IEEE ICCCN 2008 Advanced Panels

Sensor Networks: Future Challenges and Applications

Moderator:

Prof. Tarek Abdelzaher, University of Illinois at Urbana Champaign, USA

Panelists:

Prof. Jack Stankovic, University of Virginia, USA (IEEE Fellow, ACM Fellow)
Prof. Mani Srivastava, University of California, Los Angeles, USA (IEEE Fellow)
Prof. Xenofon D. Koutsoukos, Vanderbilt University, USA
Prof. P.R. Kumar, University of Illinois at Urbana Champaign, USA (NAE member, IEEE Fellow)
Prof. Taieb Znati, NSF, USA

Abstract:

Sensor networks generated an exploding amount of publications in recent years, including several descriptions of interesting prototypical applications. Yet, commercial deployment has not been as dramatic. This panel includes leading researchers on sensor networks from both academia and industry to discuss the future of sensor network applications and challenges. Is there indeed a gap between research and deployment? Is sensor network deployment on the right track? Is there a real business case to propel sensor network applications into the future? How well does current research address deployment needs and challenges? What is the role of industry and academia in helping technology transfer? What is the biggest success or hurdle in applying sensor networks in the real world? Where are the low-hanging fruit and what are the main research obstacles? The panel will feature a series of short position statement on the topic followed by open discussion with the audience.

Pervasive and Mobile Computing: Continued Challenges and Opportunities

Moderator:

Prof. Sajal Das, University of Texas at Arlington, USA

Panelists:

Prof. Jie Wu, NSF, USA (Director, IEEE Distinguished Visitor)
Prof. Jiannong Cao, Hong Kong Polytechnic University, Hong Kong
Dr. Lavy Libman, NICTA, Sydney, Australia
Prof. P.R. Kumar, University of Illinois at Urbana Champaign, USA (NAE member, IEEE Fellow)

Abstract:

The recent years have seen tremendous developments in mobile and pervasive computing technologies, networking, systems, and services with the potential for a wide variety of applications including smart homes, health care, education, security and crisis management, and so on. While mobile computing deals with ‘anytime anywhere’ type of computing, pervasive computing is about ‘what you want, where you want, when you want, and how you want’ type of computing in an autonomous and continuous manner, without explicit awareness of the users. However, there remain significant challenges in

providing context-aware mobile and pervasive computing services and applications. Such challenges and issues as well as research and development opportunities will be the theme of discussions in this exciting panel.

Peer Assisted Content Delivery: Challenges and Opportunities

Moderator:

Dr. Jin Li, Microsoft Research, USA

Panelists:

Mr. Laird Popkin, Pando Network, USA (CTO)

Mr. Harvey Benedict, Kontiki, USA (VP of Corporate Development and Strategy)

Prof. Thinh Nguyen, Oregon State University, USA

Abstract:

In both academia and industry, peer-to-peer (P2P) applications have attracted great attentions. P2P applications such as Napster, Gnutella, FastTrack, BitTorrent, Skype, Neokast and PPLive, have witnessed tremendous success among the end users. Unlike a client-server based system, peers bring with them serving capacity. Therefore, as the demand of a P2P system grows, the capacity of the network grows, too. This enables a P2P application to be cheap to build and superb in scalability. The rise of P2P has put tremendous pressure on the Internet service providers (ISPs) though to carry the traffic load. In this panel, we invite panelists from P2P application builders and Internet service provider to discuss the current research, development and deployment status of the P2P applications. We will also examine the impact of P2P traffic on the Internet. We wish that through this high profile discussion, the P2P industries and the ISP will better understand each other's business. We also hope that the panel discussion will provide the audience guidance on the challenges and future research topics in P2P.

Biography of Invited Panel Speakers

Professor John A. Stankovic is the BP America Professor in the Computer Science Department at the University of Virginia. He recently served as Chair of the department, completing two terms (8 years). He is a Fellow of both the IEEE and the ACM. He also won the IEEE Real-Time Systems Technical Committee's Award for Outstanding Technical Contributions and Leadership. Professor Stankovic also served on the Board of

Directors of the Computer Research Association for 9 years. Before joining the University of Virginia, Professor Stankovic taught at the University of Massachusetts where he won an outstanding scholar award. He has also held visiting positions in the Computer Science Department at Carnegie-Mellon University, at INRIA in France, and at the Scuola Superiore S. Anna in Pisa, Italy. He was the Editor-in-Chief for the IEEE Transactions on Distributed and Parallel Systems and is a founder and co-editor-in-chief for the Real-Time Systems Journal. He was also General Chair for ACM SenSys 2004 and will serve as General Chair for ACM/IEEE Information Processing in Sensor Networks (IPSN) 2006. His research interests are in distributed computing, real-time systems, operating systems, and wireless sensor networks. Prof. Stankovic received his PhD from Brown University.

Prof. Mani Srivastava is a Professor and Vice Chair of Graduate Affairs in the Electrical Engineering Department, UCLA, with a joint appointment as Professor in the Computer Science Department. Prior to joining UCLA in 1997, he worked for several years at the Networked Computing Research Department at Bell Labs in Murray Hill, NJ where his group built one of the first wireless ATM systems. Prof. Srivastava received his B.Tech. degree in Electrical Engineering from IIT, Kanpur in India in 1985. He joined the EECS Department at Bob Brodersen, where he received his M.S. degree in 1988 on CMOS bit-slice datapath compilation for DSP VLSI and his Ph.D. degree in 1992 on hardware-software rapid prototyping for embedded DSP and control applications. His research at UCLA is on networked and embedded systems, focusing particularly on power-aware computing and communications, low-power design, sensor-instrumented physical spaces, wireless sensor networking, wireless QoS, gigabit wireless routers, and wireless node architectures. He leads DARPA and NSF funded projects in these areas. He has several patents, and has published extensively. He currently serves as the Editor-in-Chief of the ACM Mobile Computing and Communications Review, and as Associate Editor of the ACM Transactions on Sensor Networks and the ACM/IEEE Transactions on Networking.

Prof. P.R. Kumar obtained his B. Tech. degree in Electrical Engineering (Electronics) from IIT Madras in 1973, and the MS and D.Sc. degrees in Systems Science and Mathematics from Washington University, St. Louis in 1975 and 1977, respectively. From 1977-84 he was a faculty member in the Department of Mathematics at the University of Maryland, Baltimore County. Since 1985, he has been at the University of Illinois at Urbana-Champaign. He has worked on problems in game theory, adaptive control, stochastic systems, simulated annealing, neural networks, machine learning, queueing networks, manufacturing systems, scheduling, and wafer fabrication plants. His current research interests are in wireless networks, sensor networks, and networked embedded control systems. He received the Donald P. Eckman award of the American Automatic Control Council in 1985, the IEEE Field Award in Control Systems in 2006, and the Fred W. Ellersick Prize of the IEEE Communications Society in 2007.

Dr. Tarek Abdelzaher received his B.Sc. and M.Sc. degrees in Electrical and Computer Engineering from Ain Shams University, Cairo, Egypt, in 1990 and 1994 respectively. He received his Ph.D. from the University of Michigan in 1999 on Quality of Service Adaptation in Real-Time Systems. He has been an Assistant Professor at the University of Virginia, where he founded the Software Predictability Group until 2005. He is currently an Associate Professor at the Department of Computer Science, the University of Illinois at Urbana Champaign. He has authored/coauthored more than 100 refereed publications in real-time computing, distributed systems, sensor networks, and control.

He is Editor-in-Chief of the Journal of Real-Time Systems, an Associate Editor of the IEEE Transactions on Mobile Computing, IEEE Transactions on Parallel and Distributed Systems, the ACM Transaction on Sensor Networks, and the Ad Hoc Networks Journal, as well as Editor of ACM SIGBED Review. He was Program Chair of RTAS 2004, General Chair of RTAS 2005. Program Chair of RTSS 2006 General Chair of IPSN 2007, and General Chair of RTSS 2007. He is currently General Chair of DCoSS 2008 and Sensys 2008. Abdelzaher's research interests lie broadly in understanding and controlling the temporal properties of software systems in the face of increasing complexity, distribution, and degree of embedding in an external physical environment. Tarek Abdelzaher is a member of IEEE and ACM.

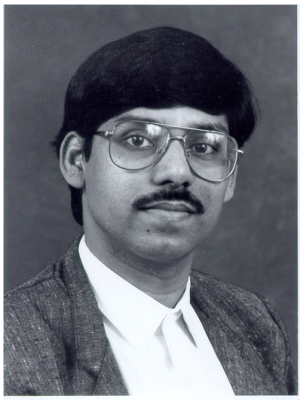
Dr. Xenofon D. Koutsoukos received the Diploma in electrical and computer engineering from the National Technical University of Athens, Athens, Greece, in 1993, M.S. degrees in electrical engineering and applied mathematics and the Ph.D. degree in electrical engineering from the University of Notre Dame, Notre Dame, IN, in 1998 and 2000, respectively. From 2000 to 2002, he was a member of Research Staff with the Xerox Palo Alto Research Center, Palo Alto, CA, working in the Embedded Collaborative Computing Area. Since 2002, he has been with the Department of Electrical Engineering and Computer Science, Vanderbilt University, Nashville, TN, where he is currently an Assistant Professor and a Senior Research Scientist in the Institute for Software Integrated Systems. He has authored or coauthored more than 80 technical publications and is the holder of three U.S. patents. His research interests include hybrid systems, real-time embedded systems, and sensor networks. He currently serves as Associate Editor for the ACM Transactions on Sensor Networks and for Modelling Simulation Practice and Theory. Dr. Koutsoukos is a senior member of IEEE and a member of ACM. He was the recipient of the National Science Foundation CAREER Award in 2004.

Dr. Taieb Znati obtained a Ph.D. Degree in Computer Science at Michigan State University, East Lansing, in April 1988, and a Master of Science Degree at Purdue University, West Lafayette, Indiana. In 1988, he joined the University of Pittsburgh where he currently is a professor in the Department of Computer Science with a joint appointment in Telecommunications in the Department of Information Science.

His current research interests focus on the design of network protocols for wired and wireless communication networks to support multimedia applications' QoS requirements, the design and analysis of medium access control protocols to support distributed real-time systems, and the investigation of fundamental design issues related to distributed systems. He is frequently invited to present lectures and tutorials in networking and distributed multimedia related topics, in the United States of America and abroad.

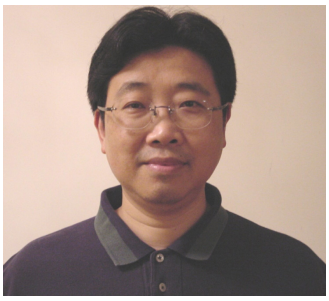
Dr. Znati is a member of the Editorial Board of IEEE Transaction of Parallel and Distributed Systems, the Wireless Networks Journal of Mobile Communication, Computation and Information, the Journal of Adhoc Networks, the International Journal of Parallel and Distributed Systems and Networks, and the Journal on Wireless Systems and Mobile Computing. He will serve as the General Chair of Infocom 20001.

Dr. Znati is currently on leave from the University of Pittsburgh to serve as Senior Program Director for Networking Research at the National Science Foundation. He also served as the Committee Chair of the Information Technology Research Program at the National Science Foundation.



Dr. Sajal K. Das is a University Distinguished Scholar Professor of Computer Science and Engineering and the Founding Director of the Center for Research in Wireless Mobility and Networking (CReWMaN) at the University of Texas at Arlington (UTA). He is also a Visiting Professor at the Indian Institute of Technology (IIT) at Kanpur and IIT at Guwahati; Honorary Professor of Fudan University in Shanghai and Advisory Professor of Beijing Jiaotong University, China; and Visiting Scientist at the Institute of Infocomm Research (I^2R), Singapore. His current research interests include mobile and pervasive computing, smart environments, sensor networks, security, resource and mobility management in wireless networks, mobile Internet, distributed and grid computing, biological networking, applied graph theory and game theory. He has published over 400 papers in international conferences and journals, and over 35 invited book chapters. He holds five US patents in wireless networks and mobile Internet, and co-authored the books *Smart Environments: Technology, Protocols, and Applications* (John Wiley, 2005) and *Mobile Agents in Distributed Computing and Networking* (John Wiley, 2008) Dr. Das is a recipient of Best Paper Awards in EWSN'08, MUBICA'07, IEEE PerCom'06, ICOIN'02, ACM MSwiM'00, ACM MobiCom'99, and ACM/IEEE PADS'97. He is also a recipient of the IEEE Engineer (Ft Worth Section) of the Year Award (2007), UTA Academy of Distinguished Scholars Award (2006), the University Award for Distinguished Record of Research (2005), College of Engineering Research Excellence Award (2003), and Outstanding Faculty Research Award in Computer Science (2001 and 2003). He is frequently invited as keynote speaker at international conferences and symposia. He serves as the Founding Editor-in-Chief of *Pervasive and Mobile Computing* (PMC) journal, and Associate Editor of *IEEE Transactions on Mobile Computing*, *ACM/Springer Wireless Networks*, *IEEE Transactions on Parallel and Distributed Systems*, and *Journal of Peer-to-Peer Networking*. He is the founder of IEEE WoWMoM and co-founder of IEEE PerCom conference. He has served as General or Technical Program Chair as well as TPC member of numerous IEEE and ACM conferences. He serves on the IEEE TCCC and TCPP Executive Committees.

Dr. Jie Wu is a Distinguished Professor at the Department of Computer Science and Engineering, Florida Atlantic University and a Program Director at National Science Foundation. He has published over 400 papers in various journals and conference proceedings. His research interests are in the areas of wireless networks and mobile computing, routing protocols, fault-tolerant computing, and interconnection networks. Dr. Wu was on the editorial board of IEEE Transactions on Parallel and Distributed Systems and was a co-guest-editor of IEEE Computer and Journal of Parallel and Distributed Computing. He served as the program co-chair for MASS 2004, executive program vice-chair for ICDCS 2008, and program vice-chair for ICPP 2000. He was also general chair for MASS 2006 and is general chair for IPDPS 2008. He is the author of the text "Distributed System Design" published by the CRC press. He was also the recipient of the 1996-97 2001-2002, and 2006-2007 Researcher of the Year Award at Florida Atlantic University. Dr. Wu has served as an IEEE Computer Society Distinguished Visitor and is the Chairman of IEEE Technical Committee on Distributed Processing (TCDP).



Prof. Jiannong Cao received BSc degree in computer science from Nanjing University, Nanjing, China in 1982, and MSc and Ph.D degrees in computer science from Washington State University, Pullman, USA, in 1986 and 1990 respectively. He is currently a professor in the Department of Computing at Hong Kong Polytechnic University. He is also the director of the Internet and Mobile Computing Lab. Before joining Hong Kong Polytechnic University, he was on the faculty of computer science at James Cook University and University of Adelaide in Australia, and City University of Hong Kong. His research interests include parallel and distributed computing, networking, mobile and wireless computing, fault tolerance, and distributed software architecture. He has published over 200 technical papers in the above areas. His recent research focus is on mobile and pervasive computing systems, developing test-bed, protocols, middleware and applications. Dr. Cao is a senior member of China Computer

Federation, senior member of IEEE Computer Society, IEEE Communication Society, IEEE, and ACM. He is also a member of IEEE Technical Committee on Distributed Processing, IEEE Technical Committee on Parallel Processing, IEEE Technical Committee on Fault Tolerant Computing. He has served as a member of editorial boards of several international journals, a reviewer for numerous journals and conferences, and also as a chair and member of organizing and program committees for many international conferences.

Dr. Lavy Libman received his B.Sc. degrees in Electrical Engineering and in Computer Engineering, and his M.Sc. and Ph.D. degrees in Electrical Engineering, from the Technion - Israel Institute of Technology, Haifa, Israel, in 1992, 1997, and 2003, respectively. Since2003, he is currently a researcher at the Networked Systems research group at NICTA (National ICT Australia), Sydney. He previously held several visiting and consulting positions, including with Bell Laboratories in summer 2002, and with Millimetrix Broadband Networks in summer 2000. During 1993-1999, he served as a computer engineer in the Israel Defence Forces. Dr. Libman is a member of the IEEE Communications Society. He currently co-chairs the Track on Protocols and Algorithms for Wireless Networks in ICCCN 2008. He was the chair of the Cross-Layer Design and Optimization track of ICCCN 2007 and a co-chair of the Workshop on Networking in Public Transport (WNEPT 2006). In addition, he serves as a technical program committee member for several international conferences, including IEEE Infocom, IEEE LCN, IEEE MASS, and IEEE VTC. Dr. Libman is a member and a local representative of the Australian Communications Research Network (ACoRN).

Dr. Jin Li is currently a Principal Researcher, managing the Communication System team at Microsoft Research (Redmond, WA). He received his Ph.D. in from Tsinghua University (Beijing, China) in 1994 with honor. He has 80+ referred conference and journal papers in a diversified research field, with interests cover audio/image/video compression, virtual environment and graphic compression, audio/video streaming, and real-time audio/video conferencing. His recent interest is in peer-to-peer applications. He has personally built a number of P2P applications, such as P2P web hosting, P2P streaming and P2P distributed storage system. He was the driving force behind Microsoft's strategy and application development in the peer-to-peer area.

Mr. Laird Popkin is the CTO of Pando network, which is a small company on a big mission to establish a new Internet infrastructure standard for efficient, secure and commercially viable rich media delivery. Laird is the co-chair of the P4P Working Group and the Information and Content Exchange (ICE) Authoring Group. As the director of digital technology for Warner Music Group he was responsible for P2P and wireless technology and as CTO of 3Path, Laird helped establish one of the first digital document delivery services online. Previously, Laird was the CTO at Sotheby's Holdings and the Internet division of News Corporation, which launched and operated hundreds of web sites including TVGuide.com, FOXNews.com, MLB.com.

Mr. Harvey Benedict has worked in the content delivery and video centric space for more than 12 years. Currently, Harvey is the Vice President of Corporate Development and Strategy at Kontiki, whose peer-assisted technology is used to publish, protect, deliver, and track digital media content by global enterprises and broadcasters worldwide. Kontiki's network-friendly protocol, fine-grained controls, edge throttling and client application flexibility enable enterprises to deliver high-quality video to their employees

and partners worldwide utilizing existing network infrastructure and capacity. Working for market setting technology companies such as Netcom Online (purchased by Mindspring/Earthlink), the first consumer ISP to reach 500,000 users; Broadcast.com (purchased by Yahoo), the largest streaming focused service provider; Virage (purchased by Autonomy),a pioneering video indexing software solution and Kontiki, the industry's leading legitimate P2P platform that is powering some of the most advanced P2P commercial offerings such as the BBC Iplayer. Harvey has been directly involved in providing technical and business solutions to solve large scale IP based delivery challenges from text to long form video. He also was the founder and principal for Streamline Media Consulting that provided rich media services to some of the largest enterprises and Media organizations.

Dr. Thinh Nguyen is a faculty in the School of Electrical Engineering and Computer Science at Oregon State University. He is the director of the Multimedia InformAtion ProcessIng and Networking (MAIN) Lab. His research interests lie in the union of Networking, Signal Processing, and Coding for optimal information transmission. He earned his Ph.D. from U.C. Berkeley in 2003. His doctoral work focused on multimedia streaming over the Internet, using the path diversity framework in conjunction with network protocols, and source and channel coding techniques. This work won him best paper award at Packet Video Workshop 2002. His current research interests include multimedia networking, signal processing, computer graphics, machine learning, data analysis and data mining. Before joining Oregon State University in September, 2004, he was a post-doctoral research associate in the Center for Applied Scientific Computing at Lawrence Livermore National Laboratory. While at Lawrence Livermore National Lab, Nguyen was involved in a number of projects ranging from analyzing statistics of streamed dataset to image processing. From 1998 to 2003, he was a research assistant in the Electrical Engineering and Computer Science at UC Berkeley. From 1996-1998, he was a graphics researcher at Intel's Microcomputer Research Lab, working on fast methods for 3-D visualization and navigation in human body. He also spent 6 months at Microsoft, optimizing DirectX6 for Pentium III. From 1995 to1996, he worked on caches for multi-processor system in the Microprocessor Group at Intel, Corp. Before that, he worked on PBX switches at ROLM, Siemens.