

# IEEE UIC/ATC Joint Panel on Smart Planet Challenges: Impediments and Enablers

**Panel Chair:** Professor Sumi Helal, *University of Florida, USA*

**Panelists:**

Professor Dr. Christian Becker, *University of Mannheim, Germany*

Professor Wanlei Zhou, *Deakin University, Australia*

Professor Zhiwen Yu, *Northwestern Polytechnical University, China*

Professor Jadwiga Indulska, *University of Queensland, Australia*

## Abstract

Recent advances in Pervasive Computing and Intelligent Environments research give a glimpse into the future of our planet and reveal exciting visions of smart everything - smart cities, smart homes, smart workplaces, smart hotels, smart schools, and much more. Driven by technological evolution offering low power many-things and wireless almost-everything (e.g., IEEE 802.15.4 radio, wireless sensor networks, sensor platforms), we could, in only a decade, envision and prototype impressive cyber-physical systems and ubiquitous applications. In most of these systems, the goal has been clear and convincing, and the technology proved to be promising and exciting. But prototyping is only a beginning, and much remains to be innovated and done before smart cities and smart environments become common places.

This panel will discuss the exciting and promising future of smart planet in terms of the challenging impediments and the potential enablers. Some of the challenges include:

- *The need to integrate research and education across disciplines.* Many research disciplines must collaborate among and within themselves, including domain experts (of the particular environment, e.g., gerontologist for assisted living spaces), behavior scientists, engineers, computer scientists. Collaboration within the computer science and engineering discipline is key enabler to a smart planet.
- *The need for novel cyber-physical software architectures.* Systems support and middleware are essential foundation to building any systems – a smart planet is no exception. Software engineering is urgently needed to understand and support the full lifecycle of intelligent environments and smart spaces. New programming models are also needed for developing safe and adaptive applications and services. New notions of trust must be formulated and supported to ensure symbiotic relationship between the users and their smart environments.
- *Broader support is needed for effective human computer interaction.* Understanding the broader requirements of human computer interaction is crucial for both individuals and the masses. Effective persuasion is also proving to be of paramount importance to the success of the operation of such smart spaces.
- *The need to integrate computational intelligence with systems research.* Without machine learning and computational intelligence techniques, the potential utility and “ceiling of goals” of smart spaces would be severely limited. Without expanding the computer system’s research to encompass proven and established machine learning and computational intelligence techniques, it will be difficult to increase the capacity of appropriately trained smart space engineers.

Panelists will present their position statements and highlight what they identify as challenges and enablers to smart planet progress and advancements.



**Professor Sumi Helal**

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*Short Biography*

Sumi Helal is a Professor at the Computer and Information Science and Engineering Department (CISE) at University of Florida (UF), and a Finland Distinguished Professor (FiDiPro) at Aalto University, Finland. He is a pioneer and recognized leader in the field of Pervasive and Ubiquitous Computing. He is well known, worldwide, for his interdisciplinary research on smart spaces and Health Telematics in support of Health Care, Aging, Disabilities and Independence. He directs the Mobile and Pervasive Computing Laboratory in the CISE department at UF. He is co-founder and director of the Gator Tech Smart House, an experimental home for applied research in the domains of eldercare and health telematics. He led and directed the NIDRR-funded Rehabilitation Engineering Research Center (RERC) on Successful Aging (2001-2007), and is currently leading a continuation project on smart home based personal health and independence, funded by the National Institutes of Health (NIH).

Dr. Helal organized over 20 IEEE and ACM conferences or workshops and is currently serving as the associate Editor-in-Chief of IEEE Computer, the flagship magazine of the IEEE Computer Society. Dr. Helal earned his B.E. and M.E. degrees summa cum laude in Computer Engineering and Automatic Control from Alexandria University, Egypt, in 1982 and 1985 respectively. He earned his Ph.D. in Computer Sciences from Purdue University in 1991.



**Professor Dr. Christian Becker**

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*Short Biography*

Christian Becker is a full professor of Information Systems at the University of Mannheim since 2006. Prior to this, he was a visiting professor for distributed systems at the University of Duisburg-Essen in Spring Term 2006. He studied Computer Science at the Universities of Karlsruhe and Kaiserslautern where he received the Diploma in 1996. From 1997 till 2001 he was a researcher at the distributed systems and operating systems group at the University of Frankfurt where he received his PhD in 2001 with a thesis about “Quality of Service Management in Distributed Object Systems”. In 2001 he joined the distributed systems group at the University of Stuttgart as Post Doc. His research focused on system support for Pervasive Computing and Peer to Peer Computing. He is specifically interested in architectures for adaptive systems. In 2004 he received the *venia legendi* (Habilitation) for Computer Science (Informatik). Christian’s research interests

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*Short Biography*

Professor Wanlei Zhou received the B.Eng and M.Eng degrees from Harbin Institute of Technology, Harbin, China in 1982 and 1984, respectively, and the PhD degree from The Australian National University, Canberra, Australia, in 1991. He is currently the Chair Professor of Information Technology and the Head of the School of Information Technology at Deakin University, Melbourne, Australia.



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*Short Biography*

Dr. Zhiwen Yu is currently a professor and vice dean of the School of Computer Science, Northwestern Polytechnical University, P. R. China. He received his B.Eng, M.Eng and Ph.D. degree of Engineering in computer science and technology in 2000, 2003 and 2005 respectively from the Northwestern Polytechnical University. He has worked as a research fellow at the Academic Center for Computing and Media Studies, Kyoto University, Japan from Feb. 2007 to Jan. 2009, and a post-doctoral researcher at the Information Technology Center, Nagoya University, Japan in 2006-2007. He has been a visiting researcher at the Context-Aware Systems Department, Institute for Infocomm Research (I2R), Singapore from Sep. 2004 to May 2005. He has been an Alexander von Humboldt Fellow at the Mannheim University, Germany from Nov. 2009 to Oct. 2010.



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*Short Biography*

Jadwiga Indulska is a Professor in the School of Information Technology and Electrical Engineering at The University of Queensland, Brisbane, Australia. She received a Master degree in Mathematics from Jagiellonian University and her PhD degree in Computer Science from AGH

University of Science and Technology, both in Krakow, Poland. Her research interests are in the areas of computer networks, distributed computing and pervasive/ubiquitous computing. Over the last 10 years, her research has addressed many problems in pervasive and autonomic computing including context information models for context-aware applications; autonomic management of context information; privacy of context information; software engineering of context-aware applications; balancing user control and software autonomy; and autonomic, rapidly deployable mesh networks. She has led research projects on interoperability of distributed applications, mobile computing, and pervasive computing at the DSTC, an Australian Government funded Collaborative Research Centre on Distributed Systems Technology (1992- 2005). She has been a Research Leader at NICTA (Australian National Centre of Excellence in Information and Communication Technology) since 2006.