta-Kappa-Nu, Tau-Beta-Pi and Sigma-Xi, the Fellow of the IEEE and the Optical Society of America.

Throughout his career, Professor Chan has spent his research focus on communication and networks, particularly on free space and fiber optical communication and networks and satellite communications. His work has led the way to the first successful laser communication demonstration in space and early deployment of WDM optical networks. His recent research emphasis is on heterogeneous (satcom, wireless and fiber) network architectures with stringent performance demands, such as those encountered in the defense and other medical, financial and R&D communities.



Anthony Ephremides

(IEEE Fellow)

Cynthia Kim Professor of Information Technology, University of Maryland, USA

To Schedule or Not to Schedule? The conundrum of channel access-

Abstract: A basic question in wireless networks is whether the users who share a common channel should schedule their access or transmit randomly. This question is intimately related to the issues of power and transmission rate control as well as to the issue of what the performance measure is.

We formulate the access problem in a layerless fashion and chart a methodical way of solving it. Ultimately, the resulting trade-offs are difficult to resolve, but in certain cases useful insights emerge that shed light into the resource allocation problem at its fundamental level.

Biography: Anthony Ephremides holds the Cynthia Kim Professorship of Information Technology at the Electrical and Computer Engineering Department of the University of Maryland in College Park where he holds a joint appointment at the Institute for Systems Research, of which he was among the founding members in 1986. He obtained his Ph.D. in Electrical Engineering from Princeton University in 1971 and has been with the University of Maryland ever since.

He has held various visiting positions at other Institutions (including MIT, UC Berkeley, ETH Zurich, INRIA, etc) and co-founded and co-directed a NASA-funded Center on Satellite and Hybrid Communication Networks in 1991. He has been the President of Pontos, Inc, since 1980 and has served as President of the IEEE Information Theory Society in 1987 and as a member of the IEEE Board of Directors in 1989 and 1990. He has been the General Chair and/or the Technical Program Chair of several technical conferences (including the IEEE Information Theory Symposium in 1991 and 2000, the IEEE Conference on Decision and Control in 1986, the ACM Mobihoc in 2003, and the IEEE Infocom in 1999). He has served on the Editorial Board of numerous journals and was the Founding Director of the Fairchild Scholars and Doctoral Fellows Program, a University-Industry Partnership from 1981 to 1985.

He has received the IEEE Donald E. Fink Prize Paper Award in 1991 and the first ACM Achievement Award for Contributions to Wireless Networking in 1996, as well as the 2000 Fred W. Ellersick MILCOM Best Paper Award, the IEEE Third Millennium Medal, the 2000 Outstanding Systems Engineering Faculty Award from the Institute for Systems Research, and the Kirwan Faculty Research and Scholarship Prize from the University of Maryland in 2001, and a few other official recognitions of his work. He also received the 2006 Aaron Wyner Award for Exceptional Service and Leadership to the IEEE Information Theory Society.

Tuesday, 7 December 2010 • 14:00 – 15:30 • Room: Jasmine

Session II: Access Networks

Chair: Jianwei Huang, Chinese University of Hong Kong, China



John M. Cioffi
(NAE Member, IEEE Fellow/RAEng Fellow)
Chairman and CEO, ASSIA Inc, USA
Hitachi Professor Emeritus
Stanford University, USA

Dynamic Spectrum Management

Abstract: Dynamic Spectrum Management (DSM) is the application of multi-user communications' signal processing to the problem of cross-talking transmission paths. DSM has been used with significant success in binders of cross-talking DSL circuits, and is a predecessor to dynamic spectrum access in wireless transmission. This talk will focus on the methods used for the 3 standardized levels of DSM, which address (1) outages and transmission-path stability, (2) politeness and adaptive power-spectra control, and (3) coordinated vector (or multiple-input, multiple-output) removal of crosstalk noise. DSM thus provides signal-processing opportunities in integrated circuits and network-management software that will be described.

Biography: John M. Cioffi is Chairman and CEO of ASSIA Inc, a Redwood City, CA based company pioneering DSL management software sold to DSL service providers, specifically known for introducing Dynamic Spectrum Management or DSM. He is also the Hitachi Professor Emeritus at Stanford University, where he held a tenured endowed professorship before retiring after 25 full-time years. Cioffi received his BSEE, 1978, Illinois; PhDEE, 1984, Stanford; Honorary Doctorate, University of Edinburgh 2010; Bell Laboratories, 1978–1984; IBM Research, 1984-1986; EE Prof., Stanford, 1986-present. Cioffi also founded Amati Com. Corp in 1991 (purchased by TI in 1997 for its DSL technology) and was officer/director from 1991-1997. At Amati, Cioffi designed the world's first ADSL and VDSL modems, which design today accounts for roughly 98% of the worlds over 300 million DSL connections. Cioffi is an inventor on the basic patents on the widely licensed ADSL design, VDSL, Dynamic Spectrum Management, and vectored DSLs.

Cioffi currently is also on the Board of Directors of Alto Beam, Teranetics, and ClariPhy. He is on the advisory boards of Focus Ventures, Wavion, SiTune, and Quantenna. Various other awards include IEEE Alexander Graham Bell Medal (2010), International Marconi Fellow (2006); Member, United States National Academy of Engineering (2001); International Fellow United Kingdom's Royal Academy of Engineering (2009); IEEE Kobayashi Medal (2001); IEEE Millennium Medal (2000); IEEE Fellow (1996); IEE JJ Tomson Medal (2000); 1999 University of Illinois Outstanding Alumnus and 2010 Distinguished Alumnus. Cioffi has published several hundred technical papers and is the inventor named on over 100 additional patents, many of which are heavily licensed in the communication industry.



Ian F. Akyildiz
(ACM/IEEE Fellow)
Ken Byers Distinguished Chair Professor
Georgia Institute of Technology, USA

NANONETWORKS: A New Frontier in Communications

Abstract: Nanotechnology is enabling the development of devices in a scale ranging from one to a few one hundred nanometers. Nanonetworks, i.e., the interconnection of nano-scale devices, are expected to expand the capabilities of single nano-machines by allowing them to cooperate and share information. Traditional communication technologies are not directly suitable for nanonetworks mainly due to the size and power consumption of existing transmitters, receivers and additional processing components. All these define a new communication paradigm that demands novel solutions such as nano-transceivers, channel models for the nano-scale, and protocols and architectures for nanonetworks. In this talk, first the state-of-the-art in nano-machines, including architectural aspects, expected features of future nano-machines, and current developments are presented for a better understanding of the nanonetwork scenarios. Moreover, nanonetworks features and components are explained and compared with traditional communication networks. Novel nano-antennas based on nano-materials as well as the terahertz band are investigated for electromagnetic communication in nanonetworks. Furthermore, molecular communication mechanisms are presented for short-range networking based on ion signaling and molecular motors, for medium-range networking based on flagellated bacteria and nanorods, as well as for long-range networking based on pheromones and capillaries. Finally, open research challenges such as the development of network components, molecular communication theory, and new architectures and protocols, which need to be solved in order to pave the way for the development and deployment of nanonetworks within the next couple of decades are presented.

Biography: Ian F. Akyildiz received his BS, MS, and Ph.D. degrees in Computer Engineering from the University of Erlangen-Nuremberg, Germany, in 1978, 1981 and 1984, respectively. Currently, he is the Ken Byers Distinguished Chair Professor with the School of Electrical and Computer Engineering, Georgia Institute of Technology, Director of Broadband Wireless Networking Laboratory and Chair of the Telecommunication Group at Georgia Tech.

Dr. Akyildiz is also an Honorary Professor with the School of Electrical Engineering at the Universitat Politècnica de Catalunya, Barcelona, Spain, since June 2008. Also since March 2009, he is an Honorary Professor with the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria, South Africa.

He is the Editor-in-Chief of Computer Networks (Elsevier) Journal, the founding Editor-in-Chief of the Ad Hoc Networks Journal (Elsevier) in 2003, the founding Editor-in-Chief of the Physical Communication (PHYCOM) Journal (Elsevier) in 2008, and the founding Editor-in-Chief of Nano Communication Networks (NANO-COMNET) Journal (Elsevier) in 2010. Dr. Akyildiz serves on the advisory boards of several research centers, journals, conferences and publication companies.

Dr. Akyildiz is an IEEE FELLOW (1996) and an ACM FELLOW (1997). He received numerous awards from IEEE and ACM. His current research interests are in Nanonetworks, Cognitive Radio Networks, and Wireless Sensor Networks.

FEATURED TALKS

Wednesday, 8 December 2010 • 14:00 – 15:30 • Room: Hibiscus

Session I: Broadband Networks

Chair: Kejie Lu, University of Puerto Rico, Mayagüez, USA



Mohsen Kavehrad
(IEEE Fellow)
W. L. Weiss Endowed Chair Professor of
Electrical Engineering
Director of CICTR, Center for Information and
Communications Technology Research
Pennsylvania State University, USA



Gee-Kung Chang
(IEEE/OSA Fellow)
Georgia Research Alliance and Byers Eminent
Scholar Chair Professor in Optical Networking
Georgia Institute of Technology, USA

**Multi-dimensional Convergence of
Broadband Access Technologies in the
21st Century**

**Let There Be Light and Sustainable Energy-Efficient
Wireless Applications**

Abstract: As we step further into the 21st century, the demand for sustainable energy-efficient technology grows higher. The important area of electric lighting, currently dominated by decades-old incandescent and fluorescent sources, is being taken over by White Light Emitting Diodes (WLED), which are solid state devices with greater energy-saving. Replacement of current inefficient lighting by these LEDs will result in reduction of global carbon dioxide emissions, a major cause of global warming, among other things. The LED holds the potential, in the field of photonics, to be as transformational as the transistor was in electronics. This core device has the potential to revolutionize how we use light, including not only for illumination, but communications, sensing, navigation, imaging and many more applications. In this presentation, we will highlight some of the potentials.

Biography: Dr. Mohsen Kavehrad is the W. L. Weiss Chair Professor of Electrical Engineering at the Pennsylvania State University. Between 1978 and 1981, he worked for Fairchild Industries (Space Communications Division) and GTE (Satellite Corp. and Labs.). He then joined Bell Laboratories where he worked on communications and networking research problems. He joined the Department of Electrical Engineering at University of Ottawa, as a Full Professor in March 1989. In January 1997, he joined the Department of Electrical Engineering, The Pennsylvania State University as the W. L. Weiss Chair Professor of Electrical Engineering. In August 1997 he was appointed as the founding Director of Center for Information and Communications Technology Research (CICTR). During 1997-1998 he was also the CTO and a Vice President at Tele-Beam Inc., State College, PA. He has also served as a consultant to a score of major corporations and government agencies.

Dr. Kavehrad's research contributions have been in the fields of: Satellite, microwave radio, Portable and Mobile radio, Atmospheric Free Space Optic, Fiber optic communications and fiber optic networks. His current research interests are in the areas of Broadband Wireline/Wireless and Optical Communications Networked Systems. He was elected a Fellow of the IEEE in January 1992. He received 3 Exceptional Technical Contributions awards while working at Bell Laboratories for his works on Wireless Communications Systems, the 1990 TRIO Feedback award for his patent on a "Passive Optical Interconnect" and the 2001 IEEE VTS Neal Shepherd best propagation paper award and 3 IEEE Lasers and Electro-Optics Society best paper awards and a Canada NSERC PhD-thesis gold medal award, jointly with his former graduate students for their works on wireless and optical systems. He received the 2009 DesignCon Paper Award in the High-Speed and RF Design Category and also the Paper of the Year Award from ETRI Journal in December of 2009. His works have been published in over 350 refereed journal and conference papers, several books and book chapters, and he holds several key issued patents in these areas.

He is a former Technical Editor for the IEEE Transactions on Communications, IEEE Communications Magazine and the IEEE Magazine of Light-wave Telecommunications Systems. Presently, he is on the Editorial Board of the International Journal of Wireless Information Networks. He served as the General Chair of leading IEEE conferences and workshops. He has chaired, organized and been on the advisory committee for several international conferences and workshops.

Abstract: With the rapid growth of bandwidth demand of emerging data and high definition digital video services, radio-over-fiber technology has gained tremendous momentum due to its ability to increase network capacity, bit rate, coverage, and mobility by seamlessly integrating optical fiber and wireless access systems. Owing to globally available multi-gigahertz bandwidth for wireless transmission, the millimeter-wave (mm-W) bands at 60-90 GHz with negligible interference with existing radio-frequency wireless services are playing a vital role for next generation very high throughput wireless local area networks (WLAN) and wireless personal area networks (WPANs). Several industrial and standardization efforts have been established, such as IEEE 802.15.3c (WPAN), ECMA-387, and IEEE 802.11ad (WLAN), to usher in global use of multi-gigabit MM-Wave wireless technology. In this talk, we will highlight recent progresses in system design and experimental demonstration of converged multi-band and multiple services wireless and wired access technologies based on optical millimeter wave signal generation, processing, and low-cost mm-W transceiver for multi-gigabit data transport in wireless over fiber access networks.

Biography: Gee-Kung Chang is the Byers Endowed Chair Professor in Optical Networking in the School of Electrical and Computer Engineering of Georgia Institute of Technology and an Eminent Scholar of Georgia Research Alliance. At Georgia Tech, he serves as the co-director of 100G Optical Networking Center and an Associate Director of Georgia Tech Broadband Institute. He served as the leader of Optoelectronics thrust of NSF-ERC of Microsystems Packaging Research Center at Georgia Tech. Prof. Chang received a B.S. degree in Physics from National Tsinghua University in Taiwan and a Ph.D. degree from the University of California, Riverside. Dr. Chang devoted a total of 23 years of service to the Bell Systems—Bell Labs, Bellcore, and Telcordia where he served in various research and management positions including Director and Chief Scientist of Optical Internet Research. Prior to joining Georgia Tech, he served as Vice President and Chief Technology Strategist of OpNext, Inc., in charge of technology planning and product development strategy for high-speed optoelectronic and photonic components and systems.

Dr. Chang has co-authored 56 US and international patents and published more than 350 peer-reviewed journal and conference papers. He received Bellcore President's Award in 1994, won R&D 100 Award in 1996, and elected as a Telcordia Fellow in 1999 for his pioneering work in MONET and NGI optical networking projects. He was elected to Fellow of Photonics Society of Chinese American in 2000. He is a Fellow of IEEE Photonic Society, and a Fellow of Optical Society of America (OSA) for his key contributions in DWDM Optical Networking and Optical Label Switching Technologies.

Dr. Chang has devoted his career to develop and push high performance computing and high throughput communications system technologies towards ever smaller dimensions (from hundreds kilometers down to meters and centimeters) through optimized design and integration of electronic, optoelectronic, and photonic components for broadband optical and wireless access networks. His current research interests cover: 100G transport network, DWDM and optical label switching system, broadband optical access networks, microwave and millimeter wave photonics, radio over fiber systems and very-high-throughput wireless over fiber networks.

FEATURED TALKS

PLENARY SPEAKERS

Wednesday, 8 December 2010 • 14:00 – 15:30 • Room: Jasmine

Session II: Wireless Networking

Chair: Yanchao Zhang, Arizona State University, USA



H. Vincent Poor

(NAE member, AAAS/IEEE/OSA Fellow)
Dean, School of Engineering and Applied Science
Michael Henry Strater University Professor of Electrical Engineering
Princeton University, USA



Roy Want

(ACM/IEEE Fellow)
Senior Principal Engineer, Intel Labs, USA

Smart Phones: A Revolution in Mobile Computing

Physical Layer Security in Wireless Networks

Abstract: Security in wireless networks has traditionally been considered to be an issue to be addressed at the higher layers of the network. However, with the emergence of ad hoc and other less centralized networking architectures, and networks (such as sensor networks) having low-complexity nodes, there has been an increase in interest in the potential of the wireless physical layer to provide communications security. The idea that the physical properties of a communications channel, rather than secret keys or trusted authorities, can provide security dates to Wyner's 1975 study of the wire-tap channel. But, recent work has taken these early ideas and expanded on them considerably, by examining this potential in a variety of basic wireless network architectures, and by considering the issues of fading, code design for secure transmission, feedback, authentication, secure network coding, among many others. This talk will review recent work and open issues in this field.

Biography: H. Vincent Poor is the Michael Henry Strater University Professor of Electrical Engineering at Princeton University, where he is also Dean of the School of Engineering and Applied Science. His interests lie in the areas of statistical signal processing, stochastic analysis and information theory, with applications in wireless networks and related fields. Among his publications in these areas are the recent books *Quickest Detection* (Cambridge, 2009) and *Information Theoretic Security* (Now Publishers, 2009). Dr. Poor is a member of the US National Academy of Engineering, a Fellow of the American Academy of Arts and Sciences, and an International Fellow of the Royal Academy of Engineering of the UK. He is also a Fellow of the IEEE and other scientific and technical organizations. He received a Guggenheim Fellowship in 2002 and the IEEE Education Medal in 2005. Recent recognition of his work includes the 2007 Marconi Prize Paper Award in Wireless Communications, and the 2009 Edwin Howard Armstrong Achievement Award, both from the IEEE Communications Society.

Abstract: The Smart Phone is not just a communication device, it is the most successful and ubiquitous computer the world has ever seen. This presentation will review the status of the Smart Phone as a computing platform, discuss its strengths and weaknesses, and look to the future for evolutionary opportunities. In particular, the discussion will focus on two nascent technologies: Dynamic Composition, the ability to wirelessly build a logical computer on the fly from nearby resources; and Context-Aware computing, sensing the local environment and the state of the user, to automatically customize applications to the current situation. We will examine how both of these approaches hold the promise to revolutionize today's mobile computing experience, to the next level of possibility.

Biography: Dr. Roy Want is a Senior Principal Engineer at Intel Labs, Santa Clara, California, and Director of the Next-Generation Platforms Lab (NPL). His research interests include mobile & ubiquitous computing, wireless protocols, hardware design, embedded systems, distributed systems, automatic identification and micro-electromechanical systems (MEMS). Want received his BA in computer science from Churchill College, Cambridge University, UK in 1983 and continued research at Cambridge into reliable distributed multimedia-systems.

While at Olivetti Research (1988–1991), he developed the first in-building location system called the Active Badge, launching his interest in location-based services. He joined Xerox PARC's Ubiquitous Computing program in 1991 and led a project called PARCTab, one of the first context-aware computer systems. At PARC, Want managed the Embedded Systems area and earned the title of Principal Scientist. He joined Intel Research in 2000 as a Principal Engineer. He is also the author, or co-author, of more than 60 publications in the field of mobile and distributed systems; and has over 60 patents issued in these areas. Want is very involved in the research community through program committees and invited talks. He is Chair of ACM SIGMOBILE, Editor-in-Chief Emeritus for IEEE Pervasive Computing, and a Fellow of both the IEEE and ACM.

FEATURED TALKS

Thursday, 9 December 2010 • 14:00 – 15:30 • Room: Hibiscus
 Session I: Multimedia Communications
 Chair: Bin Wei, AT&T Labs, USA



Aggelos K. Katsaggelos
 (IEEE/SPIE Fellow)
 Professor, Northwestern University, USA

Video Transmission: Recent Results, Challenges, and Opportunities

Abstract: Supporting video communication over lossy channels such as wireless networks and the Internet is a challenging task due to the stringent quality of service (QoS) required by video applications and the many channel impairments. Two important QoS characteristics for video are the degree of signal distortion and the transmission delay. Another important consideration is the cost associated with transmission, for example, the energy consumption in the wireless channel case and the cost for differentiated services in the Internet (with DiffServ) case.

In this presentation we consider a cross-layer resource-utility allocation and scheduling framework for balancing the requirements of different applications. Our goal is to provide acceptable content-aware QoS while taking into account system constraints. We discuss a general framework that allows a number of "resource/distortion" optimal formulations for balancing the requirements of various applications. Examples include multi-user video streaming, robust streaming of scalable video and peer-to-peer multimedia streaming. We conclude the presentation with some of the grand opportunities and challenges in designing and developing video communication systems.

Biography: Aggelos K. Katsaggelos received his degree in electrical and mechanical engineering from the Aristotelian University of Thessaloniki, Greece, in 1979, and M.S. and Ph.D. degrees in EE from Georgia Tech, in 1981 and 1985, respectively.

In 1985, he joined the EECS Department at Northwestern University, where he is currently a Professor. He was the holder of the Ameritech Chair of Information Technology (1997–2003). He is also the Director of the Motorola Center for Seamless Communications, a member of the Academic Staff, North Shore University Health System, and an affiliated faculty at the Department of Linguistics and he has an appointment at the Argonne National Laboratory.

He has published extensively in the areas of multimedia processing and communications and he is the holder of 16 international patents. He is the co-author of Rate-Distortion Based Video Compression (Kluwer, 1997), Super-Resolution for Images and Video (Claypool, 2007) and Joint Source-Channel Video Transmission (Claypool, 2007).

Among his many professional activities Dr. Katsaggelos was Editor-in-Chief of the IEEE Signal Processing Magazine (1997–2002), a BOG Member of the IEEE Signal Processing Society (1999–2001), and a member of the Publication Board of the IEEE Proceedings (2003–2007). He is a Fellow of the IEEE (1998) and SPIE (2009) and the recipient of the IEEE Third Millennium Medal (2000), the IEEE Signal Processing Society Meritorious Service Award (2001), an IEEE Signal Processing Society Best Paper Award (2001), an IEEE ICME Paper Award (2006), an IEEE ICIP Paper Award (2007) and an ISPA Paper Award (2009). He was a Distinguished Lecturer of the IEEE Signal Processing Society (2007–2008).



Philip A. Chou
 (IEEE Fellow)
 Principal Researcher, Microsoft Research, USA

The Future of Human Communication

Abstract: The invention of the telephone in 1876 was a major leap forward in making human-to-human communication more natural and immersive, leading to the quick decline of the telegraph. But the television, invented in 1926 as the visual counterpart to the telephone, did not have the expected impact. "Television" quickly morphed into the broadcast medium it is today, while the visual counterpart to the telephone, now called video telephony, did not reach the market until the 1960s, when the AT&T Picture Phone proved to be a commercial failure. Eighty years after its invention, video telephony has changed little, except that we are now seeing little images on computer screens instead of dedicated devices. However, we are now at the threshold of rapid changes in visually immersive human-to-human communication. In this talk, I will show how recent telepresence systems are just a harbinger of the many changes to come.

Biography: Philip A. Chou received his BSE degree from Princeton University, Princeton, NJ, in 1980, and his MS degree from the University of California, Berkeley, in 1983, both in electrical engineering and computer science, and his Ph.D. degree in electrical engineering from Stanford University in 1988. From 1988 to 1990, he was a Member of Technical Staff at AT&T Bell Laboratories in Murray Hill, NJ. From 1990 to 1996, he was a Member of Research Staff at the Xerox Palo Alto Research Center in Palo Alto, CA. In 1997, he was manager of the compression group at VXtreme, an Internet video startup in Mountain View, CA, before it was acquired by Microsoft in 1997. From 1998 to the present, he has been a Principal Researcher with Microsoft Research in Redmond, Washington, where he currently manages the Communication and Collaboration Systems research group. Dr. Chou has served as Consulting Associate Professor at Stanford University 1994–1995, Affiliate Associate Professor at the University of Washington 1998–2009, and Adjunct Professor at the Chinese University of Hong Kong since 2006.

Dr. Chou has longstanding research interests in data compression, signal processing, information theory, communications, and pattern recognition, with applications to video, images, audio, speech, and documents. He served as an Associate Editor in source coding for the IEEE Transactions on Information Theory from 1998 to 2001, as a Guest Editor for special issues in the IEEE Transactions on Image Processing, the IEEE Transactions on Multimedia (TMM), and IEEE Signal Processing Magazine in 1996, 2004, and 2011, respectively. He was a member of the IEEE Signal Processing Society (SPS) Image and Multidimensional Signal Processing technical committee (IMDSP TC), where he chaired the awards subcommittee 1998–2004. Currently he is chair of the SPS Multimedia Signal Processing TC, member of the ComSoc Multimedia TC, member of the IEEE SPS Fellow selection committee, and member of the TMM and ICME Steering Committees. He was the founding technical chair for the inaugural NetCod 2005 workshop, special session and panel chair for ICASSP 2007, publicity chair for the Packet Video Workshop 2009, and technical co-chair for MMSP 2009. He is a Fellow of the IEEE, a member of Phi Beta Kappa, Tau Beta Pi, Sigma Xi, and the IEEE Computer, Information Theory, Signal Processing, and Communications societies, and was an active member of the MPEG committee. He is the recipient, with Tom Lookabaugh, of the 1993 Signal Processing Society Paper Award; with Anshul Seghal, of the 2002 ICME Best Paper Award; with Zhoung Miao, of the 2007 IEEE Transactions on Multimedia Best Paper Award; and with Miroslav Ponec, Sudipta Sengupta, Minghua Chen, and Jin Li, of the 2009 ICME Best Paper Award. He is co-editor, with Mihaela van der Schaar, of the 2007 book from Elsevier, Multimedia over IP and Wireless Networks.

FEATURED TALKS

Thursday, 9 December 2010 • 14:00 – 15:30 • Room: Jasmine

Session II: Wireless Technology

Chair: Andrea Conti, University of Ferrara, Italy



Andrea Goldsmith
(IEEE Fellow)
Professor, Stanford University, USA

The Road Ahead for Wireless Technology: Dreams and Challenges

Abstract: Wireless technology has enormous potential to change the way we live, work, and play. Future wireless networks will support Gigabit per second multimedia communication between people and devices with high reliability and uniform coverage indoors and out. Wireless technology will also enable smart and energy-efficient homes and buildings, automated highways and skyways, and in-body networks for analysis and treatment of medical conditions. The shortage of spectrum will be alleviated by advances in cognitive and software-defined radios. There are many technical challenges that must be overcome in order to make this vision a reality. This talk will describe what the wireless future might look like and some of the innovations and breakthroughs that are required to realize this vision.

Biography: Andrea Goldsmith is a professor of Electrical Engineering at Stanford University, and was previously an assistant professor of Electrical Engineering at Caltech. She founded Quantenna Communications Inc., and has previously held industry positions at Maxim Technologies, Memorylink Corporation, and AT&T Bell Laboratories. Her research includes work on wireless information and communication theory, MIMO systems and multihop networks, cognitive radios, sensor networks, cross-layer wireless system design, wireless communications for distributed control, and communications for biomedical applications. She is author of the book, *Wireless Communications* and co-author of the book, *MIMO Wireless Communications*, both published by Cambridge University Press. She received her B.S., M.S. and Ph.D. degrees in Electrical Engineering from U.C. Berkeley.

Dr. Goldsmith is a Fellow of the IEEE and of Stanford. She has received several awards for her research, including the National Academy of Engineering Gilbreth Lectureship, the IEEE Comsoc Wireless Communications Technical Committee Recognition Award, the Alfred P. Sloan Fellowship, the Stanford Terman Fellowship, the National Science Foundation CAREER Development Award, and the Office of Naval Research Young Investigator Award. In addition, she was a co-recipient of the 2005 IEEE Communications Society and Information Theory Society joint paper award. Dr. Goldsmith currently serves as associate editor for the IEEE Transactions on Information Theory and as editor for the Journal on Foundations and Trends in Communications and Information Theory and in Networks. She previously served as an editor for the IEEE Transactions on Communications and for the IEEE Wireless Communications Magazine, as well as guest editor for several IEEE journal and magazine special issues. Dr. Goldsmith participates actively in committees and conference organization for the IEEE Information Theory and Communications Societies and has served on the Board of Governors for both societies. She is a Distinguished Lecturer for both societies, the President of the IEEE Information Theory Society, and was the technical program co-chair for the 2007 IEEE International Symposium on Information Theory. She also founded the student committee of the IEEE Information Theory society, is an inaugural recipient of Stanford's postdoc mentoring award, and was elected to serve as Stanford's faculty senate chair for the 2009–2010 academic year.



Peter Grant
(IEEE/IET/RAEng Fellow)
Regius Professor of Engineering,
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Green Radio – The Case for More Efficient Cellular Base-stations

Abstract: This presentation will discuss the power drain or efficiency of mobile terminals and base-stations to define the issues with current cellular systems operation, particularly in base-station or access point designs. Indications will be given for the total power consumption of (UK) cellular GSM and 3G networks. These issues are set to increase with the move from predominantly speech and text messaging to the increased roll out of smart-phones and mobile broadband, where the much higher data rate transmission requirements are not balanced by consequent increase in revenue. This is the primary driver for lower transmission energy per delivered bit.

Biography: Professor. Peter Grant was on staff at Edinburgh from 1971 until his retirement in 2009. He is now a Senior Honorary Professorial Fellow at the same University. Before joining Edinburgh, he worked at the UK for Plessey and Hughes for 5 years. He was appointed as the first head to form and integrate the School of Engineering at University of Edinburgh, leading it from 2002–2008. Before that he served as Head of Electronics from 1999–2002.

Peter Grant has three "doctorates", a Ph.D. from the University of Edinburgh in 1975, an honorary DEng (Doctor of Engineering) from the Heriot-Watt University in Edinburgh in 2006 and another honorary DEng from Edinburgh Napier University, Edinburgh in 2007.

He holds five Fellowships from: IEEE, IEE/IET, Royal Academy of Engineering, Royal Society of Edinburgh and he was elected one of the first four fellows of the European Association for Speech, Signal and Image Processing (EURASIP), having previously served there as President 2000 – 2002. He was also awarded, in 2004, the 82nd IEE Faraday Medal. He served as a director of the Mobile VCE from 2007–2009.

Professor Grant was in 2007 appointed to be the 8th Regius Professor of Engineering at the University of Edinburgh. "Regius" i.e. regal chair appointments are conferred by the Queen of Great Britain. In 2009, he was made an officer of the order of the British Empire (OBE) in the Queen's birthday honors list.