Contents

Welcome to IoT 2012

The Internet of Things (IoT) is a vision of connectivity for anything, at anytime and anywhere. It is recognized as an extension of today's Internet to the real world of physical objects. The technological revolution of IoT has brought many emerging applications and services, creating added value in market place, and will, in the near future, have a dramatic impact on our daily lives similar to the Internet done for past 10–20 years.

Building on the success of the last two conferences (IoT2008 in Zurich and IoT2010 in Tokyo), the 3rd International Conference on the Internet of Things (IoT2012) will examine the latest architectures, networking and communication, circuit and system, services and applications, business models and corresponding process changes, cooperative data processing, and social impacts related to the Internet of Things, especially work addressing real-world implementation and deployment issues. We expect the discussion of the overall state of readiness of an Internet of Things will lead to a future vision of IoT adoption, service and application.

Wuxi is a city with more than 2,000 years of history and it is one of the leading centers of IoT-related research and industry in China, known as "Sensing China center". IoT2012 Conference represents a unique opportunity for industry and academic leaders from both China and abroad to discuss and experience technology and business related to an Internet of Things.

We sincerely hope you have a fruitful conference at IoT2012 and have a great time in WuxiChina!

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Prof. Hao Min (Fudan Univ., China)

General Co-Chair

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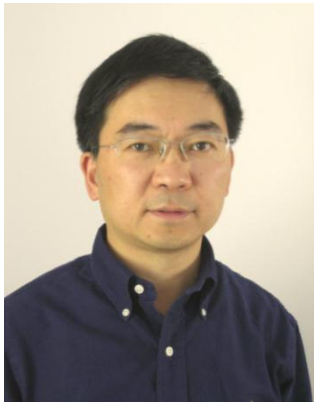

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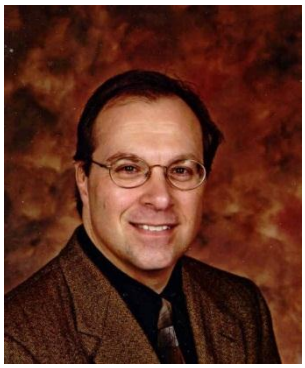

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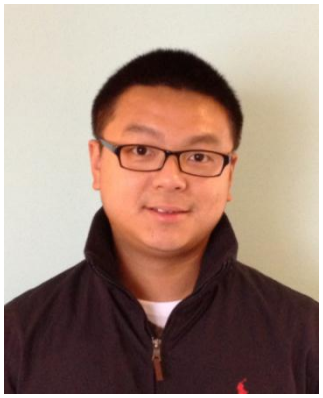

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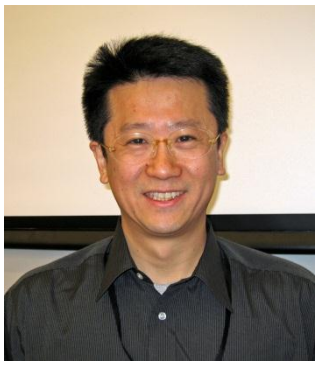

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Keio University, Japan

Jun Murai
Keio University, Japan

Sanjay Sarma (MIT, U.S.A)

Internet of Things 2012

PROGRAM AT-A-GLANCE

Wednesday Oct.24		Thursday Oct.25		Friday Oct.26		Saturday Oct.27	
8:30-10:00	Workshop	9:00-9:25	Conference Opening	9:00-9:45	Keynote K-3	9:00-9:30	Bus pickup
10:00-10:30	Break	9:25-10:10	Keynote K-1	9:45-10:30	Keynote K-4	9:30-10:30	Visit "Sensing China" Exhibition Park
10:30-12:00	Workshop	10:10-10:25	Break	10:30-11:30	Posters, Demo posters	10:30-10:45	Bus pickup
12:00-13:30	Lunch	10:25-11:10	Keynote K-2	11:30-12:45	Technical Sessions	10:45-12:00	Visit "Wuxi International IoT EXPO"
13:30-15:00	Workshop	11:10-11:35	One Minute Madness	12:45-14:00	Lunch	12:00-13:00	Lunch
15:00-15:30	Break	11:35-13:00	Lunch	14:00-15:15	Technical Sessions	13:00-	Shuttle bus to airport
15:30-17:00	Workshop	13:00-14:15	Technical Sessions	15:15-15:30	Break		
17:00-18:00	Exhibitions / IoT Challenge Competition Demo	14:15-14:30	Break	15:30-16:00	Plenary Closure / Best Award		
18:00-20:30	Reception Dinner	14:30-16:10	Technical Sessions				
18:00-18:15	Speech of the Wuxi Mayor	16:10-18:00	Exhibitions				
19:15-19:45	IoT Challenge Competition	18:00-20:30	Gala Banquet / Folk Music				
20:00-21:00	Live Demo						

Keynotes

K-1: From Control to Purpose: Humans in the Internet of Things

Presenter: Dr. Stefan Ferber

Role: Director Communities and Partner Networks

Affiliation: Bosch Software Innovations GmbH

Junlai Hall A OCT.25 Thursday 9:25-10:10

Abstract:

The Internet of Things & Services, Web 3. 0, M2M, or cyber physical systems are much more than just buzzwords for the outlook of connecting 50 billion devices by 2015. It is a chance and a challenge to bring the virtual and physical world closer to each other. The Internet of Things & Services can be viewed from several perspectives: technology advances, market disruptions, business innovation, and the human role in it. The next version of the internet is the technological and social driving force behind the transition of systems and organizations from control to purpose, from in-dependence to inter-dependence, from information to wisdom of the earth. Is this a second Renaissance?

Dr. Stefan Ferber is Director for Communities & Partner Networks of the Internet of Things and Services at Bosch Software Innovations GmbH in Germany - a 100% subsidiary of Robert Bosch GmbH.

Dr. Ferber has more than twenty years experience in software development, software processes, software product lines and software architectures for embedded, computer vision and IT domains.

Dr. Ferber worked at the research center of DaimlerChrysler AG in Ulm in the field of 3D computer vision, robotics, and measurement technologies. In 2000 he joined Robert Bosch GmbH working on software architectures and software product lines as an internal consultant and researcher in Frankfurt. Starting in 2004 he was responsible for the Corporate Systems Engineering Process Group (C-SEPG) and the research department for software and system processes at Bosch in Stuttgart. Since 2009 he was the Product Manager for the Bosch eMobility Solution and therefore engaged internationally in the eMobility market, business models, standardization, and technology topics in Europe, Asia, and Australia.

Dr. Ferber holds a Ph. D. and a diploma degree in Computer Science from the University of Karlsruhe, Germany and a MSc. in Computer Science from the University of Massachusetts Dartmouth, U.S.A.

K-2: Introduction of the technology and standardization of IoT

Presenter: Dr. Haitao Liu

Role: President of Wuxi Industrialization Research Institute and the Chairman of the Board of Sensing Group Corporation

Junlai Hall A OCT.25 Thursday 10:40-11:25

Abstract:

The topic will introduce the situation of IoT in China especially about the technology and standard development refer to the research result and experience.

Dr. Haitao Liu was born in 1968. He is the President of Wuxi Industrialization Research Institute and the Chairman of the Board of Sensing Group Corporation. He is the 973 national primer scientist of IoT, member of national information consulting committee. He also acts as the head of National Base Standard Working group of IoT and Sensor Networks Working Group. He was rewarded one the second prize of national scientific and technological progress and two of the first prize of Shanghai scientific and technological

progress and the smart achievement prize of CAS. He was the CCTV Annual Economical Evaluates and rewarded the National “May 1”Labor Medalist.

K-3: The Netwoked society - challenges and opportunities

Presenter: Jan Färjh

Role: Vice President and Head of Ericsson Research, director of Ericsson's global research

Junlai Hall A OCT.26 Friday 9:00-9:45

Abstract:

Entering The Networked Society introduce many challenges but even more opportunities for our industry. In the future, When everyone and everything is connected, the demand on e.g. capacity, coverage, flexibility and quality on the networks will increase. The growth of Mobile Broadband and an environment for open innovation will provide systems that can deliver services and applications with high quality to many different industry segments, that will be useful and beneficial. In this talk an overview of what currently is happening in our industry, a vision of the future and some important technical challenges will be presented.

Jan Färjh, Vice President and Head of Ericsson Research, is heading Ericsson's global research organization.

Jan Färjh took his M. Sc in telecommunication at the royal institute of Technology in Stockholm, 1985. After his graduation he developed signal processing algorithms for airborne radar systems. In 1990 he joined Ericsson and started to work with radio access technologies. He has a strong background in wireless research and was part of Ericsson's pioneering activities in WCDMA in the early 90's. In 1996 he became manager of the unit responsible for radio access research. The research performed in this unit has substantially contributed to the evolution of WCDMA, HSPA and LTE (4G), technologies that today provide Mobile Broadband on global base. In 2007 he became Head of Ericsson Research. Ericsson Resarch is a global organisation present in North America, Europe and Asia.

K-4: pHealth: Wearable and Unobtrusive Medical Devices for the Internet of Things

Presenter: Y. T. Zhang

Role: Director of Joint Research Center for BME at EE-CUHK, Hong Kong, China; and Director of the Key Lab for Health Informatics of Chinese Academy of Sciences (HICAS) at SIAT, Shenzhen, China

Junlai Hall A OCT.26 Friday 9:45-10:30

Abstract:

Cardiovascular diseases continue to be the leading cause of death in China and all other developed countries. A cost-effective healthcare system should encourage the Participation of all nations for the Prevention of illnesses and the early Prediction of diseases such that Preemptive treatment is delivered to realize Pervasive and Personalized healthcare, i. e. , the paradigm of the 6-Ps health or in short pHealth. This talk will present the concept and challenges of cardiovascular health informatics together with the progress of our project on “Myocardial Infraction and Stroke Screening and Intervention among Nations (MISSIoN 2020)”.

Dr. Yuan-Ting Zhang serves currently the Director of Joint Research Center for Biomedical Engineering and Professor of Department of Electronic Engineering at the Chinese University of Hong Kong (CUHK), Hong Kong, China; and the Director of the Key Lab for Health Informatics of the Chinese Academy of Sciences (HICAS), Shenzhen, China. He became the founding Head of Biomedical Engineering Division at the CUHK and the founding Director of the CAS-SIAT Institute of Biomedical and Health Engineering in Shenzhen in 2007.

Dr. Zhang holds the fellowships from the International Academy of Medical and Biological Engineering (IAMBE), Institute of Electrical and Electronics Engineers (IEEE), and the American Institute of Medical and Biological Engineering (AIMBE) in recognition of his outstanding contributions to the development of wearable medical devices and mobile health technologies.

Dr. Zhang completed his undergraduate and Master Degree studies in 1976 and 1981in Shandong University and was conferred a Ph. D. in the area of Biomedical Engineering at the University of New Brunswick in 1990.

Scientific Workshops

SW1: IIKI 2012:Workshop on Identification, Information and Knowledge on the Internet of Things

URL

http: //ireg.bnu.edu.cn/IIKI2012/

Organizers

Rongfang Bie, Beijing Normal University, China

Xiuzhen Cheng, The George Washington University, U.S.A

Yunchuan Sun, Beijing Normal University, China

Rob van Kranenburg, Expert Group on IoT for EC, Belgium

Abstract

The Internet of Things (IoT) provides a promising vision of the future world where the virtual world of information integrates seamlessly with the real world of things. Achieving the advantages of IoT requires the management, integration and utilization of massive and heterogeneous data by means of knowledge-based decision systems, as well as the integration of technologies like RFID, sensor networks, NFC, Bluetooth, Zigbee, WiFi and WiMAX etc. Knowledge and information play key roles in the automation and intelligence of IoT. The knowledge bases in IoT acquire knowledge from domain experts, as well as knowledge mining tools which can discover rules and models from massive information generated by people and things in the future context of IoT.

This workshop aims at exploring the identification, information and knowledge in IoT. In particular, it intends to investigate identification technology, data management and processing, information extracting and spreading, knowledge management and knowledge sharing, and to study how collaboration and interaction in IoT can be facilitated leveraging the best practices developed in related areas like social computing, social and community intelligence, ubiquitous computing, wireless sensor networks and service oriented computing.

Room No.2 OCT.24 Wednesday 8:30-15:00

8:30-8:40 **Welcome and Workshop Opening** Rongfang Bie

8:40-10:00 **Session 1** Session Chair: Rongfang Bie

SW1-1:**IPv6 addressing proxy: Mapping native addressing from legacy communication technologies and protocols to IPv6 and the Internet of Things**

Antonio J. Jara, Pedro Moreno Sanchez, Antonio F. Gomez Skarmeta, Socrates Varakliotis, Peter Kirstein

SW1-2:**EG-tree: Energy Efficient Indexing for Region Aggregation Queries in WSNs**

Jine Tang, ZhangBing Zhou, Jianwei Niu, Jin Liu and Qun Wang

SW1-3:**IoT Interoperability Testing: A Successful Experience on CoAP Protocol Testing**

Nanxing CHEN, César VIHO, Anthony BAIRE, Xiaohong HUANG and Jiexi Zha

SW1-4:**A Layered RFID Event-Handling Mechanism for Discrete Production Process Monitoring**

Peng SUN, Tianyun SHI, Weijiao ZHANG

10:00-10:30 **Coffee Break**

10:30-12:00 **Session 2** Session Chair: Antonio J. Jara

SW1-5:**ONS Code Resolver using Formal Decoding Rule in IoT**

Zhu Zhu, Li Minbo, Chen Guangyu

SW1-6:**Construction of simulation platform for supply chain based on the Internet of things**

Li Juntao, Cheng Xiaolin, Lin Gang

SW1-7:**Smart Data Processing of Agriculture IoT**

Li Minbo, Chen Guangyu, ZhuZhu

SW1-8:**Research on Data Processing Technology Based on the Middleware of the Internet of Things**

Liu Bingwu, Huang Kun, Li Juntao

12:00-13:30 **Lunch Break**

13:30-15:00 **Session 3** Session Chair: Yunchuan Sun

SW1-9:**A Posture-based Algorithm for Falls Detection in Real-time**

Shumei Zhang, Paul McCullagh, Chris Nugent, Huiru Zheng

SW1-10:**Ethics and IoT: looking back on the early research of Marc Langhein rich**

Rob van Kranenburg

SW1-11:**Implementation of Hummingbird-2 Cryptographic Algorithm for Passive RFID Tags**

Min Li, Mengqin Xiao, Lingzhi Fu, Junyu Wang

SW2: EPS 2012: The 1st International Workshop on Engineering Pervasive Service Systems

URL

https://sites.google.com/site/eps2012workshop/

Organizers

Weishan Zhang: Department of Software Engineering, China University of Petroleum, China

Klaus Marius Hansen: Department of Computer Science (DIKU), University of Copenhagen, Denmark

Paolo Bellavista: DEIS, Universit di Bologna, Italy

Abstract

Large Internet of Things (IoT), Internet of Services (IoS), Internet of People (IoP) applications are gaining increasing attention recently, where a large number of pervasive devices are deployed. This raises a number of challenges for enabling pervasive services on resource-limited devices in IoT/IoS/IoP applications. The challenges include how to make services running in a scalable way, how to extend the capabilities of pervasive devices by utilizing backend supporting infrastructure like cloud storage and cloud computation facilities, and how to develop various pervasive service in an efficient manner, how to make pervasive services behave more intelligently, and so on. The resolution of these issues needs cross-discipline research from Internet of Things and services, autonomic computing, service-oriented computing, cloud computing, software engineering, pervasive and mobile computing, artificial intelligence, pattern recognition, and other related fields. The EPS workshop will build a bridge between these related areas.

Room No.2 OCT.24 Wednesday 15:30-17:00

15:30-15:35 **opening the EPS 2012** Weishan Zhang

15:35-16:55

SW2-1:**Towards an Architecture of Knowledge as a Service**

Yuan Rao, Shumin Lu and Jun Dai.

SW2-2:**Structure Health Monitoring of Walls by Using Hilbert Transformation and Principal Component Analysis in Wireless Sensor Networks**

Hongyang Zhang, Junqi Guo, Xiaobo Xie, Yunchuan Sun and Rongfang Bie

SW2-3:**Towards a Comprehensive and Lightweight User State Monitoring System on Android Smartphones**

Weishan Zhang, Xun Wang

SW2-4:**Environmental Effect Removal in Vibration-based Structrual Health Monitoring in Wireless Sensor Network**

Xiaobo Xie, Junqi Guo, Hongyang Zhang, Yunchuan Sun and Rongfang Bie

16:55-17:00 **close EPS 2012** Weishan Zhang

SW3:M2M-CTS'12: International Workshop on M2M Communication Technologies and Systems

URL

http://m2m-wuxi.weebly.com/

Organizers

Andreas Mueller, Robert Bosch GmbH, Germany

Abstract

Machine-to-machine communication (M2M) will have a fundamental impact on many different industries and businesses and represents a key enabling technology for the emerging Internet of Things and Services (IoTS). By enabling all kinds of smart objects, such as intelligent sensors and actuators, to communicate and interact with each other across different networks and domains, a plethora of new services and applications may be created, thus bearing the potential to create substantial new markets and revolutionize existing ones. In order to fully exploit this potential, a close collaboration is required between academia, the traditional telecom industry as well as other industries that were not so present in this arena in the past, but which will be among the main beneficiaries of M2M and the IoTS in future since they are providing the “Things” for the Internet of Things.

The goal of this workshop is to bring all these players together and to foster a better common understanding, provide valuable networking opportunities and exchange latest research results. The workshop will cover both, technological aspects of machine-to-machine communications as well as possible applications and implementations. It comprises a keynote speech by Dr. Jian Ma – who is one of the leading figures and a distinguished expert in the IoT and communications communities in China and beyond – as well as a world-class panel discussion on "Real-World Challenges and Opportunities for M2M Communication" organized by Dr. Murat Senel, with representatives from Broadcom, Texas Instruments, Energy Micro as well as Bosch. Aside from that, of course, there will be numerous cutting-edge research presentations, with speakers from both academia and industry.

Room No.8 OCT.24 Wednesday 9:00-17:40

9:00 – 10:00 **Opening & Keynote**

SW3-1:**Welcome and Workshop Opening**

Andreas Mueller (Robert Bosch GmbH, Germany)

SW3-2:**IoT Ecosystem Platform – A New Innovative Model to Accelerate IoTDevelopment(Keynote)**

Jian Ma (Wuxi Smart Sensing Stars / Peking University / Beijing University of Posts and Telecommun. / Chinese Institute of Electronics / Chinese Academy of Sciences, China)

10:00 – 10:30 **Coffee Break**

10:30 – 12:00 **M2M Technology**

SW3-3:**An Architecture for the Future Business of Things**

Filipe Cabral Pinto, Paulo Chainho, Nuno Pássaro, Fernando Santiago (Portugal Telecom Inovação, Portugal)

Daniel Corujo, Diogo Gomes (University of Aveiro, Portugal)

SW3-4:**QoI-Aware Energy Management in Internet-of-Things Sensory Environments (Invited Talk)**

Chi (Harold) Liu (IBM Research, China)

SW3-5:**Toward Global Standardization of IoT Aspects for Service Continuity in oneM2M**

Sunghyup Lee, Kyoungkeun Kim, Youngpil Cho, Gunpyo Jeon, Wongyu Jang (Korea Communications Agency, Korea)

Dohyeun Kim (Jeju National University, Korea)

SW3-6:**Facilitating Machine to Machine (M2M) Communication Using GSM Network**

Beena Joy Chirayil (Intel Comneon, Germany)

12:00 – 13:30 **Lunch Break**

13:30 – 15:30 **Panel Session**

SW3-7:**Theme: Real-World Challenges and Opportunities for M2M Communication**

Panelists:

Murat Senel (R&D Project Manager, Robert Bosch LLC, U.S.A)

Jeff Baer (Marketing Director Embedded RF, Broadcom, U.S.A)

Jeff Su (Sales Director, Energy Micro, China)

Volker Prueller (Marketing Director Low Power RF, Texas Instruments, Norway)

15:30 – 16:00 **Coffee Break**

16:00 – 17:30 **M2M Applications & Implementation**

SW3-8:**The Design of Wireless Sensor Network Nodes for Greenhouse Environment Information Acquisition**

Lihua Qu (National Engineering Research Center for IT in Agriculture, China / Shanghai Ocean University, China)

Chuanheng Sun (National Eng. Research Center for IT in Agriculture, China)

Ming Chen (Shanghai Ocean University, China)

Xinting Yang, Chao Zhou, Wenyong Li (National Engineering Research Center for IT in Agriculture, China)

SW3-9:**Web-Based Smart Home: Architecture and Demonstration**

Kun Wei, Wuxiong Zhang, Yang Yang, Zhao Jia (Shanghai Research Center for Wireless Communications, China)

He Huang (UPMC, France)

SW3-10:**Scalability in IoT Architecture**

Dipashree M. Bhalerao (Sinhgad Technical Education Society, India)

Tahir Riad, Ole B. Madsen, Ramjee Prasad (Aalborg University, Denmark)

SW3-11:**A Study about Remote Dynamic Configuration of Sensor Applications**

Xi Jiarong (Singapore Polytechnic, Singapore)

17:30 – 17:40 **Workshop Closing**

Workshop Closing

Andreas Mueller (Robert Bosch GmbH, Germany)

Workshop Chair

Dr. Andreas Mueller

Robert Bosch GmbH, Germany

Andreas Mueller is a Research Staff Member within the Corporate Research Department of Robert Bosch GmbH in Stuttgart, Germany. He is actively working on M2M technology with applications in different verticals, including the industrial, building, consumer and healthcare domains. In this regard, he is closely collaborating with experts from various fields and disciplines to make the Internet of Things become reality.

Prior to joining Bosch, Andreas was a Research Staff Member at the Institute of Telecommunications of the University of Stuttgart, Germany, where he was among other things contributing to the further development of the 3GPP Long Term Evolution towards LTE-Advanced. Besides, he was working as a Systems Engineer for Rohde & Schwarz, developing a novel software-defined radio based communication system for the German Armed Forces. Andreas holds a German Diploma degree as well as a Ph.D. degree in Electrical Engineering and a M.Sc. degree in Information Technology, all from the University of Stuttgart, Germany.

Keynote Speech

"IoT Ecosystem Platform -A New Innovative Model to Accelerate IoT Development"

Dr. Jian Ma (Founder & CEO, Wuxi Smart Sensing Stars, China)

Dr. Jian Ma received his Ph.D. degree from Helsinki University of Technology, Finland, and his Bachelor and Master degrees from Beijing University of Posts and Telecommunications (BUPT), China. He is the Executive Dean of the Institute of Engineering of Peking University in Nanjing and the Founder and CEO of Wuxi Smart Sensing Stars, Co. Ltd., China. Jian Ma has been acting as an adjunct professor and Ph.D. advisor at BUPT and the Institute of Computing Technology of the Chinese Academy of Sciences since 2002. He had been working for 16 years at the Nokia Research Center, first in Finland and then in Beijing, where he eventually became Principal Scientist and also received Nokia's outstanding inventor award. Furthermore, he was for some time Chief Scientist of the Wuxi SensingNet Industrialization Research Institute.

Jian Ma is active in several IoT-related professional associations, for example as Vice Director of the IoT Expert Committee at the Chinese Institute of Electronics or as Vice Chair of the Sensor Network Technology Committee of the Chinese Computer Federation. His current interests include the Internet of Things, locationbased services as well as general mobile Internet applications and services. He was granted 47 patents and he has published more than 300 papers in renowned journals and conferences as well as five books or book chapters. Currently, he is also the Editorial Director of the "IoT Technology" book series by China MIP.

Panel Session

Theme: "Real-World Challenges and Opportunities for M2M Communication"

Dr. Murat Senel (Panel Organizer)
R&D Project Manager
Robert Bosch LLC, U.S.A

Murat Senel received his Ph.D. degree in Electrical and Computer Engineering at Purdue University, West Lafayette, IN in 2008 and his B.Sc. degrees in Electrical Eng. and Industrial Eng. (double-major) at Bogazici University, Turkey in 2002. In 2008, he joined Bosch Research & Technology Center and works as R&D Project Manager on wireless M2M applications. His research interests are in the area of low-power wireless communications. In particular, he is interested in connecting wireless sensor networks to the Internet.

Jeff Baer
Marketing Director Embedded RF
Broadcom, U.S.A

Jeff Baer joined Broadcom in 2004, and successfully pioneered Broadcom's entry into the rapidly growing embedded WLAN market. In 2008, Jeff assumed Business Development responsibility for the Asia-Pacific region for Broadcom's "mobility" WLAN and WLAN+Bluetooth "combo" devices that target smartphones and tablets (now Broadcom's #1 line of business). In support of this position, he relocated to Tokyo as Director of Business Development, where he spent a total of 3 years. Upon his return to the US, he resumed responsibility for driving Broadcom's push into the so-called 'internet of things' as Marketing Director for embedded RF technology.

Jeff has over 25 years of engineering, applications engineering, and marketing experience, with primary focus on embedded system CPUs and networking connectivity, including 13 years with National Semiconductor. He was the founding Representative Director of QNX Software Systems KK (now a wholly-owned subsidiary of Research in Motion). Jeff holds two BAs and an MS from the University of California at Santa Cruz, with majors in Computer and Information Sciences and Applied Economics. He also earned his MBA from the Haas School of Business, University of California at Berkeley.

Jeff Su
Sales Director
Energy Micro, China

Jeff Su joined Energy Micro in March 2011 as the sales director in Greater China. Before Energy Micro, he worked for Wintek Electronic for 12 years, which is a very competitive distributor in Asia in terms of revenue and sales force. In the past 10 years, he has been focusing on selling MCUs to different kinds of low power applications, such as battery-powered metering and so on.

Volker Prueller
Marketing Director Low Power RF
Texas Instruments, Norway

Volker joined Texas Instruments in 1999 on the European Graduate Program with different responsibilities in the product marketing area in TI's Semiconductor Group, including an assignment in the Wireless Terminals Business Unit in France and in the worldwide MSP430 marketing organization in Dallas, Texas. In 2001, he joined the MSP430 group in Freising, Germany, as product marketing engineer. In July 2007, Volker took the lead of the combined MSP430 and Low Power Wireless business development activities in EMEA and from January to September 2009 he was managing all MCU and Low Power RF marketing activities in EMEA. In September 2009, Volker moved to Oslo, Norway, where he is heading the worldwide marketing activities for the Low Power RF group of Texas Instruments' Wireless business.

Volker holds a Master's level degree in Electrical Engineering from the University of Erlangen-Nuremberg, Germany. He is married and has two children.

Industrial Workshops

IW1: IoT applications – value creation for industry

Chair, Organizer

Dr. Ing. N. L. Fantana, SM IEEE, ABB CRC
Dr. Till Riedel, KIT
Contact: nicolaie.fantana@de.abb.com

Speakers and Contributors

Dr. Ovidiu Vermesan, P. Fries, S. Lange, Stephen Miles, Prof Dr. Lin Zhang, YU Xiaoxiao, Dr. Till Riedel, Dr. Florian Michahelles, J. Hupp, Prof. Dr. Pflaum Alexander, Dr. St. Svensson, Dr. St. Ferber, Dr. Niko Hossain, Dr. Jochen Schlick, Dr. Wei CR Sun, Dr.Ing. N.L.Fantana

Abstract

IoT is a wide and rapidly developing area. Numerous IoT research and application projects have been done by universities, or in joint industry-university consortia in recent years. However an important question is on value creation for industry.

IoT applications in the sense of this industry workshop are solutions using IoT technologies to improve industrial manufacturing processes, enable new and efficient ways to do operate production plants, create new service or supervision means for industrial installations, offer an optimized infrastructure, reduce operational cost or improve human safety in industrial areas. From an industry point of view value creation form IoT applications and sustainability are essential. How these problems will be addressed and solved will influence the use of IoT technologies in the industry, on a larger scale, in the coming years.

The workshops intents to bring together experts from around the world to discuss and stimulate ideas, share experience on IoT applications and value creation for industry and to address and highlight with priority two major topics:

1. IoT in industry: experience, trends, challenges
2. IoT creating value in industrial applications

The workshop is intended to contribute to a IoT supported paradigm change in manufacturing, industrial service and over life sustainable industrial activities.

Room No.9 **OCT.24 Wednesday** **8:30-17:15**

8:30-8:40 **Welcome, Agenda, Goals** Dr.Ing. N. L. Fantana, ABB CRC

8:30--10:00

IW1-1**:IoT applications - creating value for industry. Overview, Challenges, Potential**

Dr.Ing. N.L.Fantana, ABB Corporate Research, Germany

IW1-2**:Introduction to EU IoT activities and perspectives on industrial opportunities**

Dr. Ovidiu Vermesan, P. Fries, S. Lange, EU Commission, EU IoT Research Cluster, SINTEF, VDIVDE, Norway, Switzerland, Germany

IW1-3**:Big Data Flows - A Layered Model for Supply Chain Communications**

Stephen Miles, MIT, Auto-ID Labs, U.S.A

IW1-4**:Towards Computational-sensing through large-number of networked sensors**

Prof. Dr. Lin Zhang, Xiaoxiao Yu, Tsinghua University, China

IW1-5**:Cyber Physical Systems: The Role of the Internet of Things in Industry 4.0**

Dr. Till Riedel, KIT, TECO, Germany

10:00-10:30 **Break**

10:30-12:00

IW1-6**:What your shopping basket can tell you – the value of Internet of Things for retailing**

Dr. Florian Michahelles, ETH Zürich, Auto-ID Labs, Switzerland

IW1-7**:Additional value for smart objects by the use of Smart Applications**

J. Hupp, Fraunhofer IIS, Germany

IW1-8**:IoT-based Information Services - A Service Engineering Approach**

Prof. Dr. Pflaum Alexander, Univ Bamberg, Fraunhofer ATL, Germany

IW1-9**:IoT for O&G industry**

Dr. St. Svensson, ABB Corporate Research, Sweden

IW1-10**:Technologies inspiring a connected life: The Internet of Things & Services**

Dr. St. Ferber, Bosch SI, Germany

12:00-13:15 **Lunch**

13:15-14:00

IW1-11**:The significance of fostering IoT technologies in the logistics industry to guarantee future European market leadership**

Dr. Niko Hossain, Lufthansa Cargo, Research Tech Innovation, Germany

IW1-12**:SmartFactoryKL - Introducing the IoT to Factory Automation - Achievements and Challenges**

Dr. Jochen Schlick, DFKI, Germany

IW1-13**:IOT Infrastructure and Applications**

Dr. Wei Sun, IBM Research Shanghai Lab, China

14:00-14:40 **Discussion, survey, outlook, next.** All

14:40-14:45 **Conclude workshop.** Dr.Ing. N. L. Fantana, ABB CRC

14:45-17:15 **IoT Lab Visit**

IW2: IoT technologies and applications for Chemical and Oil/gas Industry

Organizers

L. Julia Zhu, Ph. D, CEO, DigitNexus Inc. (former Co-chair for EPC Active RFID JRG)

Planed Speakers

Craig Castro, Global leader, RFID GPS Auto-ID Telemetry Expertise Center, The Dow Chemical company

Ian Robertson, CEO, S-C-R-C, (Former director of Industry Initiatives, EPC Global)

Abstract

Purpose: The purpose of the workshop is to learn from the global leaders of the Chemical, Oil and Gas industries, on how IOT technologies been used in their respective companies, and what benefits they have reaped, what lessons we can learn from their experiences.

Description: IoT technologies have been spreading into different aspects of our life. Different industries have been taken different approaches to reap the benefits of the technologies. Because of the complexities and inherent safety requirements, chemical and oil and Gas industry have been the front-runner of adopting the RFID and other IoT technologies. Companies such as BP, Dow chemicals have been using the technologies over the past 5-6 years. They have had their shares of lessons learned, but overall, they are now seeing the how the technologies helped their businesses and expanding into more of their business domains. The oil and gas companies in China and Asia are also starting to put serious efforts in leveraging the IoT technologies. This workshop will be the forum for the global leaders to share with each other and the audience all their experiences (including what technologies work and what not) and future plans.

Room No.3 OCT.24 Wednesday 8:30-11:30

8:30-10:00

IW2-1:**Oil and Gas– What is Different from "Normal" Applications**

Ian Presentation

IW2-2:**Using Auto-ID Technologies to Enable the "Internet of Things"**

Craig Presentation

10:00-10:15 **Break**

10:15-11:00

IW2-3:**IOT technologies and applications for Chemical and Oil/gas Industry**

Pannel Discussion

11:00-11:30 **Attendees questions Q & A**

Ian Robertson, CEO & President, Supply Chain RFID Consulting LLC (SCRC) (a member company of JPL RFID Holdings LLC).

Ian Robertson, MBCS, CITP, Cert Mgmt, BSc (Hons) was GS1's Director for Transportation & Other Industry Sectors and Director for the Asia Pacific region. He has a long multifaceted background covering IT, Supply Chain, RFID, global standards and international large scale program management, and was formerly HP's Worldwide Program Director of RFID, having spent 22 years in the HP, Compaq and DEC components of HP. He originates from the UK, but left 23 years ago to gain international experience from living and working in France, Switzerland, Holland, Germany and the U.S.A, and specializes in taking on complex start up situations where the rules have yet to be written and in troubleshooting Supply Chains. He has written various papers on change management within large corporations and consulted for many companies in this respect.

In November 2005 he took up the roles of Global Industry Development Director and of Asia Pacific Regional Director for EPCglobal. In his Asia Pacific role he has consulted on RFID applications and regulations for many governments and major industries. He worked closely with the Apparel, Aerospace & Defense, Automotive and Consumer Electronics industries to form their industry groups within EPCglobal. His collaboration with China contributed to the development and publication of China's UHF RFID regulations. From April 2009 he was responsible for Transportation and Other Sectors for GS1 Global Office.

Today he is the founder and CEO of Supply Chain RFID Consulting LLC, Senior Vice President of Technology for JPL Global Logistics Solutions and CTO/CIO of JPL RFID. His authoritative work Improving Supply Chains Using RFID & Standards was published in July 2011. He is also a graduate of the International Advanced Management Program at INSEAD France, of the UK Open University and a Charter Member of The British Computer Society.

J. Craig Casto, the Dow Chemical Company, Global Leader

Craig Casto is the Global Leader for Dow Chemical's RFID • GPS • AutoID Expertise Center. This Expertise Center has ownership of all of Dow's Auto ID applications implemented throughout the world and is responsible for establishing corporate direction and standards in these areas. Auto ID includes Bar Codes, RFID, and GPS.

Craig is also a founding member of Dow's RFID/GPS Steering Team. Formed in 2005, this team developed a strategy for deploying RFID and GPS technology within Dow and to provide guiding direction to RFID/GPS standards as developed by the Expertise Center.

Craig brings more than 30 years of logistics, production planning and Auto ID experience to this position having held various positions in Marine Transportation, Inventory and Production Management and Supply Chain Technology leadership. Craig has held his current role as Auto ID Technology leader since 2001.

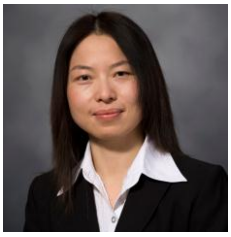
Craig holds a Bachelors and MBA degree from Marshall University. He and his wife reside in South Charleston, West Virginia.

Some of the Auto ID projects that have emerged under the Craig's leadership include:

•Container Tracking Most Effective Technology Approach for Dow shipments including:

•Construction Laydown Yard tracking of parts for new plant builds (fabricated steel, pipe spools, valves, etc) using Bar Codes, RFID and GPS

- Emergency Response support for remote field workers using GPS
- Isotank and Chassis Asset Utilization using GPS
- Tool Room Tracking using bar codes
- Package delivery confirmation using bar codes
- Field Data Collection for on-site Railcars using RFID
- Warehouse Management Solution using bar codes
- Anti-counterfeiting and Brand Protection



L. Julia Zh, Ph.D, has been a high technology executive with 10+ years of comprehensive strategic business experience in wireless technologies, communication systems, and software development. Dr. Zhu has been a successful business leader with broad talents and experiences in varied technologies and high-performance team building, in designing and delivering leading edge solutions for prominent enterprise customers. She has been an effective executive with proven ability driving key initiatives across different functional and global organizations, with demonstrated success leading new product development and initiatives on wireless communication applications and supply chains.

She spent the past 15 years working at various technical and management roles in various high-tech companies including Cisco and Texas Instrument and Savi Technology/Lockheed Martin. In the past ten years, She focused in the field of RFID and related technology and programs. Besides authoring many technical patents on the active RFID technologies, Dr. Zhu also managed some of the largest RFID commercial programs at the time.

Dr. Zhu was one of the key original EPC Gen2 group members, served as Co-chair for HAG Gen2 WG regulatory SC. She was also the co-chair for the EPC active tagging JRG. She was an active member contributing in third Generation PCS system standards, former member 3GPP2 QoS, TSA and TSG working groups. She worked as the secretariat for several ISO working groups and the editor for several of the ISO standards including ISO 18000-7, ISO 18185 part 4, ISO 18046-7, ISO 18047-7.

Dr. Zhu is currently the CEO of DigitNexus, Inc. She holds a Ph.D degree on wireless communication from The University of Illinois at Urbana-Champaign. She currently resides in Silicon Valley with her family.

IW3: IPv6 and the Future IoT: International IoT Initiatives

Organizers

Sébastien Ziegler, Mandat International,IoT6 Coordinator

Prof. Peter Kirstein, European father of the Internet, UCL, UK

Prof. Antonio Skarmeta, IoT6 Project – University of Murcia

Latif Ladid, University of Luxembourg/IPv6 Forum President

Speakers

Dr. Vint Cerf, Prof. Peter Kirstein, Prof. Liu Dong, Latif Ladid UL, Prof. Antonio Skarmeta, Yusuke Doi, Alex Gluhak, Sébastien Ziegler, Franck Greco, Prof. Srdjan Krco, Pr. Alessandro Bassi, Ovidiu Vermesan, Franck Le Gall, Prof. Cesar Viho,Prof. Peter Kirstein, Prof. Hiroshi Esaki, Prof. Daeyoung Kim, Kevin Yin, Sam Sun.

Abstract

Without public IP addresses, the Internet of Things capabilities would be greatly reduced.Most discussions about IoT have been based on the illusionary assumption that the IP address space is an unlimited resource or it's even taken for granted that IP is like oxygen produced for free by nature. Hopefully, the next generation of Internet Protocol, also known as IPv6 brings a solution. Expanding the IPv4 protocol suite with larger address space and defining new capabilities restoring end to end connectivity, and end to end services, several IETF working groups have worked on many deployment scenarios with transition models to interact with IPv4 infrastructure and services. They have also enhanced a combination of features that were not tightly designed or scalable in IPv4 like IP mobility, ad hoc services; etc catering for the extreme scenario where IP becomes a commodity service enabling lowest cost networking deployment of large scale sensor networks, RFID, IP in the car, to any imaginable scenario where networking adds value to commodity.

With the exception of very few IPv6 experts, none of the previous discussions or research papers talked explicitly about the IPv4 address crunch and its impact on IoT or the open standards needed for its scalability, let alone ever mentioning IPv6 and its advanced IETF developments such as IPv6 adaptation layer over IEEE 802. 15. 4 (including header compression) known as 6LoWPAN or IPv6 Routing Protocol for Low power and Lossy Networks (RPL) as the way forward.

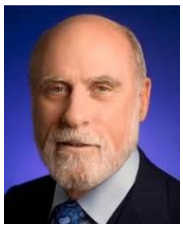
This International workshop wishes to restore some sanity in this area discussing the open and scalable architecture model. When embedding networking capabilities in "things", there are architectural decisions to be made that guarantees the "Internet of Things" is scalable, inclusive of several communication media, secure, future proof and viable for businesses and end-users. Several models can be discussed, (as reviewed below) but one clearly emerges as the best approach.

Room No.7 OCT.24 Wednesday 9:00-17:30

Provisional program

9:00 **Introduction by the Program Committee**

9:10 **Keynote speakers**



Dr. Vint Cerf, Co-Father of the Internet
(Video Key-message)

Prof. Peter Kirstein, European father of the Internet, UCL, UK
IW3-1: **The Future of the Internet**

Liu Dong, Chair China IPv6 Council
IW3-2: **IoT Deployment in China**

10:00 **IPv6 Enablers and Perspectives for IoT**

Chair:
Latif Ladid UL/IPv6 Forum President
IW3-3:**IPv6 & IOT around the World**

Speaker: Prof. Antonio Skarmeta, IoT6 Project
IW3-4: **Security& Privacy in IOT**

Speaker: Yusuke Doi, Toshiba Corporate Research
IW3-5: **IoT Deployment Challenges**

Speaker: Alex Gluhak, Surrey University
IW3-6: **The role of Smartphones in an Internet of Things**

12:00 **Lunch Break**

14:00 **IPv6 & European projects perspectives**

Moderator:
Sébastien Ziegler, Mandat International, IoT6 Coordinator
IW3-7: **IoT6 introduction: IoT and IPv6 perspectives**

Speaker: Franck Greco, European Commission
IW3-8: **European IoT & IPv6 vision**

Speaker:Prof. Srdjan Krco, Ericsson and IoT-I Project
IW3-9: **IoT-I (IoT European strategy) and IPv6 perspectives**

Speaker: Prof. Alessandro Bassi, IoT-A Coordinator
IW3-10: **IoT-A (IoT Architecture) and IPv6 perspectives**

Speaker: Ovidiu Vermesan Chair IERC (TBC)
IW3-11: **IERC (IoT European Cluster) and IPv6 perspectives**

Speaker: Franck Le Gall, Inno and BUTLER Project (TBC)
IW3-12: **BUTLER (Secure and smart life) and IPv6 perspectives**

Speaker: Prof. Cesar Viho, IRISA/Univ. Rennes 1 and Probe-IT project
IW3-13: **PROBE-IT and IPv6 perspectives**

15:30**Coffee Break**

16: 00**Worldwide IoT Collaboration**

Moderator
Prof. Peter Kirstein, European father of the Internet, UCL, UK

Prof. Hiroshi Esaki, University of Tokyo
IW3-14: **IoT and Smart University**

Prof. Daeyoung Kim, KAIST
IW3-15: **IPv6 and EPC Network for IoT**

Kevin Yin, Cisco
IW3-16: **Key Steps to Develop IoT through IPv6**

Sam Sun, CNRI
IW3-17: **Handle system and IPv6 perspectives**

17:30 **End of the workshop**

IW4: The Internet of Things to boost efficiency and effectiveness in E-Health, Wellness and Ambient Assisted Living

Organizers

Professor Dr. Christoph Thuemmler, Edinburgh Napier University, United Kingdom

Thomas Jell, Siemens AG, Munich, Germany

Speakers

Professor Dr. Christoph Thuemmler, Dr. Ing. Armin Schneider, Dr. Sebastian Lange, Thomas Jell, Dr. Mojca Volk

Abstract: Health care is moving away from a hospital based, specialist centered approach towards a distributed patient centric model. The number of things and smart devices in the healthcare, wellness and ambient assisted living domain is growing rapidly. “Things” are everywhere, in the operating theatre, in medication packages, in surgical tools and in smart homes. The Internet of Things is about to change the way care is delivered and has the potential to reduce dependencies and inequalities in our populations. What is the current state of play? How are we going to manage the integration of a growing amount of data in a Future and how can we assure interoperability?

Goals of the Workshop

The Workshop will provide an overview of current trends in the Health domain and we will discuss future IoT challenges. We will identify the inter-dependencies of health, wellness, mobility and communication. What will be the future role of the IoT and what will future markets look like? The workshop will also address key elements of social and technological alignment strategies. How to link the Internet of Things and the Internet of People? During the workshop we aim to identify prime areas of global cooperation and collaboration. One direct outcome of the workshop will be a SWOT analysis conducted jointly by all participants leading to a joint statement for potential publication.

Room No.3 **OCT.24 Wednesday** **15:30-17:00**

15.30-15.35 **Chair’s Welcome** **Christoph Thuemmler, Hui Li**

15.40-16.35

IW4-1:**"Catch the drops, make an ocean!"Innovative IoT solutions for personal wellbeing and e-health**

Dr. Mojca Volk, University of Ljubljana, Slovenia

IW4-2:**IoT In the Operating Theatre**

Dr. Ing. Armin Schneider, Klinikum Rechts der Isar, Munich, Germany

IW4-3:**IoT, Healthcare and Mobility**

Thomas Jell, Siemens AG Munich, Germany

IW4-4:**A Reference Architecture for the Internet of Things**

Dr. Sebastian Lange, VDI/VDE Berlin, Germany

16.40 – 16.55 Group discussion A

User requirements and Solutions for the Healthcare of the Future

Group B

Solutions for Future Healthcare systems

16.55 - 17.00 **Conclusions of the Session, Paper draft?**

Title: **Catch the Drops, Make an Ocean**

Speaker: Dr. Mojca Volk, Ljubljana, Slovenia. The vision of having a variety of gadgets and sensors attached to your body while consulting your virtual doctor is no longer a futuristic dream, it is the reality waiting at the door to be let into our lives. After decades of science fiction, the technology is finally here for the consumers – a smart phone with GPS, environment sensors and a camera in every pocket, a variety of Internet-enabled medical and wellbeing sensors and other wearable gadgets at affordable prices, ubiquitous mobile broadband connectivity, and unlimited storage capacities and processing powers capable of recording and sequencing unimaginable quantities of data. The ability to capture large quantities of seemingly unrelated data about our body, habits, behaviors, intake, surrounding environments, communication and social activity and all kinds of other information will give answers to our personal wellbeing and quality of life. This paves the way to radical transformation in healthcare and wellbeing and the grand innovation is yet to take its place – the immense person print databanks and powerful complex event processing and big data algorithms are the key to breaking our code.

Title: **IOT Technology in the Operating Theatre**

Speaker: Dr. Ing. Armin Schneider, Munich, Germany: RFID tracking in medicine and data logging as well as use of mobile devices in medicine is spreading rapidly. RFID can help to prevent errors in the operation theatre and increase the efficiency and effectiveness of health care. The research group MITI has been working closely with industry to increase automation and reduce human error.

Title: **A reference Architecture for the Internet of Things**

Speaker: Dr. Sebastian Lange, Berlin, Germany: IoT-A, the **European Lighthouse Integrated Project** addressing the Internet-of-Things Architecture, proposes the creation of an architectural reference model together with the definition of an initial set of key building blocks. Together they are envisioned as crucial foundations for fostering a future Internet of Things. Using an experimental paradigm, IoT-A will combine top-down reasoning about architectural principles and design guidelines with simulation and prototyping to explore the technical consequences of architectural design choices.

IW5: Internet of Things for Food Quality and Safety

Organizers

Professor Junghoon Moon, Seoul National University
Professor Yong He, Zhejiang University
Professor Gang Liu, China Agricultural University
Professor Minghao Huang, Konkuk University

Speakers

Junghoon Moon, Associate Professor, Seoul National University
Bo Tao, SEO, Rockontrol Beijing
Jayna Sheats, CTO, Terepac
Pengcheng Nie, Ph. D. Candidate, Zhejiang University
Seok Myeong Hong, CEO, GenoRevo Korea Co.
Florian Michahelles, Auto-ID Lab at ETH Zurich/HSG

Statement of goals for the workshop

The aim of the workshop is to share and broaden knowledge and experiences of IoT for food and agricultural industry. During the past decade, consumers have expressed concerns about food quality and safety. Consumers pay more attention to the quality and freshness of the food they consume. Compared with other industries, however, maintaining consistent levels of product quality in the food and agriculture industry is known to be difficult due to the extensive reliance on environmental elements (e. g., weather, soils, and water). In this regard, the role of IoT, including sensor network and RFID technology is considered more important in food and agricultural industry. Presently, the utilization of IoT in the food industry is lagging compared to most other industries. Operations (production, processing, storage, distribution, and management) for this industry, are dispersed globally, and hence require increased dependence on IoT. Therefore, the food and agricultural industries need to attempt to increase their adoption of IoT.

This workshop intends to provide an insight into IoT for the food industry and its related business areas, including agriculture, fishery, cold chain, retailing, and so forth. It addresses various aspects of the role of IoT from diverse perspectives from both academia and practitioners.

Room No.6 OCT.24 Wednesday 8:30-12:00

8:30-8:40 **Opening**

8:40-10:00

IW5-1: **IoT for Food and Agriculture Industry: Quality and Safety Management for Ginseng**
Junghoon Moon

IW5-2: **RKCloud: A PaaS Platform for IoT applications**
Bo Tao

IW5-3: **The Internet of Things and Sustainable Agriculture**
Jayna Sheats

10:00-10:30 **Opening**

10:30-12:00

IW5-4: **Fast Acquisition of Crop Nutrient Sensors and WSN for PA Practice**
Pengcheng Nie

IW5-5: **IT-BT Convergence Technology in Agrifood Industry**
Seokmyeong Hong

IW5-6: **Increasing food safety using GS1 standards**
Florian Michahelles

Title: **IoT for Food and Agriculture Industry: Quality and Safety Management for Ginseng**

Abstract: Food traceability has been critical issues in many countries, including South Korea. Product traceability information, including production, processing, logistics and distribution, strongly influences consumers' buying behavior. Consumer's concerns about food quality and safety can be alleviated though food traceability systems adoption. Korean government launched its first food traceability systems in 2003, expecting to enhance the international competitiveness of Korea's agricultural products. Since then, the Korean government initiated many new projects for food quality and safety based on RFID and sensor network technology. Ginseng is one of the most important agri-products for both domestic international markets in Korea. In An IoT project for Ginseng was carried out to guarantee the product quality and safety in 2005, but it was not successful. The Korean government investigates difficulties of the systems development, and challenges the same project again. The presentation shows Korean government's efforts for Food quality and safety using RFID and sensor network, especially focusing on Ginseng.

Junghoon Moon is an Assosicate Professor of Program in Regional Information at Seoul National University in Korea. He received his PhD in Management Science and Systems from the State University of New York at Buffalo in 2006. He previously worked for Department of Management Science, KAIST until 2010. His research interests include marketing management, technology management, and information management for food business. He is an associate director of Auto ID lab. Korea. At the Americas Conference on Information Systems in 2006, one of his papers was judged the Best Paper of the year. AT the Hawaiian International Conference on System Sciences in 2007, one of his papers was nominated as the Best Paper of the year. He has published articles in many journals in the area of business and MIS.

Title: **RKCloud: A PaaS Platform for IoT applications**

Abstract: In this talk, we will discuss RKCloud, a PaaS platform being developed at Rockontrol for IoT applications. We will discuss its main components and the technical challenges. We will also briefly discuss its application in food quality area.

Dr. Bo Tao received his B.S. and Ph.D. degrees from Tsinghua University and Princeton University, respectively. He spent a dozen years working in Silicon Valley. While in the Valley, he was a senior engineering manager at Google, working on distributed systems and infrastructure. He managed Google Video and Youtube products. After Google, he worked as the CTO of EMC China, during which time he founded EMC Labs China and served as its first managing director. He is currently the General Manager with Rockontrol, working on cloud computing and big data technologies and their application in the IoT field.

Title: **The Internet of Things and Sustainable Agriculture**

Abstract: Agriculture, the oldest industry in human society, remains vitally important today: besides providing sustenance, it is a major source of employment, and has a huge affect on the environment as a consequence of it use of water, land, energy, fertilizer, and pesticides. Once produce has left the farm, it is subject to steady degradation of quality and eventually may become unhealthy. Modern technology provides many ways to minimize these problems and maximize the value of the food, but they all depend for effectiveness on timely and accurate input concerning the state of food and its surroundings (soil, storage conditions, etc.). Wireless sensors can play a major role in providing this information, but they must be inexpensive, easily deployed, and in some cases small enough to insert into individual food items or even plants without disturbance. This presentation will present some recent technological progress toward this goal.

Dr. Jayna Sheats is co-founder and Chief Technology Officer of Terepac. She received her Ph.D. in physical chemistry at Stanford University, and after post-doctoral work at the Masshachusetts Institute of Technology and Stanford, joined Hewlett-Packard Laboratories in 1982 where she worked on chemistry for microelectronics. In 1998, she initiated and supported a program at HP to introduce internet technology in the developing world. In 2002, she left to engage in more entrepreneurial ventures (including co-founding Terepac in 2004), and eventually joined Nanosolar in 2004 as Vice President of Manufacturing Technology and subsequently Associate CTO. In 2008, she joined Terepac as CTO. She is a fellow of the AAAS, and has published 55 journal articles and filed more than 45 patents, with more than 20 presently issued.

Title: **Fast Acquisition of Crop Nutrient Sensors and WSN for PA Practice**

Abstract: According to the key and bottleneck problems in fast detection of farm and plant information in precision agriculture (PA), we studied the growing status, nutritional detection, disease screening and environmental information based on four aspects of zone, region, field of view and individual objects. We developed a serial of fast detection and radio transmission technologies (RTT) from points to entire surface of plant information detection. We also developed a serial of plant information detection instruments and network detecting systems with intellectual property rights for key technologies for the fast detection of plant growing information, nutritional information and disease screening.

Pengcheng Nie

Male, the Han Nationality, born in Tongcheng, Hubei, PH. D Candidate. Born in 1982. Specialize in researches on agricultural sensing instruments, Internet of Things, intelligent equipment and so on.

Title: **IT-BT Convergence Technology in Agrifood Industry**

Abstract: Agrifood industry is the most fundamental and important areas in various industries. Though Agrifood industry has been developed steadily as a traditional BT industry, new materials and new technologies have been developed currently through the convergence of various technologies such as IT and NT. As the advanced industry, agrifood industry is slowly evolving for leading the future society and technology. Convergence of technologies in the field of agrifood is constantly being tried for the purpose of differentiated existing technologies and buinesses, the creation of new businesses, eco-friendly changes in the industry, technology and price competitiveness, and organic combination of related fields such as health, medical, energy and the environment. As representative IT-BT convergence technologies, various screening and diagnostic technologies are being commercialized, and related technologies(Device, USN etc) are being developed fast. Featured examples of the above are real-time pathogen diagnosis and management system using Bio-chip, Nano-bio-barcode and on-site rapid diagnosis smart sensing technology for food and ingredients safety. In addition, Convergence Nano-Technology-based new materials are important sector of agrifood. Through the convergence of technologies, agrifood industry will grow as a future industry.

Seok Myeong Hong is founder and Chief Executive Officer of GenoRevo Korea Co., Ltd. He received his B.A and M.S in agricultural and environmental biology at Seoul National University in Korea, and is currently studying for a Ph.D. in pharmacology at Medical School of Chung-Ang University in Korea. After the master′s degree, he joined HYOSUNG Corporation in 1997 where he worked on materials and microbiology for environment. In 2005 he newly joined Gentro Inc. where he worked on materials and process for food, environment, and cosmetics as R&D Director. In 2010 he founded a new company GenoRevo Korea Co., Ltd. specializing in BT convergence technology. He received Korean governmental citation and company awards for developing new technologies. He is a member of technical assessment board in Korean Government(Ministry of Food, Agriculture, Forestry and Fisheries, Ministry of Knowledge Economy, Ministry of Environment). He is a fellow of the Korea Society of Food and Agriculture Information Science(KFAIS), and has published 10 journal articles and filed more than 11 patents and Korean new excellent technologies.

Title: **Increasing food safety using GS1 standards**

Abstract: This talk briefly introduces to the standards and technologies of the GS1 framework. The talk refers to on-going project in traceability of product items and derives alternatives how this could be applied to food safety.

Speaker: Florian Michahelles

At ETH Zurich Florian Michahelles heads the Auto-ID Lab ETH Zurich/HSG and directs research at the forefront of mobile commerce and social media innovations.

Michahelles received a PhD from ETH Zurich and holds a M.Sc in computer science and psychology from the Ludwig-Maximilians-University of Munich. He was an MIT Sloan Visiting Fellow in 2000. Michahelles has published 80+ papers in international journals and conferences and is the program chair of the Internet of Things Conference (IoT2012) in Wuxi. Since 2011 he has been a co-founder of 42matters AG running Appaware.com.

IW6: Security of Internet of Things: Challenges and Countermeasures

Organizers

Dr. Daniel Engels, Revere Security
Prof. Weili Han, Fudan University

Speakers

Daniel Engels, Revere Security, U.S.A.
Feng Bao, Institute for Infocomm Research, Singapore.
Jiansuo Zhou, CEC Huada Electronic Design Co., Ltd, China.
Yanan Hu, National Engineering Laboratory for Wireless Security, China.

Statement of goals for the workshop

The aim of the workshop is to share and broaden knowledge and experiences of security of IoT. During the past decades, IoT technologies obtained remarkable development, and are penetrating into dairy life of people. Many applications, such as smart city, smart agriculture, are being developed and deployed in many regions.Security, however, as an important issue in other application areas, is also re-defined by both academia and industry of IoT. Researchers of IoT, including scientists in the field of cryptography, system security, and applications, proposed many solutions to protect sensitive resources in IoT. By holding this workshop, we hope to invite active researchers in this field in the world, from both academia and industry, and discuss what the current challenges in the security issue of IoT are, and how we can counter them.

Room No.4 OCT.24 Wednesday 13:30-17:00

13:30-13:40 **Opening**

13:40-15:00

IW6-1:**Why You Need to Secure Your Toaster**
Daniel Engels
IW6-2:**Security in Smart Grid**
Feng Bao

15:00-15:30 **Break**

15:30-16:50

IW6-3:**Cryptography in RFID and Its Applications in China**
Jiansuo Zhou

IW6-4:**IoT Security and Related International Contributions**

Yanan Hu

16:50-17:00 **Discussion**

Dr. Daniel W. Engels is a Visiting Fellow at Southern Methodist University, and he is the Chair of the IEEE Technical Committee on RFID for 2011-2012. Dr. Engels is the former Director of Research of the Auto-ID Labs at MIT and is an original member of the research team started in 1998 that founded the Auto-ID Center at MIT. Dr. Engels is one of the principal architects of the Networked Physical World EPC System, the foundation of the Internet of Things, developed under the Auto-ID Center and licensed to the Uniform Codes Council, now GS1. Dr. Engels received his Ph.D. from the Massachusetts Institute of Technology. He has over 80 peer reviewed publications in RFID, RFID applications, security, embedded computing, and computer-aided design. Dr. Engels is a member of AIDC 100 and a Senior Member of IEEE.

Dr. Feng Bao received his BS in mathematics, MS in computer science from Peking University in China and his PhD in computer science from Gunma University in Japan. He joined the Institute of System Science, Singapore in 1996, and has been a Principal Scientist and the Department Head of the Cryptography & Security Department of the Institute for Infocomm Research since 2005. His research area includes algorithm, automata theory, complexity, cryptography, distributed computing, fault tolerance and information security. He has published more than 200 international journal/conference papers and has 16 patents.

Dr. Jiansuo Zhou is now working for CEC Huada Electronic Design Co., Ltd. P.R. China with the title of technical director, and has R&D experiences on smart card and RFID ICs. He is now a member of National Information Technology Standardization Technical Committee. He got his bachelor, master and Ph.D degree in control engineering from Harbin Institute of Technology in China respectively in 1996, 1998 and 2001, and he visited Bern University of Applied Sciences in Switzerland from 2001 to 2002. Dr. Zhou has published 17 papers and has 7 Chinese patents. Currently his interest involves in IC design, verification and validation, and also in cryptography application in smart card and RFID systems.

Yanan Hu is the Director of Network Security Threat Research Department of National Engineering Laboratory for Wireless Security, and the Vice Secretary-general of Broadband Wireless IP Standard Group of MIIT. His research is focusing on IoT Security and its international standardization, including WLAN, WMAN, RFID and NFC security. He is one of major authors of ISO/IEC 9798-3:1998/Amd1:2010 (the first international standard proposed by China in the field of fundamental and common technologies of information security) and UWB China national standard. He published more than 20 WLAN national industry standards and had 9 patents.

IW7: Cloud computing in the Internet of Things

Organizers

Dr. Li Shang, VP, Intel Research Institute

Prof. Wenguang Chen, Qsinghua University

Speakers

Prof. Xiaoyang Wang, Dean, School of Computer Science, Fudan Univeristy

Dr. Deng, Kan, Founder and CEO of SmartClouder

Dr. Chang, Lei, Research Mgr with EMC Research China and Greenplum

Dr. Yu Feng, INRIA, France

Dr. Chen, Jidong, Eng Mgr, Renren

Dr. Wang, Dong, Senior Software Engineer, Google

Room No.4 OCT.24 Wednesday 8:30-12:00

8:30-10:00

IW7-1:**Clear up the Data Cloud (hopefully) for IoT**

Prof. Xiaoyang Wang

IW7-2:**The Controversy of Cloud Computing**

Dr. Deng, Kan

IW7-3:**Delivering the predictive enterprise**

Dr. Chang, Lei

10:00-10:30 **Break**

10:30-12:00

IW7-4:**From Multi-Cores to Clouds, Challengers and Opportunities with ProActive Parallel Suite**

Dr. Yu Feng

IW7-5:**Big Data Analytics and Its Applications in Mobile Internet**

Dr. Chen, Jidong

IW7-6:**Delivering the predictive enterprise**

Dr. Wang, Dong

Title: **Clear up the Data Cloud (hopefully) for IoT**

Abstract: From one perspective, what's interesting about IoT is the ability to turn Thing into Data. What one can do with Data largely determines the success of IoT. The two aspects of computing technology, namely ease of use and efficiency, are still the key to supporting IoT applications. In this talk, I will venture into examining a number of characteristics of the data from the IoT, and discuss the concept of Data Cloud that is based on a number of data technologies, including those on the Cloud Computing platform, for the purpose of providing a supporting data layer for IoT.

Speaker: X. Sean Wang

X. Sean Wang is Professor and Dean at the School of Compute Science, Fudan University, Shanghai, China. He received his PhD degree in Computer Science from the University of Southern California, Los Angeles, California, U.S.A, in 1992. Before joining Fudan University, in 2003-2011, he was the Dorothean Chair Professor in Computer Science at the University of Vermont (UVM), Burlington, Vermont, U.S.A, and between 2009-2011, he served for two years as a Program Director at the National Science Foundation, U.S.A, in the Division of Information and Intelligent Systems. Between 1992-2003, he went through the ranks of Assistant Professor to Associate Professor with tenure at George Mason University, Virginia, U.S.A. He has published widely in the general area of databases and information security, and was a recipient of the US National Science Foundation Research Initiation and CAREER awards. His research interests include database systems, information security, data mining, and sensor data processing. In the research community, he served as the general chair of ICDE 2011 held in Washington DC, and in other roles at international conferences and journals, including PC co-chair of MDM 2013, WISE 2012, PC member of past SIGMOD, CIKM, ICDE and many other conferences, current associate editor of Geoinformatica and WWW journal, and past associate editor of TKDE and KAIS.

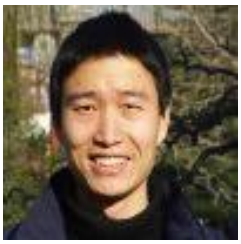
Title: **The Controversy of Cloud Computing**

Speaker: Dr. Deng, Kan

Abstract: Cloud computing has been a buzz word for several years. However, there are some controversies both in term of business and technology. In this talk we will enumerate and elaborate those disagreements, especially the significant ones, discussing their root causes and business impact, but focusing more on the comparison of the technical solution alternatives. Those significant disagreements include, 1. Is virtualization mandatory? 2. Should computation and storage be separated into different nodes? 3. Will the file system be obsolete when object storage becomes popular? 4. How far can No-SQL replace RDBMS? 5. Why not Google disclose its cloud scheduler, Borg?

Title: **Delivering the predictive enterprise**

Abstract: Various studies show that predictive enterprises can earn an incremental ROI of more than 200 percent by using Big Data capabilities to examine large and complex data sets. The predictive enterprise relies on three basic elements to achieve its goals: the platform, application development, and data science. This talk will mainly focus on the platform element. It will give an introduction about how latest Greenplum Big Data processing technologies and solutions including massive parallel processing database, in-database analytic techniques, and MapReduce related Hadoop software stack can help enterprises gain insights from their valuable datasets from different sources in different formats, and scale their infrastructure with increasing data storage and compute demands.



Speaker: Lei Chang

Advanced R&D Manager at EMC Greenplum

Dr. Lei Chang obtained his PhD degree in data warehousing and data mining from Peking University. In 2008, he joined EMC. His main research interests include parallel database, data analytics and cloud computing. In April 2011, he joined EMC Greenplum. Currently, he leads the Greenplum Advanced R&D China team and works on the research and development of Greenplum database and Greenplum Hadoop. He has published widely on data management and data mining in refereed journals and conferences, and holds several US patents.

Title: **From Multi-Cores to Clouds, Challengers and Opportunities with ProActive Parallel Suite**

Abstract: This presentation will give an overview of issues at hand when accelerating demanding applications with Multi-Cores, Clusters, Servers

and Clouds. With ProActive Parallel Suite, an Open Source library for parallel, distributed, and concurrent computing, allowing to showcase Interactive and graphical GUI and tools, it will detail how one can reduce administration costs and hardware expenditures by virtualizing the hardware resources: monitor and control all resources in a uniform manner, appropriately schedule the distribution of taskflows and applications execution over the available resources. Then, the presentation explains how to manage actual VMs in such an infrastructure, including operations such as Start, Stop, Clone, Destroy. Overall, it is shown how simple it is now to dynamically aggregate and manage many different kinds of enterprise resources (Desktop, Server, Cluster, VMs), and seamlessly upon demand, to extend them with Public Clouds (e.g. Amazon EC2).

Speaker: Ms. Yu Feng

Dr. Yu Feng is working as project-coordinator and engineer expert in INRIA. With background in Engineering and Mathematics, she holds a Ph.D in Dublin City University (DCU), Ireland in 1997. She has been very active in both industry and academic after Ph.D studies. Commercially, Dr. Feng has extensive experience in international product development with a number of multi-national corporations in Europe, i.e. Microsoft, Novell, Canon, Amadeus; her roles in this sphere extend from software development through to

project management. She has joined the Oasis team of Inria Sophia since Oct 2006, and has been working on several FP6/FP7, ANR-NSFC and Stic-Asia joint projects, related to Parallel Computing, Distributed system, Grid/Cloud Computing and Applications.

Title: **Big Data Analytics and Its Applications in Mobile Internet**

Abstract: These days, big data analytics has become a viable, cost effective way to store and analyze large volumes of data across many industries (e.g., Internet, Retail, Financial, Healthcare, Transportation, Energy). The explosive increase of smart phones and mobile apps has also brought large amounts of data and huge requirements of big data analytics in mobile Internet. In this talk, I will give an introduction of big data analytics, key technology and tools, and some use cases in mobile Internet, in particular, mobile advertisement and games.

Speaker: Dr. Jidong Chen, Chief Data Scientist at Renren Games

Dr. Jidong Chen is chief data scientist of the big data research center, RenRen Games. Currently he is responsible for research of the data infrastructure and data analytics of games and mobile advertisement business in Renren. Before joining Renren, he was a research manager of Big Data Lab at EMC Labs China. He received his Ph.D. in Computer Science from Renmin University of China. He focuses on big data management and analytics and his research interests include user behavior analytics, distributed data management, personal and mobile information management. He has published over 20 papers in refereed international journals and conference proceedings including Geoinformatica, JCST, SIGMOD, SIGIR, VLDB, SIGIR, CIKM, SDM, MDM etc. He co-authored the monograph "Moving Objects Management: Models, Techniques, and Applications" published by Springer and Tsinghua Press.

IOT Architecture Special Session

The IoT-A special session is scheduled on Oct.26, 14:00-15:15.
Moderation: Rob van Kranenburg (IoT-A SC)

While a fully functioning Internet of Things is still to come, China proves an interesting example of what to expect. Known to the Chinese as the Sensing Planet, huge investments in smart energy grids and all kinds of sensors have been deployed in large scale. In the U.S.A drive is at the level of cities. IBM/CISCO is relatively successful in deploying smart cities as "Intelligent Operation Centers," yett at US government level there little coordination in terms of societal innovation. The EU has a long tradition in funding research programs in this area. Its current projects and flagships such as IoT-A aims at providing a Reference Architecture for IoT architects worldwide, focusing on interoperability as the key issue that will bring us hopefully a true Internet, and not thousands of intranets of things. In this session we will look at how transnational and global arguments can be made to inform global interoperable architectures that will leave national and local focal points intact and fully regional yet collaborate on the level of energy efficiency in choosing wise and dynamic protocols and procedures.

Speakers:
13:45-13:55 **Coordinator of IoT-A** Sebastian Lange
13:55-14:10 **Technical Coordinator of IoT-A** Alex Bassi
14:10-14:25 **the IoT architecture for Agriculture and food safety in China** Lirong Zheng
14:25-15:00 Breakout groups on three key issues:

a) Naming and addressing
b) Energy efficiency of the infrastructure itself
c) Balance global - regional, governance issues: what model?

The format of the breakout session is based on “Notes on the Design of Participatory Systems - for the City or the Planet” from Usman Haque.

Step 1: Identify the dilemma in small groups of five participants
Step 2: Identify the stakeholders.
Step 3: List incentives for stakeholders to act or change.
Step 4: What is the evidence that the acts or changes have occurred?
Step 5: This is the most important step: Create a tool to help convince end users that the dilemma is real, the incentives are right, and the tools for change need to be adopted.

Speaker: **Dr Sebastian Lange, Coordinator of IoT-A**

Representative, VDI/VDE-IT

Dr. Sebastian Lange holds a degree in physics from the University of Heidelberg, Germany. After his Ph.D. at the European Molecular Biology Laboratory in Heidelberg, Germany he has been working as management consultant with Droege & Comp with a focus on business-process and knowledge management.

Dr. Lange has been working with VDI/VDE-IT since 2006 and is currently Senior Consultant in the department Innovation Europe. Dr. Lange had a leading role in establishing the European Technology Platform on Smart Systems Integration (EPoSS) where he was responsible for the management of the European Technology Platform’s Office as deputy secretary general and held conceptual and advisory functions. Furthermore, he has been involved in the management of several EU FP projects and has is strongly committed to establishing and evolving the topic of the Internet of Things (IoT) on a European level in recent years.

He is member of the Future Internet X-ETP working group which was strongly involved in gearing up efforts towards a Future Internet Public Private Partnership as representative of EPoSS. In a joint effort of establishing the FI Strategic Research Agenda Dr. Lange was pushing the topic of the Internet of Things and M2M communication.

With respect to IoT, Dr. Lange is currently coordinator of the large scale integrated project IoT-A (Internet of Things – Architecture) which federates 20 European large industrial and academic partners in their effort on establishing a common and ubiquitously applicable architecture for the future Internet of Things. On a strategic level, he is also strongly involved in the current process of setting up the Internet of Things Initiative (IoT-i). Recently he has been appointed as official member of the IoT Expert Group by the European Commission.

Speaker: **Alessandro Bassi, Technical Coordinator of IoT-A**

Despite being tempted by other disciplines, Alex decided to explore the esoteric world of computer science, mainly because of his tension between creativity and mathematical rigour. He enjoyed his stay in Milan, where he attended its world famous University, and became passionate of artificial intelligence, soft computing and software engineering. After serving his duty in the army, as many of us, he lent his abilities to the private sector, and joined Amadeus in 1997, to become -against his will- an expert of Unisys OS 2200 assembler. He then managed to unchain his spirit again and joined the University of Tennessee in summer 2000, where he was involved in the seminal work and development of the Internet Backplane Protocol. After surviving "Nax-vul" for 18 months, he managed to get back to Europe, and in particular to Lyon, where he had a position as Research Visitor at the Ecole Normale Superieure. For two years, he developed the relationship between the novel storage concepts and active networking. He then worked for RIPE NCC, working on project regarding the whois database such as the AfriNIC creation, and after one year of rainy A'dam in November 2004 he moved to the sunny south of France, to integrate the Hitachi Sophia Antipolis Labs. There he got involved in various projects, regarding Grid and Cloud (with particular regards to data aspects), Autonomic Communications and RFID. In 2007 he became chair of the then RFID (now Internet of Things) Working Group of the EU Technological Platform EPoSS, and from 2010 he started his own company, Alessandro Bassi Consulting, acting as a Technical Coordinator for the Internet of Things Architecture (IoT-A) FP7 IP project for Hitachi, Ltd.

Speaker: **Lirong Zheng, See bio at “Biography of Organizing Committee”.**

Moderation: Rob van Kranenburg

Rob van Kranenburg is a teacher and a writer. He wrote The Internet of Things. A critique of ambient technology and the all-seeing network of RFID, Network Notebooks 02, Institute of Network Cultures. He is co-founder of bricolabs and the Founder of Council. Together with Christian Nold he recently published Situated Technologies Pamphlets 8: The Internet of People for a Post-Oil World . He ranks nr 6 on the top 100 IOT thinkers list of Postscapes He is a member of the IOT EG of the European Commission, co-founding Member of Internet of People (IoP) and Chair of the Working Group Society of the IOT Forum. As Stakeholder coordinator for IoT-A, the largest EU IP on Internet of Things Architecture, he hosts an Open Community. If you want to know more about that, contact him at kranenbu@xs4all.nl

IoT 2012 Program Brief

Wednesday,Oct.24

	Room No.2	Room No.3	Room No.4	Room No.6	Room No.7	Room No.8	Room No.9
8:30-10:00	**SW1:IIKI2012** Organizer: Rongfang Bie, Xiuzhen Cheng, Yunchuan Sun, Rob van Kranenburg	**IW2:IoT technologies and applications for Chemical and Oil/gas Industry** Organizer: L. Julia Zhu	**IW7:Cloud computing in the Internet of Things** Organizers: Li Shang, Wenguang Chen	**IW5:Internet of Things for Food Quality and Safety** Organizers: Junghoon Moon Minghao Huang Yong He, Gang Liu	**IW3:IPv6 and the Future IoT: International IoT Initiatives** Organizers: Sébastien Ziegler Peter Kirstein Antonio Skarmeta Latif Ladid	**SW3:M2M-CTS'12** Organizer: Andreas Mueller	**IW1:IoT applications – value creation for industry** Organizers: N. L. Fantana Till Riedel
10:00-10:30	Coffee Break						
10:30-12:00	**SW1:IIKI2012**	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.
12:00-13:30	Lunch Break						
13:30-15:00	**SW1:IIKI2012**		**IW6:Security of Internet of Things: Challenges and Countermeasures** Organizers: Daniel Engels, Weili Han	Internal meeting	Cont.	Cont.	Cont.
15:00-15:30	Coffee Break						
15:30-17:00	**SW2:EPS2012** Organizers: Weishan Zhang, Klaus Marius Hansen, Paolo Bellavista	**IW4:IoT for E-Health, Wellness and Ambient Assisted Living** Organizers: Christoph Thuemmler, Thomas Jell	Cont.	Internal meeting	Cont.	Cont.	Cont.

Note: Room No.5 is the Speaker Ready Room; Shang Shu Fang is the Organizing committee office.

17:00-18:00	**IoT Challenge Competition Demo Exhibition**	**Junlai Hall A& B Foyer**
18:00-20:30	**Reception Dinner**	**Junlai Hall A& B**
18:00-18:15	**Speech of the Mayor of Wuxi**	
19:15-19:45	**IoT Challenge Competition**	
20:00-21:00	**Live Demo**	

Thursday, Oct.25

9:00- 9:25	**Conference Opening**	**Junlai Hall A&B**
9:00- 9:05	Vedio From Bosch	
9:05-9:10	Welcome (Elgar Fleisch)	
9:10-9:15	Opening (General Chair)	
9:15-9:25	Conference outline (PC Chair)	
9:25-10:10	**Keynote K-1 (Stefan Ferber)**	
10:10-10:25	**Break**	
10:25-11:10	**Keynote K-2 (Haitao Liu)**	
11:10-11:35	**One Minute Madness (15 Posters + 9 Demos)**	
11:35-13:00	**Lunch**	
13:00-14:15	**Technical Sessions**	

Junlai Hall A	Junlai Hall B
T1A: **Business and application**	T1B: **Smart sensors**
T1A-1:**Self-powered Water Meter for Direct Feedback** Vojkan Tasic, Thorsten Staake, Thomas Stiefmeier, Verena Tiefenbeck, Elgar Fleisch, Gerhard Tröster	T1B-1:**Eliciting Truthful Measurements from a Community of Sensors** Boi Faltings
T1A-2:**Delivering Internet-of-Things Services in MobilityFirst Future Internet Architecture** Jun Li, Yan Shvartzshnaider, John-Austen Francisco, Richard Martin, Kiran Nagaraja, Dipankar Raychaudhuri	T1B-2:**RSS-based Self-Adaptive Localization in Dynamic Environments** B Dil, Paul J.M. Havinga
T1A-3:**Direct or indirect sensor enabled eco-driving feedback: Which preference do corporate car drivers have?** Johannes Tulusan, Thorsten Staake, Elgar Fleisch	T1B-3:**AConfigurableRFID Sensor Tag Conforming to IEEE 1451.7 Standard** Han Haichao, Lingzhi Fu, Min Li, Junyu Wang
Session Chair: Tatsuya Inaba	**Session Chair:** Dayoung Kim

14:15-14:30	**Break**	
14:30-16:10	**Technical Sessions**	

Junlai Hall A	Junlai Hall B
T2A: **Middleware and Data Processing**	T2B: **RFID Technology**
T2A-1: **Optimizing the Storage of Massive Electronic Pedigrees in HDFS** Yin Zhang, Weili Han, Wei Wang, Chang Lei	T2B-1: **Decreasing False-Positive RFID Tag Reads by Improved Portal Antenna Setups** Thorben Keller, Frederic Thiesse, Elgar Fleisch ,

T2A-2:**XML-Less EXI with Code Generation for Integration of Embedded Devices in Web Based Systems** Yusuke Doi, Yumiko Sato, Masahiro Ishiyama, Yoshihiro Ohba, Keiichi Teramoto T2A-3:**Towards Unified Heterogeneous Event Processing for the Internet of Things** Wang Wei T2A-4:**Complex Sensing Event Process of IoT Application Based on EPCglobal Architecture and IEEE 1451** Chao-Wen Tseng, Chua-Huang Huang **Session Chair:** Till Riedel	Alexander Ilic T2B-2:**Calculation of Functions on the RF-channel for IoT** Stephan Sigg, Predrag Jakimovski, Michael Beigl T2B-3:**Collision Recovery Receiver for EPC Gen2 RFID Systems** Lingzhi Fu, Lirui Liu, Min Li,Junyu Wang **Session Chair:** Hsin-Chin Liu

16:10-18:00 **Exhibitions**
18:00-20:30 **Gala Banquet**

Friday,Oct.26

9:00-9:45 **Keynote K-3 (Jan Färjh)** **Junlai Hall A& B**
9:45-10:30 **Keynote K-4 (Yuanting Zhang)**
10:30-11:30 **Posters &Demo posters/ Coffee Break**
11:30-12:45 **Technical Sessions**

Junlai Hall A	Junlai Hall B
F1A: W**eb of Things** F1A-1:**Searching in a Web-based Infrastructure for Smart Things** Simon Mayer, Dominique Guinard, Vlad Trifa F1A-2:**Fuzzy-based Sensor Search in the Web of Things** Cuong Truong, Kay Römer, Kai Chen F1A-3:**Actinium: A RESTful Runtime Container for Dynamic, Scriptable Internet of Things Applications** Matthias Kovatsch, Martin Lanter, Simon Duquennoy **Session Chair:** Florian Michahelles	F1B:**IoT Modeling** F1B-1:**RDF Provisioning for the Internet of Things** Alexander Kröller, Henning Hasemann, Max Pagel F1B-2:**Dynamix:An Open Plug-and-Play Context Framework for Android** Darren Carlson, Andreas Schrader F1B-3:**IoT Mashups with the WoTKit** Michael A Blackstock, Rodger J Lea **Session Chair:** Paul J.M. Havinga

12:45-14:00 **Lunch**
14:00-15:15 **Technical sessions**

Junlai Hall A	Junlai Hall B
F2A: **IoT Architecture (Special Session)** **Speaker1:** Sebastian Lange, Coordinator of IoT-A	F2B:**Communication Technology** F2B-1:**The Stateless Point to Point Routing**

Speaker2: Alex Bassi, Technical Coordinator of IoT-A **Speaker3:** Lirong Zheng, the IoT architecture for Agriculture and food safety in China 15 min presentation each, followed by a breakout group session. **Session Chair:** Bob van Kranenburg	**Protocol based on Shortcut Tree Routing Algorithm for IP-WSN** Kiwoong Kwon, Minkeun Ha, Taehong Kim, Seong Hoon Kim, Daeyoung Kim F2B-2:**Unified Routing for Data Dissemination in Smart City Networks** Viet-Duc Le, Hans Scholten, Paul J.M. Havinga F2B-3:**Evaluation of DECT-ULE for Robust Communication in Dense Wireless Sensor Networks** Kallol Das, Paul J.M. Havinga **Session Chair:** Jin Mitsugi

15:15-15:30 **Break**

15:30-16:00 **Plenary Closure (Best paper/demo/poster award), Junlai Hall A.**

Saturday,Oct.27

9:00-9:30 **Bus pickup**

9:30-10:30 **Visit "Sensing China" Exhibition Park**

10:30-10:45 **Bus pickup**

10:45-12:00 **Visit "Wuxi International IoT EXPO"**

12:00-13:00 **Lunch**

13:00- **Shuttle bus to airport**

"IoT Challenge" Competition

The “IoT Challenge” offers a platform to graduate students, PhD students, researchers and developers working in all areas of Internet of Things to share and showcase their recent highly innovative research and practical solutions to real-world problems. The solutions should be highly novel, exiting, and show a complete and working system, addressing a relevant application area for IoT, including, but not limited to: supply chain and logistics, healthcare, M2M, security, environmental monitoring, intelligent transport systems, smart homes, industrial manufacturing, and critical infrastructures.

The competition will take place in the middle of the reception dinner on **October 24**.

A desk with red tablecloth, 220 V power, wireless WLAN and a poster board will be provided. Each author have 10 minutes, 5 minute for presentation and 5 minutes for live demo. After the competition, the 3 Challenge demos will exhibited with the other live demos in the reception dining room.

The winners will be selected by the audience of the reception dinner. Cash prize will be provided.

Co-Chairs

Paul J.M. Havinga, University of Twente, Netherlands.

Nirvana Meratnia, University of Twente, Netherlands.

Time and Place

IoT Challenge Competition Demo: 17:00-18:00, Wednesday Oct.24, 2012 Junlai Hall A&B

IoT Challenge Competition: 19:15-19:45, Wednesday Oct.24, 2012 Junlai Hall A&B

Live Demo: 20:00-21:00, Wednesday Oct. 24, 2012 Junlai Hall A&B

Best Challenge Award: TBA

C-1:**AmbientWeb: Bridging the Web’s Cyber-physical Gap**	
Author	Darren Carlson, Bashar Altakrouri, Andreas Schrader
Affiliation	Ambient Computing Group / Institute of Telematics, University of Luebeck, Luebeck, Germany
C-2:**True Self-Configuration for the IoT**	
Authors	Ioannis Chatzigiannakis, Henning Hasemanny, Marcel Karnstedtz, Oliver Kleinex, Alexander Kr ollery, Myriam Leggieriz, Dennis Pfistererx, Kay R¨ omer, and Cuong Truong
Affiliations	Computer Technology Institute & Press ”Diophantus”, Greece Algorithms Group, TU Braunschweig, Germany Digital Enterprise Research Institute, Galway, Ireland Institute of Telematics, Universit¨ at zu L¨ ubeck, Germany Institute of Computer Engineering, Universit¨ at zu L¨ ubeck, Germany
C-3:**Context-aware Computing Mediated Dynamic Service Composition and Reconfiguration for Ubiquitous Environment**	
Authors	Tao Gong, Zheng Hu, HaiFeng Liu, Feng Lin, Dian Zhou, Hui Tian
Affiliations	Key Laboratory of Universal Wireless Communications, Ministry of Education Wireless Technology Innovation Institute (WTI), Beijing University of Posts and Telecommunications, Beijing, R.R.China

Live Demo Session

The demo session in IoT 2012 is intended to introduce new or on-going work on systems and applications related to the Internet of Things. It provides a forum for researchers and developers from academia, industry, and government to interact with and explore their latest research results.

A desk with yellow tablecloth, 220 V power, wireless WLAN and a poster board will be provided. All the live demos will exhibit along the 3 walls the reception dining room at the end of the reception dinner on **October 24**. The demo authors have one minute presentation in the **one minute madness** session on **October 25** in the morning with other poster authors, and the demo posters will be exhibit in the poster session on **October 26**.

Co-Chairs

Dr. Zhuo Zou (KTH-Royal Institute of Technology, Sweden)

Dr. Jayna Sheats, (Terepac Corporation, Canada)

Time and Place

Live Demo: 20:00-21:00, Oct. 24, 2012 Junlai Hall A&B

One minutes madness: 11:10-11:35, Oct. 25, 2012, Junlai Hall A&B

Demo Posters: 10:30-11:30, Oct. 26, 2012 Junlai Hall A&B

Best Demo Award: 15:30-16:00, Oct. 26, 2012 Junlai Hall A

D-1: **Actinium (Ac) and the Thin Server Architecture** **Author** Matthias Kovatsch **Affiliation** ETH Zurich, Switzerland
D-2: **A Product Information Service System for End users Based on RFID and Mobile Internet** **Authors** Xi Tan, Junyu Wang, Kaijiang Wang, and Xiaoxiang Sun **Affiliations** Fudan University, Shanghai, China Jiema Computer Information Technology Co., LWD., China Qilian electronics Co., LWD., China
D-3: **Smart Energy Management in Home Area Networks** **Authors** Tan Yi, Wang Yiming, Wang Siying, Rong Hongqian, Chang Yuan, Zhong Jianlun, Daixun,Chen Yue, Chai Michael, and Zhang Tiankui **Affiliations** Beijing University of Posts and Telecommunications, China Queen Mary University of London, United Kingdom
D-4: **WoTKit: a Toolkit for Rapid Development of IoT Applications** **Authors** Rodger Lea and Mike Blackstock **Affiliations** Sense Tecnic Systems Inc., Canada University of British Columbia, Canada
D-5: **Web-enabled Smart Tags for Physical Things** **Authors** Nam Giang, Minkeun Ha, and Daeyoung Kim **Affiliations** Korea Advanced Institute of Science and Technology (KAIST), Korea
D-6: **Enabling A Global Infrastructure For Physical Information Sharing Over The Internet** **Authors** Seong Hoon Kim, Janggwan Im, Jaewook Byun, Kwangkoog Lee, Daeyoung Kim,

	Cedric Crettaz, and Sébastien Ziegler
Affiliations	Korea Advanced Institute of Science and Technology (KAIST), Korea Mandat International, International Cooperation Foundation, Switzerland

D-7: **An Intelligent Medicine Box System in Pervasive Healthcare Applications**

Authors	Shiyang Shen, Danwei Luo, Tianyi Chen, Lucas Ahlstrom, Xiaolin Zhou, and Lirong Zheng
Affiliations	Fudan University, China Ambigua Medito AB, Sweden iPack VINN Excellence Center, KTH-Royal Institute of Technology, Sweden

D-8: **Multi-Services Home Network With Globally Unique Identifier Of Home Appliance**

Authors	Shigeru Yonemura, Yuki Sato, and Jin Mitsugu
Affiliation	Keio University

Demo-9

D-9: **Demonstration of an IPv6 multi-protocol gateway for seamless integration of Building Automation Systems into Constrained RESTful Environments**

Authors	Markus Jung, Jürgen Weidinger, Dominik Bunyai, Christian Reinisch, Wolfgang Kastner, and Alex Olivieri
Affiliations	Vienna University of Technology, Austria Haute Ecole Spécialisée de Suisse occidentale, Switzerland

Poster Session

The Poster session in the Internet of Things Conference 2012 is intended to introduce new or on-going work on systems and applications related to the Internet of Things. The Poster session will take place on **October 26 2012** in the morning and the poster authors have one minute presentation in the **one minute madness** session on **October 25** in the morning.

Co-Chairs

Univ.-Prof. Dr. rer.nat. Sabina Jeschke (IMA/ZLW & IfU, RWTH Aachen, Germany)
Dipl.-Ing. Max Hoffmann M.B.A. (IMA/ZLW & IfU, RWTH Aachen, Germany)

Time and Place

One minutes madness: 11:10-11:35, Oct. 25, 2012, Junlai Hall A&B
Posters: 10:30-11:30, Oct. 26, 2012 Junlai Hall A&B
Best Poster Award: 15:30-16:00, Oct. 26, 2012 Junlai Hall A

P-1: **Cloud-based Internet of Things Platform** **Authors** Jiehan Zhou, Chung-Horng Lung, Chen Yu, Hai Jin **Affiliations** University of Oulu, Finland Carleton University, Ottawa, Canada Huazhong University of Science and Technology,Wuhan, China
P-2: **Passive IoT Interoperability Testing with Successful Experimentation in CoAP Plugtest** **Authors** Nanxing Chen, César Viho, Anthony Baire, Xiaohong Huang, Jiexi Zha **Affiliations** IRISA/University of Rennes 1 Campus universitaire de Beaulieu Beijing University of Posts and Telecommunications
P-3: **Internet of Things Governance: Initial Findings from a European Case Study** **Authors** Mailyn Fidler **Affiliations** Stanford University – Science, Technology, and Society
P-4: **Identification of missing objects with physical FEC** **Authors** Yuki Sato, Yuki Igarashi, Jin Mitsugi, Osamu Nakamura, and Jun Murai **Affiliations** Auto-ID Laboratory Japan at Keio University
P-5: **Measurement of UHF RFID Tag with Antenna Diversity** **Authors** Hsin-Chin Liu, Jie-Wei Tan, and Min-Hsiang Li **Affiliations** Department of Electrical Engineering, National Taiwan University of Science and Technology Taipei, Taiwan
P-6: **Quality-of-Service Management on IoT-IMS Communication Platform for Future Internet Applications** **Authors** Han-Chuan Hsieh, Yanuarius Teofilus Larosa, Yi-Wei Ma, Jiann-Liang Chen **Affiliations** Department of Electrical Engineering, National Taiwan University of Science and Technology, Taipei, Taiwan Department of Engineering Science, National Cheng Kung University, Tainan, Taiwan

P-7: **A 3D RFID Static Test System Developed in a Spherical Near-Field Antenna Measurement**

Authors Yuan-Hung Lee, Ike Lin, Meng-Ying Tsai, Chang-Fa Yang

Affiliations Department of Electrical Engineering, National Taiwan University of Science and Technology (Taiwan Tech)
WavePro Inc., Taiwan

P-8: **Node Oriented Internet of Things Framework for Agriculture: Architecture and Operation**

Authors Lingzhi Fu, Junyu Wang, Lirong Zheng, Yi Liu, Kaijiang Wang

Affiliation State Key Lab of ASIC and System, Fudan University, Shanghai, China
JM Information Technology Inc., Shanghai, China

P-9: **An IDMA-based Multi-Reader Joint Detection Scheme for Dense RFID Networks**

Authors Weijie Shen, Xiaolin Zhou, Xixu Wang

Affiliations Department of Communication Science and Engineering, Fudan University, Shanghai 200433, China

P-10: **Smart object-based agile production management in Internet of Things**

Authors Linjiang Zheng, Gang Ma

Affiliations Key Laboratory of Dependable Service Computing in Cyber Physical Society (Chongqing University), Ministry of Education, Chongqing University, Chongqing 400044, China
College of Computer Science, Chongqing University, Chongqing 400044, China

P-11: **A Novel Method for Robot Positioning Based on Passive RFID System**

Authors Yang Qing, Li Jian-cheng, Wang Hong-yi, Shen Rong-jun

Affiliations National University of Defense Technology, P.R. China

P-12: **A New Forward-Link Coding Scheme for Passive RFID System**

Authors Li Cong, Li Jian-cheng, Wang Hong-yi and Yang Qing

Affiliations College of Electronics Science and Engineering, National University of Defense, Technology, Changsha, China

P-13: **Assure Food Safety by Using Enhanced Electronic Pedigrees**

Authors Yun Gu, Weili Han

Affiliations Software School, Fudan Unviersity, Shanghai, P. R. China

P-14: **A Design Of Semantic-Based Recommender System For Medical Tourism**

Authors Anindhita Dewabharata, Shuo-Yan Chou

Affiliations Department of Industrial Management, School of Management, National Taiwan University of Science and Technology

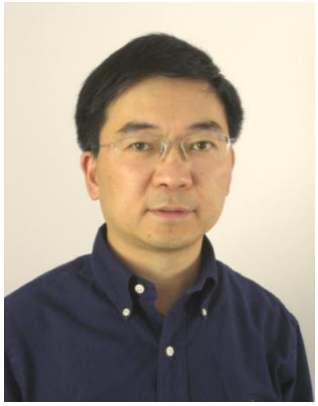
P-15: **Searching in a Web-based Infrastructure for Smart Things**

Authors Simon Meyer, Dominique Guinard, Vlad Trifa

Affiliations Institute for Pervasive Computing, ETH Zurich, Switzerland

Biography of Organizing Committee

General Co-Chair: Lirong Zheng received his Ph. D. degree in electronic system design from KTH - Royal Institute of Technology, Stockholm, Sweden in 2001. Since then, he was with KTH as a research fellow and project leader in Laboratory of Electronics and Computer Systems. He became an associate professor in electronics system design in 2003 and a full professor in media electronics at KTH in 2006. He was the founder and director of iPack VINN Excellence Center, and Senior Specialist of Ericsson Networks in Stockholm, Sweden. He was a guest professor of the state key laboratory of ASICs and Systems at Fudan University in China since 2008, and a distinguished professor of Fudan University since 2010. Currently he services as dean of ICT School of Fudan University and dean of Wuxi Institute of Fudan University, heading research and innovation in information and communication technology. He is a member of Sino-EU IoT expert group, a member of Wuxi IoT strategy/expert group, and chief expert of Chinese 863 Project “Agricultural IoT for Food Safety and Quality Management”.



General Co-Chair: Prof. Hao Min received his PhD degree from Fudan University in 1991. During 1995-1998, he was a visiting associate professor in Stanford University focusing on CMOS image sensors technologies. Meanwhile he was the consultant at a number of IC design companies in Silicon Valley. From 1998 to 2005, he served as director of the State Key Laboratory of ASIC & System, Fudan University. He is currently director of the AUTO-ID Lab of Fudan University. He was General Manager of Shanghai Huahong Integrated Circuits Co., Ltd. during 1998-2006 where his team developed the first contact-less smart card chip which was successfully applied to the Shanghai Public Transportation System and designed the chip for the second generation ID cards of China. Now he serves as Chairman of Shanghai Quanray Electronics and independent board member of Shanghai Leadcore Technology. He has contributed over 80 papers and over 10 patents authorized or pending.

TPC Co-Chair: Junyu Wang is Associate Professor of the School of Information Science of Fudan University and the Associate Director of Auto-ID Lab at Fudan. He received his Ph.D. Degree from University of Science and Technology, Beijing (USTB) in the major of Computer Science in 2002. From 2003 to 2005, he was a postdoc in Fudan University and was the Chair of Shanghai Postdoc Association. During 2008-2009, he was a visiting Associate Professor in Auto-ID Lab at MIT doing research on security issues and solutions of EPC tags for emerging applications. His research interests include RFID security, anti-collision protocols of RFID, sensor tag interface, and bio-circuit and system. Junyu Wang has published 30+ papers in the area of RFID and Internet of things and hold 10 authorized patents.

TPC Co-Chair & "IoT Challenge" Co-Chair: Prof.dr. Paul J.M. Havinga is full professor and chair of the Pervasive Systems research group at the Computer Science department at the University of Twente in the Netherlands. He received his PhD at the University of Twente on the thesis entitled "Mobile Multimedia Systems" in 2000, and was awarded with the 'DOW Dissertation Energy Award' for this work. His current research themes have focused on wireless sensor networks, large-scale distributed systems, and energy-efficient wireless communication. The common theme in these areas is on the development of large-scale, heterogeneous, wireless, distributed systems. Research questions cover architectures, protocols, programming paradigms, algorithms, and applications. This research has resulted in many scientific publications in journals and conferences. He is programme leader of the Graduate Research programme 'Wireless and Sensor Systems' at the University of Twente, and scientific leader of the ICT Innovation Platform Sensor Networks.

He is editor of several journals and magazines. He is involved as program committee chair, member, and reviewer for many conferences and workshops. He regularly serves as independent expert for reviewing and evaluation of international research projects for the EU, the US, and international government. He has been a visiting researcher at the University of Pisa in 1998, and the Communications Research Laboratory in Yokosuka Japan in 2000.In 2005 he was a visiting professor at the University of Melbourne and the Australian Institute of Marine Science, and in 2011 at A*STAR in Singapore.

He has a significant experience as project manager in several international research projects on wireless sensor networks. In 2001 he initiated the first European project on wireless sensor networks EYES, and many national and international projects evolved from this. In 2004 he founded the company Ambient Systems B.V., partly based on the results of that project. In May 2007 he received the ICT Innovation Award for the successful transfer of knowledge from university to industrial use. In June 2007 he received the "van den Kroonenberg award" for being a successful innovative entrepreneur.In 2008 he co-founded the company Inertia Technology that develops motion and activity recognition solutions for body area networks and industrial applications, based on completely wireless inertial sensing systems.

TPC Co-Chair: Florian Michahelles

At ETH Zurich Florian Michahelles heads the Auto-ID Lab ETH Zurich/University of St. Gallen and directs research at the forefront of mobile commerce innovations and global standards for supply-chain optimization.

Additionally, he coordinates the research agenda of the global Auto-ID Labs research network.

His own research approach comprises the creation of prototypes in order to evaluate and test new applications. Throughout the recent years Florian has started going beyond controlled lab experiments but to deploy applications also in the wild among real users in order to study adoption and usage behaviors under real-world conditions of everyday users (see "research-in-the-large" workshop series). Based on data generated by these deployments Florian seeks to analyze novel business concepts and to apply those in practice.

Michahelles received a PhD from ETH Zurich and holds a M.Sc in computer science and psychology from the Ludwig-Maximilians-Universität München. He was a MIT Sloan Visiting Fellow in 2000. As part of his duties as being a Program Chair of IoT2010 in Tokyo, he was a visiting researcher at Keio University in summer 2010. Michahelles has published 80+ papers in international journals, conferences and scientific workshops and lectures on Internet of Things as keynote speaker at scientific and industry conferences several times per year. Apart of his involvement in the organization of various international conferences and workshops, he currently is the program chair of the Internet of Things Conference (IoT2012) in Wuxi-Shanghai.

In 2011 Florian co-founded 42matters AG running Appaware.com with two of his Ph.D. students.

Michahelles received a PhD from ETH Zurich and holds a M.Sc in computer science and psychology from the Ludwig-Maximilians-University of Munich. He was an MIT Sloan Visiting Fellow in 2000. Michahelles has published 70+ papers in international journals and conferences and is the program chair of the Internet of Things Conference (IoT2012) in Wuxi. Since 2011 he has been a co-founder of 42matters AG running Appaware.com.

Publication Chair: Weili Han is an associate profess at Software School, Fudan University. He received his BS of Geochemistry, his BE of Computer Software at USTC in 1998, and his PhD of Computer Science and Technology at Zhejiang University in 2003. Then, he joined the faculty of Software School at Fudan University. From 2008 to 2009, he visited Purdue University as a visiting scholar funded by China Scholarship Council and Purdue. His research interests are mainly in the fields of Policy Based Management, Security of IoT, Digital Identity Management and Distributed Systems. He is now members of the ACM, SIGSAC, IEEE, and CCF. As an active researcher, he published more than ten papers and six patents about information security in recent.

Workshop Co-Chair: Dr. Tatsuya Inaba is Associate Professor at Kanagawa Institute of Technology and Associate Director at Auto-ID Lab Japan. His research interests are business aspects of the automated data capturing technologies such as RFID. Assessing the impact of the technologies especially on supply chain management is his current research topic. He received bachelor of Engineering from University of Tokyo, master of Engineering from Massachusetts Institute of Technology, and Ph.D in Media and Governance from Keio University.

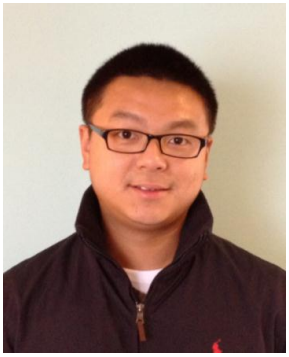
Workshop Co-Chair: Dr. Bo Tao received his B.S. degree from Tsinghua University in 1992 and his Ph.D. degree from Princeton University in 1998. Before coming back to China, he spent a dozen years in Silicon Valley. During that time, he was an engineering manager with Google, working on Google Video, Youtube and Picasa. Later he managed the research program at Google China. He was the CTO of EMC China. While at EMC, he founded EMC Labs China and served as its first managing director. He is currently the CEO of Rockontrol Beijing, looking at how to apply cloud computing technologies to IoT applications.

"**IoT Challenge" Co-Chair: Nirvana Meratnia** is assistant professor at the Pervasive Systems group at the University of Twente. She obtained her BSc and MSc in Software Engineering and Geoinformatics, respectively. After receiving her PhD in 2005 on moving object data management, she joined the Computer Architecture for Embedded Systems (CAES) group and later on the Pervasive Systems (PS) group, as a researcher.

Her research interests are in the area of distributed data processing and reasoning in wireless sensor networks, smart and collaborative objects, ambient intelligence, context-awareness, spatial and spatio-temporal data mining, moving object databases. Currently, she is involved in three national projects, namely IOP-Gencom Go-Green (on

Greener house through a self-learning, privacy-aware user-centric energy-aware wireless monitoring and control system), and STW SeaSTAR (on underwater monitoring platform), as well as two EU funded projects, namely CLAM (on collaborative embedded networks for submarine surveillance) and GENESI (on green sensor networks for structural monitoring).

Previously she has been actively involved in four EU IST funded projects, namely CoBIs (on collaborative smart business objects), Embedded WiSeNts, e-SENSE (on on distributed data processing and reasoning in wireless sensor networks), and SENSEI (on Future Internet). On the national scale, she has been working on PointOne project FREE (on developing energy management mechanisms for wireless sensor networks) and BSIK project Smart Surroundings (on ambient intelligence).



Demo Co-Chair: Zhuo Zou received the Ph.D. degree in electronic and computer systems from the Royal Institute of Technology (KTH), Stockholm, Sweden. He is currently a research scientist at iPack Vinnova Excellence center, KTH, Sweden, where he is working on wireless sensing and positioning systems. His current research interests include UWB communications, energy-efficient circuits and systems, and ultra-low power processors for applications of RFID and the Internet-of-Things. Dr. Zou also holds MBA from Turku School of Economics, Finland, and is involved in several high-tech start-ups focusing on innovation and growth.

Demo Co-Chair: Dr. Jayna Sheats is co-founder and Chief Technology Officer of Terepac. She received her Ph.D. in physical chemistry at Stanford University, and after post-doctoral work at the Massachusetts Institute of Technology and Stanford, joined Hewlett-Packard Laboratories in 1982 where she worked on chemistry for microelectronics. In 1998 she initiated and supported a program at HP to introduce Internet technology in the developing world. In 2002 she left to engage in more entrepreneurial ventures (including co-founding Terepac in 2004), and eventually joined Nanosolar in 2004 as Vice President of Manufacturing Technology and subsequently Associate CTO. In 2008 she joined Terepac as CTO. She is a fellow of the AAAS, and has published 55 journal articles and filed more than 45 patents, with more than 20 presently issued.

Poster Co-Chair: Max Hoffmann is a research assistant and doctoral candidate at the Institute of Information Management in Mechanical Engineering of the RWTH Aachen University since July 2012. According to his research emphasis he focuses on production technology and optimization of production processes.

He studied mechanical engineering at the RWTH Aachen and completed his studies with a Diplom degree in October 2010. The main focus of his studies consisted of modeling of complex processes, his diploma thesis emphasized on the data treatment of complex data of processes in petroleum engineering. Following to his master degree in mechanical engineering Mr. Hoffmann completed additional studies in economic sciences with a Master in Business Administration degree in April 2012. In addition to his studies in economic science he worked as an IT consulting, among other activities as a freelancer for the petroleum company Total E&P in France.

At the Institute of Information Management in Mechanical Engineering he is member of the cluster of excellence “Integrative Production Technology for High-Wage Countries” of the RWTH Aachen. According to this assignment Mr. Hoffmann focuses on the optimization of factory planning processes and real time monitoring of production process data.

Poster Co-Chair: Sabina Jeschke

Head of the Institute Cluster IMA/ZLW & IfU
Faculty of Mechanical Engineering
RWTH Aachen University
Vice Dean, Faculty of Mechanical Engineering, RWTH Aachen University
Chairwoman, Board of Management, VDI Aachen

Sabina Jeschke became Head of the IMA/ZLW & IfU Institute Cluster of the RWTH Aachen University in June 2009.

She studied Physics, Computer Science and Mathematics at the Berlin University of Technology. After research stays at the NASA Ames Research Center/ California and the Georgia Institute of Technology/Atlanta, she gained a doctorate on “Mathematics in Virtual Knowledge Environments” in 2004. Following a junior professorship (2005-2007) at the TU Berlin with the construction and direction of its media center, she was Head of the Institute of Information Technology Services (IITS) for electrical engineering at the University of Stuttgart from May 2007 to May 2009, where she was also the Director of the Central Information Technology Services (RUS) at the same time.

Some of the main areas of her research are complex IT-systems (e.g. cloud computing, Internet of Things, green IT & ET, semantic web services), robotics and automation (e.g. heterogeneous and cooperative robotics, cooperative agents, web services for robotics), traffic and mobility (autonomous and semi-autonomous traffic systems, international logistics, car2car & car2X models) and virtual worlds for research alliances (e.g. virtual and remote laboratories, intelligent assistants, semantic coding of specialized information).

Sabina Jeschke is Vice Dean of the Faculty of Mechanical Engineering of the RWTH Aachen University, chairwoman of the board of management of the VDI Aachen, a member and
consultant of numerous committees and commissions, alumni of the German National Academic Foundation (Studienstiftung des Deutschen Volkes) and IEEE Senior Member.

Abstracts

Technical Paper Abstracts

T1A: **Business and Application**

T1A-1:**Self-powered Water Meter for Direct Feedback**

Vojkan Tasic, Thorsten Staake, Thomas Stiefmeier, Verena Tiefenbeck, Elgar Fleisch, Gerhard Tröster

Hot water usage accounts for 16% of household demand for energy, much more than lighting and cooking (5% each) and is comparable to electricity usage for appliances (21%). As a means of helping consumers to save hot water, we present a novel self-powered water consumption sensor that enables direct consumption feedback. We equipped 91 Swiss households with the sensors and recorded 3,164 individual showers during the period of three months. The presence of feedback during a shower resulted in the reduction of average shower water consumption from 79 l to 61 l (-22.2%) per day and household. In addition to savings attributable to already installed flow restrictors, an average household could conserve 6,400 l of drinking water and 210 kWh of heat energy (projected to one year). Furthermore, we show that the effects of direct feedback on water consumption did not decline over the course of the study.

T1A-2: **Delivering Internet-of-Things Services in MobilityFirst Future Internet Architecture**

Jun Li, Yan Shvartzshnaider, John-Austen Francisco, Richard Martin, Kiran Nagaraja, Dipankar Raychaudhuri

In the emerging paradigm of pervasive computing, applications change their behaviors in response to their environmental context, which is provided by the smart objects in the Internet of Things (IoT). IoT envisions building a convergent platform to share dynamic data from smart objects and middleware services that process the data. In this paper, we show that the MobilityFirst Future Internet Architecture is an ideal platform for realizing pervasive computing in an IoT framework. In particular, MobilityFirst's identity based routing, overloaded identity resolution, content caching and in-network compute plane are excellent building blocks for IoT service distribution. We then present a detailed example of a location context-aware service built as a dynamic content service, and discuss innetwork distribution of this IoT service via MobilityFirst future Internet, whereas now only possible via overlay content distribution network (CDN).

T1A-3: **Direct or indirect sensor enabled eco-driving feedback: Which preference do corporate car drivers have?**

Johannes Tulusan, Thorsten Staake, Elgar Fleisch

The increasing demand for energy is rapidly exhausting our planet's natural resources (e.g. fossil fuels). Corporations with increasingly large car fleets significantly contribute to the volume of CO 2 emissions released into the atmosphere. Further investigation is needed to help reduce this escalation in global warming utilizing eco-friendly yet cost effective measures. Internet of Things solutions, using sensor enabled feedback technologies with GPS and accelerometer, offer a medium which provides drivers with eco-driving feedback services. A field-test with 50 corporate car drivers demonstrated an overall improvement in fuel efficiency, supporting literature findings claiming that direct feedback has a greater impact on energy savings than indirect feedback approaches. In this study monetary incentives were irrelevant, as corporate car drivers fuel costs are reimbursed by the company. This provides an attractive opportunity for corporations looking to reduce their CO_2 footprint and petrol costs by offering their employees eco-driving applications at minimum costs.

T1B: **Smart Sensors**

T1B-1: **Eliciting Truthful Measurements from a Community of Sensors**

Boi Faltings

As the Internet of Things grows to large scale, its components will increasingly be controlled by selfinterested agents. For example, sensor networks will evolve to community sensing where a community of agents combine their data into a single coherent structure. As there is no central quality control, agents need to be incentivized to provide accurate measurements. We propose game-theoretic mechanisms that provide such incentives and show their application on the example of community sensing for monitoring air pollution. These mechanisms can be applied to most sensing scenarios and allow the Internet of Things to grow to much larger scale than currently exists.

T1B-2: **RSS-based Self-Adaptive Localization in Dynamic Environments**

B Dil, Paul J.M. Havinga

This paper focuses on optimal and automatic calibration of the propagation model of Received Signal Strength (RSS) based localization algorithms. Conventional RSS-based localization algorithms assume that optimal calibration is static and identical for all nodes, which limits its use to static environments. However realistic environments are dynamic, where each node should estimate its own optimal propagation model settings dependent on the node's hardware and location. We call this process Self-Adaptive Localization (SAL). SAL algorithms estimate the parameter settings from available localization measurements. We show that existing SAL algorithms significantly decrease the localization accuracy and stability. Our main contribution is that we determine the conditions under which SAL algorithms provide optimal results, that are shown to be constraints on the localization surface. Since the antenna orientation has a significant impact on RSS and thus optimal propagation model settings, we evaluated SAL in an environment with unknown and thus dynamic antenna orientations. Our measurements and simulations show that these constraints increase the accuracy by ~45% and the stability by~70% in static and dynamic environments.

T1B-3: **A Configurable RFID Sensor Tag Conforming to IEEE 1451.7 Standard**

Han Haichao, Lingzhi Fu, Min Li, Junyu Wang

This paper presents a design of sensor tag baseband based on IEEE 1451.7 standard. In this work, general UHF RFID commands is implemented by the hardware state machine in baseband and an embedded 8-bit microcontroller is adopted to process IEEE 1451.7 standard. The simulation and test results show that this design is able to realize the IEEE 1451.7 standard with high flexibility. The power consumption of the baseband is about 18μW at the clock frequency of 1.28MHz and 1.2V power supply, which is suitable for RFID sensor tags and portable application.

T2A: M**iddleware and Data Processing**

T2A-1: **Optimizing the Storage of Massive Electronic Pedigrees in HDFS**

Yin Zhang, Weili Han, Wei Wang, Chang Lei

Benefiting from trustworthily tracking of the processes in the production, processing, storage, transportation and sale phases, an electronic pedigree system becomes an important technology of the Internet of Things. In an electronic pedigree system, small-sized but huge volume of electronic pedigrees in the XML format will be generated, stored, and retrieved. Unfortunately, study of these massive electronic pedigrees' storage in an electronic pedigree system, which is in the form of small XML files, is rarely concerned. We, therefore, try to leverage Hadoop to solve the storage problem of massive electronic pedigrees, by the optimization of storing and accessing massive small XML files in HDFS. First, all correlated small XML files of the same envelope are merged into a larger file to reduce the metadata occupation at NameNode. Second, a prefetching mechanism and a remerging mechanism are used to improve the efficiency of accessing small XML files. Finally, we implement a prototype to evaluate the effectiveness and efficiency comparing with the origin HDFS. The results show that the

optimized approach is able to reduce the memory consumption of NameNodes by up to 50%, improve performance of storing by up to 91%, and accelerate accessing by up to 88% in Hadoop.

T2A-2: **XML-Less EXI with Code Generation for Integration of Embedded Devices in Web Based Systems**

Yusuke Doi, Yumiko Sato, Masahiro Ishiyama, Yoshihiro Ohba, Keiichi Teramoto

XML is a widely used as message serialization format in web-based open and heterogeneous systems because of its flexible data model. Internet-of-Things (IoT), or network with constrained nodes, is expected to be heterogeneous, and flexibility and expressiveness of XML are also good for IoT. However, RAM and bandwidth constraints on such nodes make handling of XML difficult. The authors are developing XMLless EXI to solve the problem. Our approach adopts Efficient XML Interchange (EXI) as alternative serialization form of XML. It solves the bandwidth problem of XML. At the same time, the authors apply code generation techniques to encode/decode EXI stream without XML data models on constrained nodes. Static state machines from a schema-informed EXI grammar enable constrained nodes to convert EXI data directly from/to its internal data. The authors show that XML-less EXI is highly efficient in RAM usage regardless of the size of an EXI stream and more compact in ROM size than other implementations. The authors also provide code size estimations for a set of schema-informed EXI grammars and insights on how to make the grammars compact.

T2A-3: **Towards Unified Heterogeneous Event Processing for the Internet of Things**

Wang Wei

RFID technology and the Internet of Things provide a flood of information which can be regarded as a stream of complex events. The most acute complex event data management challenges today stem from organizations which rely on a large number of diverse, interrelated data sources, but with difficulties of managing their event data in a unified, integrated and correlated way. It is because ,up until now, there is no standard data stream query language and the fundamental questions in connection with data models and formal semantics for stream queries have not yet been thoroughly addressed. In this paper, we present the design of a framework named HEP which integrates the representation of two typical categories of event streams (relational and XML event streams). Our framework supports unified event fusing and processing with a general window specification that can be used to express almost all types of windows of which we are aware, and is semantically clear and easy to understand. It can be extended to new types of windows that may occur in the future for some new IoT applications. We provide a real case prototype implementation, and experiments show the usefulness and effectiveness of our method.

T2A-4: **Complex Sensing Event Process of IoT Application Based on EPCglobal Architecture and IEEE 1451**

Chao-Wen Tseng, Chua-Huang Huang

In this paper, we present an Internet of Things (IoT) framework based on EPCglobal architecture and IEEE 1451 smart transducer standard series. The mechanism of handling complex sensing events which are generated and aggregated from things (tags and transducers) is also proposed and simulated. Complex sensing event process is an effective facility to achieve intelligence of an IoT application that empowers a system to analyze object data, to reason of sensing events, and to trigger responding actions. We develop the IoT management platform to verify the IoT framework and simulate an EcoPark application to demonstrate the mechanism of complex sensing event process. The result shows that the framework is feasible and the mechanism is practical.

T2B: **RFID Technology**

T2B-1: **Decreasing False-Positive RFID Tag Reads by Improved Portal Antenna Setups**

Thorben Keller, Frederic Thiesse, Elgar Fleisch , Alexander Ilic

The problem of false-positive RFID tag reads i.e, tags that have been read unintentionally by a reader, is crucial for the actual implementation of RFID solutions in the real world. Prior research has shown that the use of the low-level reader data is suitable to approach this problem and it is the scope of this paper to evaluate the use of alternative RFID reader antenna setups to support this idea. We collected a large number of data in a productive RFID enabled distribution center, derived additional knowledge from our findings and used it to train a machine learning algorithm for the detection of such false-positive reads. It will be shown that the proposed solutions significantly improve the previously in the literature presented classification algorithms.

T2B-2: **Calculation of Functions on the RF-channel for IoT**

Stephan Sigg, Predrag Jakimovski, Michael Beigl

We consider the calculation of mathematical functions at the time of wireless superimposition of data sequences in IoT environments. IoT devices will be heavily resource limited, possibly parasitic or passive powered nodes. Although restricted in their computational capabilities, such nodes draw on a virtually unlimited power source. We exploit this property by trading computational load for communication load. In particular, we present a communication scheme by which mathematical computations can be executed at the time of wireless transmission. This transmission scheme enables the execution of complex computations by a network of resource restricted, cooperating nodes at a computational load below the operation's computational complexity. We derive the scheme analytically, explore its feasibility for dense networks in mathematical simulations and demonstrate its practicability in a case study with 15 nodes.

T2B-3: **Collision Recovery Receiver for EPC Gen2 RFID Systems**

Lingzhi Fu, Lirui Liu, Min Li, Junyu Wang

In this paper, a multi-tag anti-collision method with collision signal recovery for UHF RFID systems is proposed. Signal recovery of 2 tags or 3 tags is adopted in the algorithm and the frame size is optimized accordingly. S imulation results show that the average system efficiency of the proposed anti-collision algorithm can be up to 67%, while the system efficiency of the algorithms without adopting collision recovery is no more than 36.8%. The influence of non-ideal parameters in different scenarios, such as signal-noise-ratio (SNR) and frequency of clustering, is discussed as well.

F1A: **Web of Things**

F1A-1: **Searching in a Web-based Infrastructure for Smart Things**

Simon Mayer, Dominique Guinard, Vlad Trifa

Given the expected high number of accessible digitally augmented devices and their communication requirements, this paper presents our work on creating a Web-based infrastructure for smart things to facilitate the integration, look-up, and interaction with such devices for human users and machines. To exploit the locality of interactions with and between smart things, the proposed infrastructure treats the location of a smart thing as its main property and is therefore structured hierarchically according to logical place identifiers. We discuss the infrastructure's look-up mechanism that leverages Web patterns to foster scalability and load balancing and features an advanced caching mechanism that greatly reduces the response time and number of exchanged messages. These properties are demonstrated in an evaluation in a simulated smart environment.

F1A-2: **Fuzzy-based Sensor Search in the Web of Things**

Cuong Truong, Kay Römer, Kai Chen

An increasing number of sensors is being connected to the Internet and their output is published on the Web, resulting in the formation of a Web of Things (WoT) that will soon connect tens of Billions of devices. As in the traditional web, search will be a key service also in the WoT to enable users to find sensors with certain properties. We propose sensor similarity search, where given a sensor, other sensors on the WoT are found that produced similar output in the past. At the heart of our approach is an algorithm that exploits fuzzy sets for efficiently

computing a similarity score for a pair of sensors that is used to obtain a ranked list of matching sensors. Using sensor data sets from real deployments, we find that this approach results in a high accuracy.

F1A-3: **Actinium: A RESTful Runtime Container for Dynamic, Scriptable Internet of Things Applications**

Matthias Kovatsch, Martin Lanter, Simon Duquennoy

Programming Internet of Things (IoT) applications is challenging because developers have to be knowledgeable in various technical domains, from low-power networking, over embedded operating systems, to distributed algorithms. Hence, it will be challenging to find enough experts to provide software for the vast number of expected devices, which must also be scalable and particularly safe due to the connection to the physical world. To remedy this situation, we propose an architecture that provides Web-like scripting for low-end devices through Cloud-based application servers and a consistent, RESTful programming model. Our novel runtime container Actinium (Ac) exposes scripts, their configuration, and their lifecycle management through a fully RESTful programming interface using the Constrained Application Protocol (CoAP). We endow the JavaScript language with an API for direct interaction with mote-class IoT devices, the CoapRequest object, and means to export script data as Web resources. With Actinium, applications can be created by simply mashing up resources provided by CoAP servers on devices, other scripts, and classic Web services. We also discuss security considerations and show the suitability of this architecture in terms of performance with our publicly available implementation.

F1B: **IoT Modeling**

F1B-1: **RDF Provisioning for the Internet of Things**

Alexander Kröller, Henning Hasemann, Max Pagel

We present the platform-independent Wiselib RDF Provider for embedded IoT devices such as sensor nodes. It enables the devices to act as semantic data providers. They can describe themselves, including their services, sensors, and capabilities, by means of RDF documents. Used in a protocol stack that provides Internet connectivity (6LowPAN) and a service layer (CoAP), a sensor can auto-configure itself, connect to the Internet, and provide Linked Data without manual intervention. We introduce Streaming HDT, a lightweight serialization format for RDF documents that allows for transmitting compressed documents with minimal effort for the encoding; this is tailored for typical IoT applications where the embedded devices are often senders and seldom receivers of complete documents.

F1B-2: **Dynamix: An Open Plug-and-Play Context Framework for Android**

Darren Carlson, Andreas Schrader

Today’s mobile devices represent exceptional foundations for wide-area Internet of Things (IoT) applications. However, the vast heterogeneity of real-world environments makes it challenging for applications to sense, understand and adapt to the user’s continually evolving context. We’re investigating a new community-based approach for context-aware computing, where advanced context sensing capabilities are dynamically deployed to mobile devices as plug-ins, and are made available to applications through only a few lines of code. Towards this end, we’re developing Dynamix, an open plug-and-play context framework for Android. Dynamix runs as lightweight background service on the user’s mobile device, modeling context information from the environment using the device itself as a sensing, processing and communications platform. Mobile applications request context support from Dynamix using simple application programming interfaces (APIs). Dynamix automatically discovers, downloads and installs the plug-ins needed for a given context sensing task. When the user changes environments, new or updated plug-ins can be deployed to the device at runtime, without the need to restart the application or framework. Dynamix comes with a growing collection of ready-made plug-ins, and provides open software developments kits (SDKs) and a scalable repository architecture, which enable 3rd party developers to quickly create and share newplug-ins types with the community. This paper presents the Dynamix approach, describes our prototype implementation and presents promising performance evaluation results.

F1B-3: **IoT Mashups with the WoTKit**

Michael A Blackstock, Rodger J Lea

Toward reducing barriers for developing applications for the Internet of Things, researchers have connected things to the web enabling the development of IoT mashups. While establishing a Web of Things for mashup development has been an important step forward, we believe that web-centric IoT toolkits have the potential to increase the use of Internet-enabled things further by increasing the pool of developers and applications that can take advantage of the connected physical world. In this paper we derive several key requirements for IoT mashup toolkits based on existing systems, past research and our experience with an IoT mashup toolkit called the Web of Things Toolkit (WoTKit). Unlike other systems, the WoTKit aims to address key requirements for IoT mashup developers in one system. From this experience we derive key lessons learned for the community toward improving toolkits for developing IoT mashups.

F2B: **Communication Technology**

F2B-1: **The Stateless Point to Point Routing Protocol based on Shortcut Tree Routing Algorithm for IP-WSN**

Kiwoong Kwon, Minkeun Ha, Taehong Kim, Seong Hoon Kim, Daeyoung Kim

IP-based Wireless Sensor Network (IP-WSN) is one of the essential elements enabling Internet of Things (IoT). However, IP-WSN imposes great challenges due to low processing resources and strict energy constraints of sensors. Various routing protocols for IP-WSN have been proposed considering low-cost communication with resource-constraint and typical traffic patterns like multipoint-to-point, but most of routing protocols causes problems incurring inefficient route or/and consuming many processing resources. Especially, as far as point-to-point (P2P) traffic is concerned, those routing protocols incur triangular detour routes and require many processing resources at intermediate nodes where P2P traffic is an important traffic pattern. To address these challenges, we propose the Stateless P2P Routing protocol (SPR) based on shortcut tree routing algorithm which is our previous study. SPR can deliver a packet to the node having the smallest remaining hop count among neighbors without additional control overhead, instead of always delivering a packet to a parent or children along tree routes. SPR also provides a nearly stateless routing in that SPR determines a route through hierarchical address structure and one hop neighbor information without having to store global routing state. We implement SPR in our IP-WSN platform named SNAIL and conduct a simulation and a measurement to verify the performance of SPR. The simulation results show SPR provides improved hop count compared to HiLow and RPL. It also provides reduced memory usage and the number of control packets compared to RPL. Additionally, the measurement results show SPR provides decreased round trip time and increased packet delivery ratio compared to HiLow and RPL.

F2B-2: **Unified Routing for Data Dissemination in Smart City Networks**

Viet-Duc Le, Hans Scholten, Paul J.M. Havinga

The Internet of Things continues to expand from traditional homogeneous technologies with low resources to increasingly heterogeneous and resource rich technologies. An emerging domain in this respect is the use of mobile phones to monitor and process events. Moreover, there is increasing interest in expanding the application domains, such as to smart cities. Existing routing algorithms for such technologies and application domains are still designed for homogeneous technologies, such as mobile phones, vehicles, and Road Side Units. In this paper, we propose a new routing scheme for a heterogeneous architecture that is composed of a heterogeneous set of nodes. Our proposed routing algorithm uses two parameters, namely the Delivery Capability and Number of Copies, to control the dissemination area and connection priority. By optimally choosing these two parameters according to characteristics of nodes, the proposed algorithm works well with various types of sensor node. In addition, a heterogeneous network architecture and several mobility models are introduced to obtain a realistic simulation scenario. The simulation results show that our proposed approach outperforms all other compared algorithms in terms of delivery ratio and latency.

F2B-3: **Evaluation of DECT-ULE for Robust Communication in Dense Wireless Sensor Networks**

Kallol Das, Paul J.M. Havinga

In today's world wireless sensor networks (WSNs) have enormous applications which made our everyday life much easier. In most of these applications, the unlicensed 2.4 GHz frequency band has been used for sensor communications. Due to the wide use, the chance of getting interference in this frequency band is quite high. Thus, a reliable and real-time communication in mass WSNs can not be guaranteed, which is essential for industrial applications. In this paper, we evaluate the performance of Digital Enhanced Cordless Telecommunications - Ultra Low Energy (DECT-ULE) for robust communication in dense WSNs and found that it can cope with the limitations of existing standards. We show that DECT-ULE can elegantly handle dense WSNs by allocating communication channels with excellent quality and minimum delay.

IoT Challenge Abstracts

C-1: **AmbientWeb: Bridging the Web's Cyber-physical Gap**

The Web has rapidly evolved from a static informational medium into a highly capable interactive application platform. Today, Web browsers have become the de facto interface for many networked applications; however, conventional Web browsers are still unable to directly interact with the broad range of context sources and actuators available in highly heterogeneous mobile environments. In our Ambient Dynamix project, we are creating a new approach for mobile computing, where advanced context sensing and acting capabilities are deployed to mobile devices ondemand as plug-ins, and are made available to applications through only a few lines of code. In this paper, we present an extension of our Dynamix Framework, called AmbientWeb, which exposes Dynamix's plug-and-play context capabilities to Web applications running in unmodified mobile Web browsers, such as Google Chrome and Firefox. By leveraging AmbientWeb, browser-based Web applications are able to directly interact with contextually relevant resources without requiring environmental modification or Web-based proxies. For the IoT Challenge, we present a fully operational version of the AmbientWeb architecture along with an example browser-based Web application that uses runtime installed Dynamix plug-ins to discover rich, high-order contextual information, perform context-aware adaptations, and influence the physical environment through direct ad-hoc control of DMX-based lighting equipment.

C-2: **True Self-Configuration for the IoT**

For the Internet of Things to finally become a reality, obstacles on different levels need to be overcome. This is especially true for the upcoming challenge of leaving the domain of technical experts and scientists. Devices need to connect to the Internet and be able to offer services. They have to announce and describe these services in machine-understandable ways so that user-facing systems are able to find and utilize them. They have to learn about their physical surroundings, so that they can serve sensing or acting purposes without explicit configuration or programming. Finally, it must be possible to include IoT devices in complex systems that combine local and remote data, from different sources, in novel and surprising ways. We show how all of that is possible today. Our solution uses open standards and state-of-the art protocols to achieve this. It is based on 6LowPAN and CoAP for the communications part, semantic web technologies for meaningful data exchange, autonomous sensor correlation to learn about the environment, and software built around the Linked Data principles to be open for novel and unforeseen applications.

C-3: **A Context-aware Computing Mediated Dynamic Service Composition and Reconfiguration for Ubiquitous Environment**

Context-aware and customization services are expected in the forthcoming ubiquitous computing environment. In order to make SOA provide context-aware services, we propose a SOAextended architecture, which integrates a Context-aware Decision Making system that can evaluate services for mediating dynamic service composition and reconfiguration according to the context information. In the Context-aware Decision Making system, a semantic multi-dimension model is defined for the context representation and inference. By using this context model, we explore an effective mechanism that can evaluate all services from two aspects: QoS and user preferences. To evaluate user preferences for services, a method based on Association Rules in data mining is defined. This evaluation result is a configuration that can guide SOA to select services that are most appropriate for the current context environment. Finally, a language called Abstract BPEL and a service broker middleware are included to assist our architecture to enable dynamic service composition and reconfiguration. In this paper, a case study with intelligent house is also presented for verifying the featured functionalities of our architecture.

Demo Abstracts

D-1: **Actinium (Ac) and the Thin Server Architecture**

Our paper Actinium: A RESTful Runtime Container for Scriptable Internet of Things Applications presents an architecture to make programming of Internet of Things applications significantly easier. Traditional programming models, stemming from networked embedded systems and wireless sensor network research, require developers to be knowledgeable in various technical domains, from low-power networking, over embedded operating systems, to distributed algorithms. With Actinium, we bring Web-like scripting to wireless sensor and actuator nodesand comparable resource-constrained devices. Applications are split into two components: Thin servers that provide the hardware functionality of IoT devices through a low-level RESTful interface and scripted apps that implement the application logic and run in the Cloud. Using our Actinium (Ac) app-server, Erbium (Er) REST engine for Contiki, Californium (Cf) CoAP framework, and Copper (Cu) CoAP user-agent, we demonstrate how to create IoT application by simply mashing up devices, modular apps, and other RESTful Web services. All these building blocks are also publicly available.

D-2: **A Product Information Service System for End users Based on RFID and Mobile Internet**

Nowadays applications of Internet of Things (IoT) are mainly limited to closed-loop information systems. The lack of convenient connection from things to internet and open service platforms hinder the popularity of IoT applications. This article provides a solution for a seamless integration of things into the information network. The showcase demonstrates that an individual customer making use of a smart phone plugged in a low cost, miniaturized ultra high frequency (UHF) RFID reader can access retail product information and obtain services from a product service platform on internet. The reader achieves a reading distance of 50cm with a 3.5cm x 3.5cm ceramic antenna, and a small profile of 36mm x 25mm x 2mm (L x W x H).

D-3: **Smart Energy Management in Home Area Networks**

Distributed renewable energy resources systems are becoming widely use in home area networks. These systems can intelligently selects resources to maintain high efficiency power management at home and energy grids based on the power consumption of home appliances and availability of distributed energy sources. In this demo, the test bed demonstrates a smart strategy based on Grey Model Prediction on power selection and power control for decentralized electrical equipment and appliances in a home area network. The proposed smart strategy takes into account of the real-time electrical pricing, environmental data from sensors and predicted power consumption within home.

D-4: **WoTKit: a Toolkit for Rapid Development of IoT Applications**

We propose to demonstrate the WoTKit, a toolkit for rapid development of IoT applications. WoTKit is the result of a research project at the University of British Columbia, now productized by Sense Tecnic Systems. The WoTKit has been designed to support the rapid development of IoT applications. The approach we have taken is based on a lightweight philosophy, i.e. WotKit supports a minimal core set of services and functionalities and a strong reliance on Web technologies. The WotKiT leverages these minimal services with a flexible web centric application architecture, including an open an extensible data flow model and sophisticated support for sensor mashups. We have refined the WotKiT using a range of end-user test cases, including environmental sensing, energy reduction and health related sensing.

D-5: **Web-enabled Smart Tags for Physical Things**

This article proposes Web-enabled smart tags or WEST tags, a new type of tag that not only provides an identification mean but also a rich web experience access to physical things in the Internet of Things. WEST tag comprises of a sensor/actuator board which is Internet-connected by adopting 6LoWPAN technology and a NFC tag that stores a URL of the physical things. WEST tag’s rich web interface is aided by a resourceful server called

Presentation Server located on the Internet. By attaching WEST tags to physical things, users are not only able to capture the things' contextual information but also to browse that information in a web browser with a rich web interface effortlessly.

D-6: **Enabling a Global Infrastructure for Physical Information Sharing over the Internet**

The key to enabling the Internet of Things (IoT) is an global infrastructure that connects things to the Internet and provides a way of information sharing and interaction between things and applications. In this paper, we describe IoT infrastructure called Smart Things Information Service (STIS) integrating RFID with sensor networks based on EPC networks. Prototype implementation and evaluations of our STIS show usefulness and effectiveness of our system.

D-7: **An Intelligent Medicine Box System in Pervasive Healthcare Applications**

With the rapid growth of global population, the average medical resources become increasingly scarce. Meanwhile, the aging population also leads to the excessive growth of medical cost. However, most hospitals still use the traditional medical model, causing the substantial waste of medical resources. To solve these problems, we design an Intelligent Medicine Box System based on Radio Frequency Identification (RFID) technology. This system aims at significantly enhancing the efficiency and reliability of patient self-care and changing the current medical model from hospital-center to family-center. It will greatly save the medical resources eventually.

D-8: **Multi-Services Home Network with Globally Unique Identifier of Home Appliance**

In this paper, we propose a multi-services home network which provides an information platform to share information on home appliances among their manufacturers, consumers and application developers. The multi-services home network features the use of globally unique identifier (EPC:Electronic Product Code) stored in a dual interface RFID tag embedded to home appliances, automatic discovery of appliances in the home network with an extended UPnP (Universal Plug and Play) and the use of end-to-end web communications with HTTP and CoAP (Constrained Application Protocol). We have been developing a prototype of the multi-services home network with over 50 appliances in 6 geographical locations. In the multi-services home network, the list of all home appliances can be generated automatically with the extended UPnP over HTTP and CoAP. All the services associated with a particular appliance can also be automatically listed with ONS (Object Naming Service) with the EPC of appliance. The list of services, at this moment, includes, energy management, remote control of appliances and supply chain traceability obtained from an EPCIS repository. The end-to-end web communication conceals the actual implementation of appliances, which may be directly connected to a constrained network. This facilitate the developments and mash-ups of applications.

D-9: **Demonstration of an IPv6 Multi-protocol Gateway for Seamless Integration of Building Automation Systems into Constrained RESTful Environments**

Millions of existing smart devices are already deployed in home and building automation covering domains of lighting, heating ventilation and air conditioning (HVAC), security, safety, and smart metering. From an Internet of Things point of view, these devices are legacy devices based on technologies like BACnet, ZigBee or KNX which mostly use non-IP communication technologies and IP almost exclusively to tunnel their specific network protocols. For native IoT devices recent research work is focusing on IPv6 communication stacks using RESTful Web services for direct device interaction. In order to use such a communication stack in embedded devices, protocols for Constrained RESTful Environments (CoRE) have been standardized having the Constrained Application Protocol (CoAP) as main message exchange protocol. This paper presents a transparent IPv6 multi-protocol gateway that allows a seamless integration of existing Building Automation Systems into the Internet of Things. The gateway provides a CoRE conformant interface for each legacy device and hence has the potential to populate the Internet of Things with millions of real world devices at one go.

Poster Abstracts

P-1: **Cloud-based Internet of Things Platform**

The Internet of Things presents the user with a novelNmeans of communicating with the Web world through ubiquitous object-enabled networks. Cloud computing enables a convenient, on demand, scalable, pay-per-use network access to a shared pool of configurable computing resources. This paper proposes the Mammoth architecture, a Cloud-based Internet of Things platform which accommodates Mammoth IaaS (Infrastructure as a service), PaaS (Platform as a service), and SaaS (Software as a service) for accelerating IoT application development and management.

P-2: **Passive IoT Interoperability Testing with Successful Experimentation in CoAP Plugtest**

This poster presents an interoperability testing methodology based on the technique of passive testing, as well as its experimentations in CoAP protocol interoperability testing event in the context of Internet of Things.

P-3: **Internet of Things Governance: Initial Findings from a European Case Study**

N/A

P-4: **Identification of missing objects with physical FEC**

Automatic identification of physical objects is one of the important functions to realize the Internet of Things. Some existing automatic identification technologies, such as bar-code, RFID and etc..., can identify objects which is in their reading area according to the unique identifier (ID) of each object. However, these technologies cannot identify missing objects, and correctly says, they cannot even determine whether there are any missing objects or not. Physical objects often form a group, such as a shipping container, and this missing object identification is particularly important for such group of objects. In existing automatic identification systems, the missing object identification is generally done by some additional look-up of the list of objects' IDs which belongs to the group. Such systems require some databases or verifiers to share the list of grouped objects. On the other hand, the proposing group coding, which works on the RFID system, identifies the IDs of missing objects only with the communication of the interrogator and remaining RF tags. The group coding writes additional group-related information to RF tags belonging to the group, then it can eliminate the external database or verifier. By a numerical simulation, it is shown that the group coding can determine up to 64 missing RF tags' IDs out of a group of 100 RF tags within 0.5% error rate. It is also proved by an experiment that the group coding works well on the real RFID system.

P-5: **Measurement of UHF RFID Tag with Antenna Diversity**

The performance degradation of a RFID system due to the multipath fading channel has been proved. Such a problem is often mitigated using diversity combining techniques, which are widely used in many state-of-the–art communication systems and are expected to be adopted in next generation RFID systems. Recently, a novel RFID tag with backscatter diversity has been proposed; in which two antennas with orthogonal polarizations are used in one tag. To ensure the tag can benefit from the antenna diversity, the correlation of propagation channels associated with the two tag antennas is desired to be low. This work performs some measurement of the two tag antennas with orthogonal polarizations in the forward (read-to-tag) link and the reverse (tag-to-reader) link. Measurement results clearly show the differences between the channels associated with the two tag antennas.

P-6: **Quality-of-Service Management on IoT-IMS Communication Platform for Future Internet Applications**

Dealing with scalability of future IoT applications, enabling IoT infrastructure's integration and operation into telecommunication network system becomes very important task. Through IP Multimedia Subsystems (IMS) capability to bring internet service into telecommunications network, an IoT-IMS communication platform is

designed to fulfill service delivery demand of IoT applications in ubiquitous manner. IoT-IMS platform enables EPCIS middleware services in IMS's HSS module to perform physical object identification and service discovery through mobile device. Subjected to QoS management, IoT-IMS platform implementation in cloud computing shows that IMS operation decreases IoT application server computation load.

P-7: **A 3D RFID Static Test System Developed in a Spherical Near-Field Antenna Measurement**

N/A

P-8: **Node Oriented Internet of Things Framework for Agriculture: Architecture and Operation**

Radio frequency identification (RFID) technology is widely used in supply chain and agriculture, and EPCglobal has published related standards. For large-scale implementation in open-loop environment, engineering issues, such as scalability, privacy, Discovery Service (DS) model, as well as business model are to be considered to make the system extendable. In this work, a node oriented IoT architecture framework for agriculture is proposed. With the node oriented mechanism, the system will be able to operate appropriately in large scale application as the network extends in the future.

P-9: **An IDMA-based Multi-Reader Joint Detection Scheme for Dense RFID Networks**

This paper proposes an innovative multi-reader joint detection scheme for dense RFID systems. The Interleave Division Multiple Access (IDMA) is adopted for multi-tag access control. The transmitters and receivers of IDMA are adapted to the RFID backscattering channel model. With the help of IDMA, signals from multiple tags can be resolved simultaneously, allowing joint detection among adjacent readers. Fundamental channel multiplexing can thus be achieved from the extra diversity. Computer simulations show that the proposed scheme can achieve better detection bit error rate and channel capacity than non-IDMA assisted systems in overlapped region.

P-10: **Smart object-based agile production management in Internet of Things**

N/A

P-11: **A Novel Method for Robot Positioning Based on Passive RFID System**

RFID technology has been widely used in mobile robot positioning system for its unique advantages. RFID tags store their unique positions which are placed on the ceiling or the floor. The mobile robot carries a RFID reader which reads the RFID tags to position itself. In this paper, a improved method for mobile robot localization is proposed, and the equations to calculate the position of the mobile robot are given. Finally, the experiment results show that compared to conventional positioning method, the proposed method can effectively improve the positioning accuracy of the mobile robot.

P-12: **A New Forward-Link Coding Scheme for Passive RFID System**

An improved forward-link coding scheme for passive Radio Frequency Identification (RFID) system was present in this paper. The Power Spectral Density (PSD) was characterized, and performance comparison was done between the proposed coding scheme and Pulse Interval Encoding (PIE). The result shows that, the new coding scheme not only offers more energy to the tag, but also increases the forward-link symbol rate in the same bandwidth.

P-13: **Assure Food Safety by Using Enhanced Electronic Pedigrees**

The safety problem of food is a critical issue in recent years. To address the issue, the technologies of the Internet of Things are used to offer the possibilities to easily track the process in the production, storage, transportation, sale, and even use phases of foods. This paper, therefore, introduces the design of an electronic pedigree system for food safety. The system implements an extension of the pedigree standard of EPCglobal (now GS1), and offers a more trustworthy tracking service to monitor and supervise the production and supply of

foods. We discuss the key issues of the design, and implement a prototype to evaluate the feasibility of the design. Finally, we analyze the trustworthy assurance and security vulnerabilities in our electronic pedigree system.

P-14: **A Design Of Semantic-Based Recommender System For Medical Tourism**

N/A

P-15: **Searching in a Web-based Infrastructure for Smart Things**

Given the expected high number of accessible digitally augmented devices and their communication requirements, this paper presents our work on creating a Web-based infrastructure for smart things to facilitate the integration, look-up, and interaction with such devices for human users and machines. To exploit the locality of interactions with and between smart things, the proposed infrastructure treats the location of a smart thing as its main property and is therefore structured hierarchically according to logical place identifiers. We discuss the infrastructure's look-up mechanism that leverages Web patterns to foster scalability and load balancing and features an advanced caching mechanism that greatly reduces the response time and number of exchanged messages. These properties are demonstrated in an evaluation in a simulated smart environment.

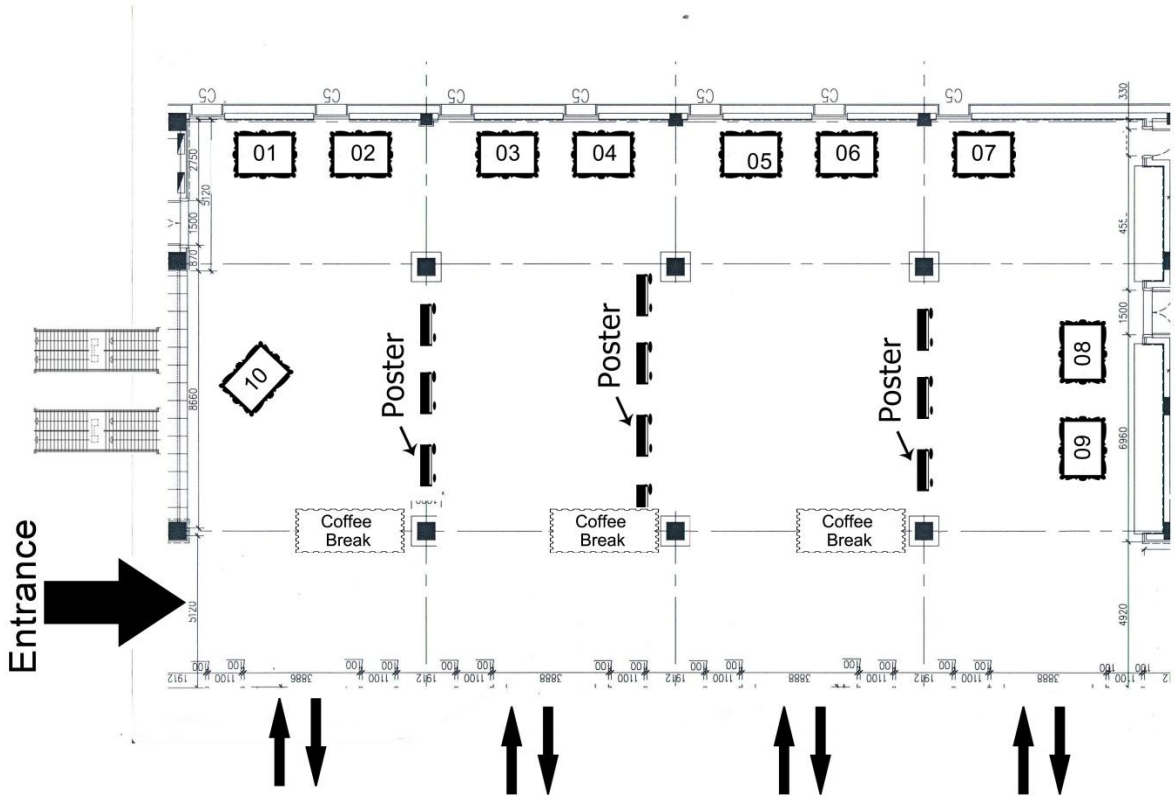
Local Information

Conference Venue

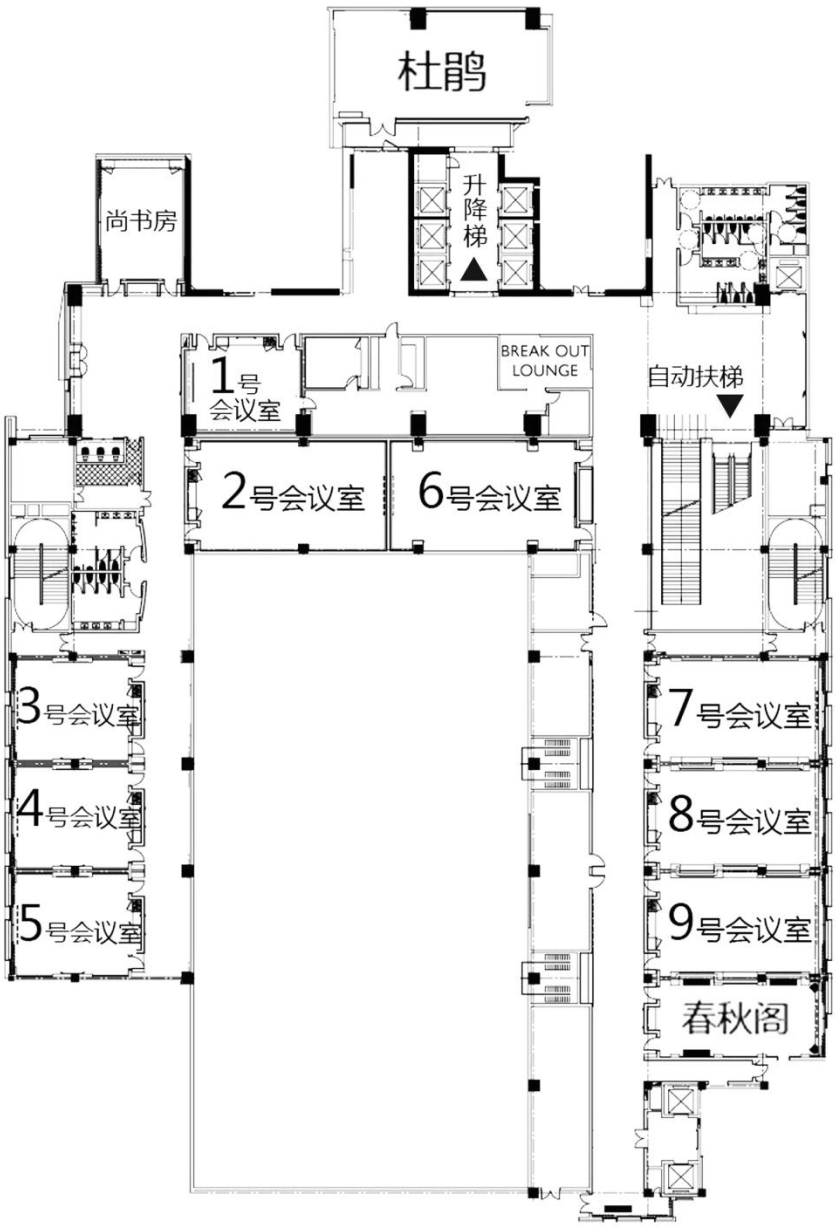
InterContinental Hotel
3rd Floor, Dining Hall, for the main conference
4th Floor, 10 meeting rooms, for the work shops

No. 6 Yonghe Road, Wuxi City 214023
Jiangsu Province, P. R. China
www.intercontinental.com

Conference Meeting Locations



Map of the 3rd floor of the confernece venue
(Foyer for posters & exhibitions; Junlai Hall for the main confernece and for the plenery dinners)



Map of the 4th floor of the confernece venue
(Scientific Workshops and Industrial Workshops)

Shuttle Bus Schedule

Shanghai Pudong Airport (PVG) → Wuxi Juna InterContinental Hotel

October 23, Tuesday

10：00 ， 13：00 ， 16：00 ， 20：00

Wuxi Junlai InterContinental Hotel → Shanghai Pudong Airport (PVG)

October 26, Friday

17:30 ， 19:00

October 27, Saturday

13:00

It takes about 2.5 hours (without traffic jams) to travel between the Shanghai Pudong Airport (PVG) and the conference venue in Wuxi.

Tours

1 Day Wuxi Highlight Tour, Wuxi

Price from: USD 110 /p(based on 2-5 pax)

Visiting Liyuan Garden, Qingming Bridge & Huishan Clay Figure Workshop, which are the most popular sights in Wuxi

1 Day Wuxi-Suzhou Highlight Tour

Price from:USD 226 /p(based on 2-5 pax)

This one day tour will take you to elegant Suzhou, the famous ancient water town to experience the the Grand Canal, then visit the Pan Gate, Lingering Garden, and the No.1 Silk Factory

4D Wuxi Hangzhou & Shanghai Highlight Tour

Price from: USD 341 /p(based on 2-5 pax)

This is the highlight tour of Hangzhou and Shanghai, covering the most popular sights of interests in the east of China. Visit famous West Lake, Lingyin Temple, Feilai Peak, Six Harmonies Pagoda and interests in Shanghai.

Contact

Casper Xia , Tel: +86 773 5858306

Cell phone: +86 13397833691

Toll Free Number: 1-(888)-803-9432

E-mail Add: sales@discoverchinatours.com