The 2016 International Conference on Smart X

Conference Program

Dalian, China

July 29-31, 2016

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Welcome Message

Dear Friends,

The rapid development of information technology and computer science takes human society toward smart environments. In the smart environments, anything that can assist to solve the current challenges in business, industry, science, daily life etc., can refer to 'Smart X'. Smart X includes smart city, smart home, smart grids, smart building, smart forest, smart geosciences, and smart computing, etc. Smart X can help human in various dimensions, e.g., better living with better resources, faster and better decision making, more precise future predicting, and quicker response making to challenges in surrounding environments and so on. However, how to implement Smart X? Today, smart techniques, together with the advances in big data and high-performance computing power, offer us big opportunities and transformative potential for intelligent decisions and predictive services. The major challenges we are facing involve extracting valuable knowledge from big data i.e. smart data for smart X, studying creative computing theories and techniques for Smart X, and designing dynamic and globally cooperative infrastructure built upon Smart X. Smart X also leads to a dramatic paradigm shift in our scientific research towards smart-driven computing.

The Smart X aims to bring together computer scientists, industrial engineers, and researchers to discuss and exchange experimental and theoretical results, novel designs, work-in-progress, experience, case studies, and trend-setting ideas in the areas of Smart Computing.

You are cordially welcomed to participate in the 2016 International Conference on Smart X to share your ideas, visions, and researches for the betterment of Smart X.
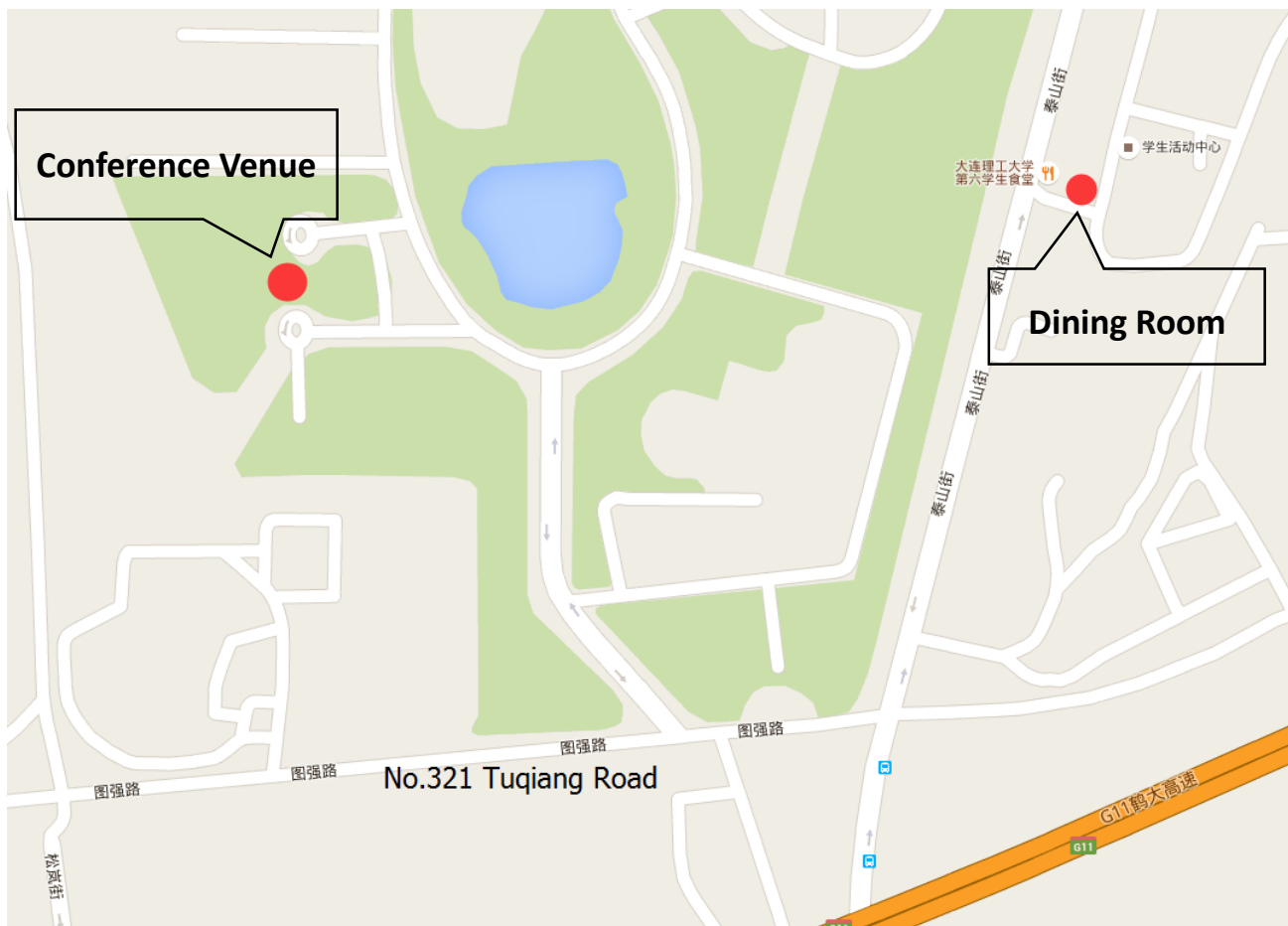
Smart X 2016 Executive General Chair

Conference Venue

Office Building
School of Software Technology, Dalian university of Technology
Dalian, China

Add: No.321 Tuqiang Street, Economy & Technology Development Zone,
Dalian, Liaoning, People's Republic of China, 116620

Conference Time Schedule

Day 1 (Friday, July 29, 2016)	
13:00pm-17:00pm	**Registration** **Location: Office Building Lobby, School of Software Technology, Dalian University of Technology** Registration and Conference materials collection
Day 2 (Saturday, July 30, 2016)	
Opening Remark & Keynotes Location: Center Meeting Room (Office Building No. 204, 2th Floor)	
08:20am-08:40am	Opening Remark: Prof. Zhikui Chen, Prof. Mianxiong Dong, Prof. Zhongxuan Luo
08:40am-09:40am	Keynote Speech I **Prof. Wen Gao** Peking University, China Title: **Visual Search via Smart Phone Based on CDVS**
09:40am-10:00am	*Group Photo & Coffee Break*
10:00am-11:00am	Keynote Speech II **Prof. M. Jamal Deen** McMaster University, Canada Title: **Smart Sensors - Research, Trends and Opportunities**
11:00am-12:00am	Keynote Speech III **Dr. Yu Zheng** Lead Researcher and Research Manager from Microsoft Urban Computing Group, Microsoft Research Title: **Urban Computing: Using Big Data to Solve Urban Challenges**
12:00am-13:00pm	Lunch

	Authors' Oral Presentation and Revision discussion	
14:00pm-15:20pm	Session 1 *Smart Environments and Networking* Location: Center Meeting Room (Office Building No. 204, 2th Floor)	Session 2 *Machine Learning* Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)
15:20pm-15:40pm	*Coffee Break*	
15:40pm-17:00pm	Session 1 *Smart Environments and Networking* Location: Center Meeting Room (Office Building No. 204, 2th Floor)	Session 2 *Machine Learning* Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)
17:00pm-18:00pm	Banquet	

Smart X 2016 Conference Program

	Day 3 (Sunday, July 31, 2016)	
	Keynotes Location: Center Meeting Room (Office Building No. 204, 2th Floor)	
08:30am-09:30am	Keynote Speech IV **Prof. Stephen S. Yau** Arizona State University, USA Title: **Intelligent Human Activity Detection in Smart Living**	
09:30am-09:50am	*Coffee Break*	
09:50am-10:50am	Keynote Speech V **Prof. Lizhe Wang** Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China Title: **Big Earth Data Computing: Understanding the Unobserved**	
10:50am-11:50am	Keynote Speech VI **Dr. Zhibo Pang** Senior Scientist ABB AB Corporate Research Forskargr änd, Sweden Title: **Towards the Real-Time Cyber Physical Systems for Smarter Living and Production Facilities**	
12:00am-13:00pm	Lunch	
14:00pm-15:20pm	Authors' Oral Presentation and Revision discussion	
	Session 3 ***Big Data and Data Intelligence*** Location: Center Meeting Room (Office Building No. 204, 2th Floor)	Session 4 ***Smart Models and Systems*** Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)
15:20pm-15:40pm	*Coffee Break*	
15:40pm-17:00pm	Session 3 ***Big Data and Data Intelligence*** Location: Center Meeting Room (Office Building No. 204, 2th Floor)	Session 4 ***Smart Models and Systems*** Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)
17:00pm-18:00pm	Dinner	

Smart X Keynotes

Speaker:

	Prof. Wen Gao **Title**: **Visual Search via Smart Phone Based on CDVS** Fellow of Chinese Academy of Engineering IEEE Fellow, ACM Fellow Peking University, China http://www.jdl.ac.cn/htm-gaowen/
	Prof. M. Jamal Deen **Title: Smart Sensors - Research, Trends and Opportunities** President – Academy of Science, Royal Society of Canada IEEE Fellow McMaster University, Canada http://www.ece.mcmaster.ca/faculty/deen/
	Prof. Stephen S. Yau **Title**: **Intelligent Human Activity Detection in Smart Living** IEEE Fellow Arizona State University, USA http://dpse.asu.edu/yau/
	Prof. Lizhe Wang **Title: Big Earth Data Computing: Understanding the Unobserved** "ChuTian" Chair Professor at School of Computer Science, China Univ. of Geosciences Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China http://www.escience.cn/people/lzwangEN/index.html
	Dr. Yu Zheng **Title: Urban Computing: Using Big Data to Solve Urban Challenges** Lead Researcher and Research Manager from Microsoft Urban Computing Group, Microsoft Research https://www.microsoft.com/en-us/research/people/yuzheng/
	Dr. Zhibo Pang **Title: Towards the Real-Time Cyber Physical Systems for Smarter Living and Production Facilities** Senior Scientist ABB AB Corporate Research Forskargränd, Sweden https://www.linkedin.com/in/zhibopang

Keynote Speech I

Visual Search via Smart Phone Based on CDVS

Wen Gao
Peking University, China

Session Chair: Prof. Zhongxuan Luo

Abstract:

Smart phone and surveillance camera systems have shown great potential for visual search. Emerging applications include landmark search, product search, CD or book cover search, location recognition, scene retrieval, car search, etc. There are at least two challenges for visual search, low latency transmission via wireless network connection, and high speed search in large image database at cloud server. A possible approach is to extract the visual feature at the capturing device, then sending that to cloud server for search. A practical issue is how to make visual search applications compatible across a broad range of devices and platforms. To solve the problem, we need a standard which can specify the feature set which is suitable for most applications.

In this talk, I will discuss CDVS (Compact Descriptor for Visual Search), the standard created by ISO/IEC MPEG working group in 2015, known as ISO/IEC 15938-13, the part 13 of MPEG-7. CDVS uses feature descriptors instead of compressed images for transmitting and search, with high efficiency and acceptable search accuracy. To encode robust compact visual descriptors, advanced machine learning and data mining approaches have been employed to learn compact and discriminative properties from visual feature data, as well as to improve the search performance in dealing with a very large scale image database. In particular, a generative probabilistic model Fisher Kernel has been exploited in CDVS elegantly for scalable, compact and dense feature representation, which selectively aggregates local feature descriptors for efficient visual search.

I will also give some results on competitive and collaborative platform to evaluate the state-of-the-art visual search techniques and application solutions, where machine learning and data mining techniques have been shown to be the most promising approach to improve the performance and usability of visual search.

Biography:

Wen Gao received his Ph.D. degree in electronics engineering from the University of Tokyo in 1991. He is a professor at the Peking University since 2006. He serves as the vice president of NSFC from Feb. of 2013, and the president of CCF from Feb. 2016. Prof. Gao joined with the Harbin Institute of Technology from 1991 to 1995, as professor, department head of computer science. He was with Institute of Computing Technology (ICT), Chinese Academy of Sciences (CAS) from 1996 to 2005. During his career in CAS, he served as the managing director of ICT from 1998 to 1999, the executive vice president of Graduate School of CAS from 2000 to 2004, the vice president of University of Science and Technology China from 2000 to 2003.

Prof. Gao works in the areas of multimedia and computer vision, including video coding, video analysis, multimedia retrieval, face recognition, multimodal interfaces, and virtual reality. He published six books and over 700 technical articles in refereed journals and proceedings in above areas. He earned many awards including six National Awards in Science and Technology Achievements. He has been featured by IEEE Spectrum in June 2005 as one of the "Ten To Watch" among China's leading technologists. He is a fellow of IEEE, a fellow of ACM, and a fellow of Chinese Academy of Engineering.

Keynote Speech II

Smart Sensors - Research, Trends and Opportunities

M. Jamal Deen

McMaster University, Canada

Session Chair: Prof. Laurence T. Yang

Abstract:

Several of the grand challenges in engineering for current and future societal needs require smart sensors. For example, in the health area, smart sensing systems are required for screening, diagnostics and monitoring of a variety of diseases and illnesses for the health of well-being of individuals. Using these screening, diagnostics and monitoring systems, it will be feasible to catch diseases in their very early stages, which in turn will significantly impact treatment and outcomes. In the health area, we discuss healthcare and aging, major healthcare issues and four examples of smart sensor systems. These sensors are for heart monitoring, a living diary, cancer screening and blood oxygenation levels. In the environmental area, smart sensors are required to, for example, monitor drinking water quality because water is a vital and necessary resource for all humans. However, chemicals and bacteria in drinking water pose significant health risks for us. Therefore, to improve the safety of drinking water, sensitive, low-cost, rapid detection methods are required for water quality monitoring. In this area, we discuss three sensitive, low-cost systems for counting bacteria and for monitoring the pH and chlorine level in drinking water. In both the health and environment areas, the sensor systems are either developed directly in standard, low-cost, deep sub-micron silicon technologies, or with technologies compatible with standard silicon manufacturing. This approach also allows us to take advantage of the inherent speed and increased integration density afforded by the state-of-the-art silicon processes while concurrently minimizing the manufacturing costs. Next, we will focus on trends in smart sensor systems. These trends will be illustrated with examples from healthcare and automotive fields, as well as for smart mobile devices and smart cities. Finally, we will discuss the role of internet-of-things for connected homes, wearables, connected cities and connected cars.

Biography:

M. Jamal Deen is Distinguished University Professor, Senior Canada Research Chair in Information Technology, and Director of the Micro- and Nano-Systems Laboratory, McMaster University. His current research interests are nanoelectronics, optoelectronics, nanotechnology and their emerging applications to health and environmental sciences. Dr. Deen's research record includes more than 500 peer-reviewed articles (about 20% are invited), two textbooks on "Silicon Photonics-Fundamentals and Devices" and "Fiber Optic Communications:

Fundamentals and Applications", 6 awarded patents that have been used in industry, and 13 best paper/poster/presentation awards. Over his career, he has won more than fifty awards and honors. As an undergraduate student at the University of Guyana, Dr. Deen was the top ranked mathematics and physics student and the second ranked student at the university, winning the Chancellor's gold medal and the Irving Adler prize. As a graduate student, he was a Fulbright-Laspau Scholar and an American Vacuum Society Scholar. He is a Distinguished Lecturer of the IEEE Electron Device Society for more than a decade. His awards and honors include the Callinan Award as well as the Electronics and Photonics Award from the Electrochemical Society; the Distinguished Researcher Award from the Province of Ontario; a Humboldt Research Award from the Alexander von Humboldt Foundation; the Eadie Medal from the Royal Society of Canada; McNaughton Gold Medal (highest award for engineers), the Fessenden Medal and the Ham Education Medal, all from IEEE Canada IEEE Canada In addition, he was awarded the three honorary doctorate degrees in recognition of his exceptional research and scholarly accomplishments, professionalism and service. Dr. Deen has also been elected Fellow status in ten national academies and professional societies including The Royal Society of Canada - The Academies of Arts, Humanities and Sciences (the highest honor for academics, scholars and artists in Canada), IEEE, APS (American Physical Society) and ECS (Electrochemical Society). Currently, he is serving as the elected President of the Academy of Science, The Royal Society of Canada.

Keynote Speech III

Urban Computing: Using Big Data to Solve Urban Challenges

Yu Zheng

Urban Computing Group, Microsoft Research

Session Chair: Prof. Stephen S. Yau

Abstract:

Urban computing is a process of acquisition, integration, and analysis of big and heterogeneous data generated by a diversity of sources in cities to tackle urban challenges, e.g. air pollution, energy consumption and traffic congestion. Urban computing connects unobtrusive and ubiquitous sensing technologies, advanced data management and analytics models, and novel visualization methods, to create win-win-win solutions that improve urban environment, human life quality, and city operation systems. Urban computing is an inter-disciplinary field where computer science meets urban planning, transportation, economy, the environment, sociology, and energy, etc., in the context of urban spaces. In this talk, I will overview the framework of urban computing, discussing its key challenges and methodologies from computer science's perspective. This talk will also present a diversity of urban computing applications, ranging from big data-driven environmental protection to transportation, from urban planning to urban economy. The research has been not only published at prestigious conferences but also deployed in the real world. More details can be found on http://research.microsoft.com/en-us/projects/urbancomputing/default.aspx

Biography:

Yu Zheng is a research manager from Microsoft Research, passionate about using big data to tackle urban challenges. One of his project, entitled Urban Air, has been deployed with the Chinese Ministry of Environmental Protection, predicting air quality for over 300 Chinese cities. Zheng currently serves as the Editor-in-Chief of ACM Transactions on Intelligent Systems and Technology and a member of Editorial Advisory Board of IEEE Spectrum. He is also the founding secretary of SIGKDD China Chapter. Zheng publishes referred papers frequently as a leading author at prestigious conferences and journals, such as KDD, VLDB, UbiComp, and IEEE TKDE, where he has received five best paper awards. His book, titled "Computing with Spatial Trajectories", has been used as a text book in universities world-widely and awarded the Top 10 Most Popular Computer Science Book authored by Chinese at Springer. Zheng has served as chair on over 10 prestigious international conferences—most recently, as the program co-chair of ICDE 2014. In 2013, he was named one of the Top Innovators under 35 by MIT Technology Review (TR35) and featured by Time Magazine for his research on urban computing. In 2014, he was named one of the Top 40

Business Elites under 40 in China by Fortune Magazine, because of the business impact of urban computing he has been advocating since 2008. Zheng is also a Chair Professor at Shanghai Jiao Tong University, an Adjunct Professor at Hong Kong University of Science and Technology, and Hong Kong Polytechnic University.

Keynote Speech IV

Intelligent Human Activity Detection in Smart Living

Stephen S. Yau

Arizona State University, USA

Session Chair: Prof. Jinjun Chen

Abstract:

Due to the rapid progress in cost-effective smart wearable devices, Internet of Things, cloud computing, it is increasingly convenient to detect human activity continuously, which can greatly improve various aspects which are needed for smart living, such as monitoring physical conditions, providing services for health care and assisted living, and predicting human risk behaviors. In this address, the current state of the art, challenges, and future research directions for developing some of these applications in smart living will be discussed.

Biography:

Stephen S. Yau is the director of Information Assurance Center and Professor of Computer Science and Engineering at Arizona State University (ASU), Tempe, Arizona, USA. He served as the chair of the Department of Computer Science and Engineering at ASU in 1994-2001. Previously, he was on the faculties of Northwestern University, Evanston, Illinois, and University of Florida, Gainesville. He served as the president of the Computer Society of the Institute of Electrical and Electronics Engineers (IEEE) and was on the IEEE Board of Directors, and the Board of Directors of Computing Research Association. He served as the editor-in-chief of IEEE COMPUTER magazine. He organized many major conferences, including the 1989 World Computer Congress sponsored by the International Federation for Information Processing (IFIP), and the IEEE Annual International Computer Software and Applications Conference (COMPSAC) sponsored by IEEE Computer Society. He was a general co-chair of the 2014 IEEE World Congress on Services, including Cloud Computing, Web Services, Services Computing, Mobile Services, held in Anchorage, Alaska, USA.

His current research includes cloud and services computing, cyber security, software engineering, mobile ad hoc networks, ubiquitous computing and Internet-of-Things. He has received many awards and recognitions, including the Tsutomu Kanai Award and Richard E. Merwin Award of the IEEE Computer Society, the IEEE Centennial Award and Third Millennium Medal, and the Outstanding Contributions Award of the Chinese Computer Federation. He is a Life Fellow of the IEEE and a Fellow of the American Association for the Advancement of Science. He received the B.S. degree from National Taiwan University, Taipei, and M.S. and Ph.D. degrees from the University of Illinois, Urbana, all in electrical engineering.

Keynote Speech V

Big Earth Data Computing: Understanding the Unobserved

Lizhe Wang
China Univ. of Geosciences
Chinese Academy of Sciences
China

Session Chair: Prof. Zhikui Chen

Abstract:

Earth system is a highly complexed, highly uncertain huge system. People's understanding on earth system is very limited due to spatial and temporal obstacles. In addition to modeling and simulation, big data computing in geosciences will bring opportunities to understanding complex phenomenon via analyzing multi-sourced heterogeneous and non-stationary big earth data.

Biography:

Lizhe Wang is a "ChuTian" Chair Professor at School of Computer Science, China Univ. of Geosciences (CUG), and a Professor at Inst. of Remote Sensing & Digital Earth, Chinese Academy of Sciences (CAS). Prof. Wang received B.E. & M.E from Tsinghua Univ. and Doctor of Eng. from Univ. Karlsruhe (Magna Cum Laude), Germany. Prof. Wang is a Fellow of IET, Fellow of British Computer Society. Prof. Wang serves as an Associate Editor of IEEE T. Computers, IEEE T. on Cloud Computing, IEEE T. on Sustainable Computing. His main research interests include Cloud Computing, e-Science, and remote sensing image processing.

Keynote Speech VI

Towards the Real-Time Cyber Physical Systems for Smarter Living and Production

Facilities

Zhibo Pang

ABB Corporate Research, Sweden

Session Chair: Prof. Mianxiong Dong

Abstract:

The big efforts from industries towards the Internet of Things, Services and People (IoTSP) and Industry4.0 are making living and production facilities smarter. Despite the diversity of specific solutions, the primary shared feature of the new generation of smart facility is the tight combination of computation, networking, and physical processes. Therefore the emerging paradigm of Cyber-Physical Systems (CPS) will be the foundation. In CPY, computational elements monitor and control the physical elements through high performance networks with feedback loops where physical processes affect computations and vice versa. It is not only an opportunity but also huge challenge to fulfill the demanding users of such smart living and production facilities.

Today, we have seen some pre-cursor CPS examples in the areas like space, avionics, automotive, chemical processes, civil infrastructure, energy, healthcare, manufacturing, transportation, entertainment, and consumer appliances. To delivery enough business values, the CPS solutions have to provide real-time, reliable and deterministic computation and communication to effectively control the physical loops with short time constant. Additionally, we have to apply more complicated AI (artificial intelligence) algorithms for sufficient smartness, deploy the solution through cloud to cover highly distributed facilities, and adopt wireless communications to reach mobile objects and harsh environments. All these requirements are pulling the evolution from conventional CPY to the Real Time CPS (RT-CPS), which is motivating the emerging technologies like edge computing, 1ms internet, hard real time wireless communications, centimeter level indoor localization, etc. In this presentation, I will overview the details requirements and challenges by practical use cases of RT-CPS in process industry, factory automation, cloud robotics, smart buildings, and power systems. The latest progresses on wireless communications with ultra-high performances e.g. Gbps level data rate and sub-us level latency, will be introduced as well.

Biography:

Zhibo Pang (Senior Member IEEE) received B.Eng. in Electronic Engineering from Zhejiang University, Hangzhou, China in 2002, MBA in Innovation and Growth from University of Turku, Turku, Finland in 2012, and PhD in Electronic and Computer Systems from the Royal Institute of Technology (KTH), Stockholm, Sweden in 2013. He is currently a Senior Scientist and Project Manager on Industrial IoT and Buildings at ABB Corporate Research, Västerås, Sweden, leading research projects on real-time industrial wireless communications, high accuracy localization, IP-based convergence of communications, and vertical solutions for smart homes and buildings, factory and manufacturing, and power systems. He is also serving as Adjunct Professor or similar roles at universities such as Royal Institute of Technology (KTH), Sweden, Tsinghua University, China, and Beijing University of Post and Telecommunication (BUPT), China. He is a Senior Member of IEEE and serves as Chair of Sub TC in the Technical Committee on Industrial Informatics, and Vice Chair of Sub TC in the Technical Committee on Cloud and Wireless Systems for Industrial Applications, Industrial Electronics Society of IEEE. He is serving the editorial boards of the Journal of Management Analytics (Taylor & Francis), and the Journal of Industrial Information Integration (Elsevier). His current research interests include the real-time cyber physical systems, Internet-of-Things, wireless sensor network, industrial communication, real time embedded system, enterprise information systems, automation networks, multicore system-on-chip and network-on-chip. He also works on the business-technology joint research such as strategy, business model, value chain, and entrepreneurship.

Dr. Zhibo Pang led the productization of the world first single chip DVB-S receiver SoC in 2005, conceptualized and demonstrated for the first time the Intelligent Medicine Box for in-home healthcare in 2009, developed one of the earliest functional implementations of WirelessHART stack for industrial wireless sensor networks in 2012, and demonstrated centimeter level accuracy in-door localization as industrial infrastructure with the world-wide leading performances in 2014. He has 25+ patents and 13+ refereed journal papers and 40+ conference papers. He won the National Great Invention Award of China in 2005, the First Place Prize of the RFID Nordic EXPO in 2008, and the Outstanding Paper Awards in ICACT2013.

Smart X 2016 Technical Program

Session 1: Smart Environment and Networking

Time: 14:00 pm – 17:00 pm

Location: Center Meeting Room (Office Building No. 204, 2th Floor)

Session Chair：Prof. Chen Yu

Paper ID: 2	A Novel Chain-Based Routing Protocol - BranChain in Wireless Sensor Networks
	Wanli Chen, Xingcheng Liu and Xiang Chen
Paper ID: 14	A PID-FEC Mechanism Using Cross-layer Approach for Video Transmission over Multi-hop Wireless Networks
	Longzhe Han, Jia Zhao, Hongying Yu, Xuecai Bao, Hui Sun, Huasheng Zhu and Yeonseung Ryu
Paper ID: 19	DRET: A System for Detecting Evil-twin Attacks in Smart Homes
	Zhanyong Tang, Yujie Zhao, Lei Yang, Shengde Qi, Dingyi Fang, Xiaojiang Chen, Xiaoqing Gong and Zheng Wang
Paper ID: 31	Dynamic Compressive Wideband Spectrum Sensing Based on Channel Energy Reconstruction in Cognitive Radio Networks
	Guangming Luo, Baoming Chang, Zhetao Li, Anfeng Liu, Tingrui Pei and Shujuan Tian
Paper ID: 4	Improving Broadcast QoS for Smart Industrial Wireless Sensor Networks
	Zhuangbin Chen, Anfeng Liu, Zhetao Li, Young-June Choi, Hiroo Sekiya and Jie Li
Paper ID: 18	Speed-Density Model of Interrupted Traffic Flow Based on Coil Data
	Chen Yu, Jiajie Zhang, Dezhong Yao, Ruiguo Zhang and Hai Jin

Session 2: Machine Learning

Time: 14:00 pm – 17:00 pm

Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)

Session Chair：Prof. Xingang Liu

Paper ID: 34	An Ensemble Feature Selection Method for Imbalanced Learning in Software Defect Prediction
	Guoxun Wang and Yachen Lin
Paper ID: 33	No-reference Quality Assessment with Convolutional Neural Network
	Lin Li and Shengsheng Yu
Paper ID: 12	A Risk Analysis and Prediction Model of Electric Power GIS Based on Deep Learning
	Kehe Wu, Jianyong Xue and Yan Zhou

Paper ID: 38	Chinese Entity Attributes Extraction Based on Bidirectional LSTM Networks
	Zhonghe He, Zhongcheng Zhou, Liang Gan and Weihong Han
Paper ID: 25	Combining Density Estimation and Distance Computation for K-Means Initialization
	Wei Du, Hu Lin and Haibo Yang
Paper ID: 15	KNN based Ensemble Selection for Imbalance Learning
	Guirong Zheng, Changan Wu and Huaping Guo
Paper ID: 23	Logistic Regression for Imbalanced Learning based on Clustering
	Huaping Guo, Rui Xue, Hongbing Liu and Changan Wu

Session 3: Big Data & Data Intelligence

Time: 14:00 pm – 17:00 pm

Location: Center Meeting Room (Office Building No. 204, 2th Floor)

Session Chair：Prof. Xingcheng Liu

Paper ID: 30	An Instant Message Scheme for Cross-Domain SDN Controllers in Cloud Data Center
	Weiyang Wang, Mianxiong Dong, Kaoru Ota, Jun Wu, Jianhua Li and Gaolei Li
Paper ID: 39	A Novel Exercise Thermo-physiological Comfort Prediction Model with Fuzzy Logic
	Nan Jia, Liang Yu, Ruomei Wang, Xiaonan Luo, Qingzhen Xu and Kainxing Yang
Paper ID: 37	Recovering Individual's Commute Routes Based on Mobile Phone Data
	Xin Song, Jingyuan Wang, Yuanxin Ouyang and Zhang Xiong
Paper ID: 20	Social Network Based Mobile Gaming Popularity Analysis: The Case of WeChat Game in China
	Hui Chen, Wenge Rong, Xiaoyang Ma, Yue Qu and Zhang Xiong
Paper ID: 24	The Power Big Data Based Energy Analysis for Intelligent Community in Smart Grid
	Yiying Zhang, Yeshen He, Ying Liu and Kun Liang
Paper ID: 22	The Wisdom of the Few: A Provable Approach
	Xiao-Yu Huang and Xian-Hong Xiang

Session 4: Smart Models and Systems

Time: 14:00 pm – 17:00 pm

Location: No. 1 Meeting Room (Office Building No. 514, 5th Floor)

Session Chair：Prof. Zhibo Pang

| Paper ID: 41 | A Cognitive System about Intelligent Agent with Rational Belief |
| | *Jinsheng Gao and Changle Zhou* |

Smart X 2016 Conference Program

Paper ID: 28	An Improved Human Physiological Simulation Model for Health Care Applications
	Liang Yu, Nan Jia, Ruomei Wang, Jiao Jiao and Qingzhen Xu
Paper ID: 5	An Iterative Shrinkage Threshold Method for Improving Radar Angular Super-resolution
	Xin Zhang, Xiaoming Liu, Chang Liu and Zhenyu Na
Paper ID: 21	A Novel Statistical Database Management Mechanism in Smart Transportations
	Zhiming Ding, Xu Gao, Zhi Cai and Juncheng Chen
Paper ID: 36	Comprehensive Vulnerability Assessment and Optimization Method of Power Communication Network
	Chenchen Ji, Peng Yu, Wenjing Li and Puyuan Zhao
Paper ID: 3	The Attack Efficiency of PageRank and HITS Algorithms on Complex Networks
	Yangqian Su, Yunfei Yi and Jun Qin

Accepted Paper Abstract

Session 1: Smart Environment and Networking

<table>
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<td>P2</td>
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Authors: Wanli Chen, Xingcheng Liu, Xiang Chen
From: School of Electronics and Information Engineering, Sun Yat-sen University, Guangzhou
Title: A Novel Chain-Based Routing Protocol - BranChain in Wireless Sensor Networks

Abstract: As an improvement of the LEACH protocol, the PEGASIS reduces the total amount of data and prolongs the network lifetime. Being such an elegant solution to energy consumptions, however, there are still three deficiencies with the PEGASIS, which include: (1) the inevitability of long link between some neighbor nodes due to the local optimal result of adopting greedy algorithm, (2) the overhead of the ineligible Cluster Head (CH), and (3) the overhead and time cost of chain rebuilding whenever a node becomes invalid. In order to solve the problems aforementioned, an improved protocol, called the BranChain, short for the Branched Chain Routing Protocol, is proposed. In the novel algorithm, a novel scheme combined a long link avoiding algorithm, a network topology re-adjustment strategy, and a CH re-election mechanism is employed. In the BranChain protocol, whenever a long link comes into being, the node ready to be originally connected is supposed to form a new independent branched chain with the greedy algorithm. When all nodes get connected in the chain, the system will connect all the independent branched chains together by searching the optimal paths between each two of the branched chains. When the sensor nodes, except for end points, die, the two broken branched chains will be connected with the same algorithm as that of the optimal paths searching. Simulation results show that, comparing with the PEGASIS, the BranChain protocol can significantly prolong the network lifetime, which is vital to wireless sensor networks.

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<td>P11</td>
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Authors: Hou Lin, Yiying Zhang
From: Tianjin University of Science & Technology, Tianjin
Title: A New Energy-Efficient and Reliable Distance Protocol for Mobile Ad Hoc Networks

Abstract: Due to the independent power, self-configuration and mobility, the mobile ad hoc network (MANET) is energy-sensitive. Therefore, AODV (Ad hoc on demand distance vector) protocol usually employed the hop counts as a measurement basis to forward data. However，without considering about the factor of residual energy and link quality, AODV usually occurs the failure of path and discover the routes again and again. In this paper, we propose a new protocol named AEDV (Ad hoc on Energy and distance vector). AEDV adopts a neighbor discovery mechanism based on the energy radius and residual energy. Firstly, If node in a valid energy radius coverage area and the residual energy is more than energy threshold, it can be in a neighborhood graph. Secondly, we also give a new concept that called energy loss in the link. When choosing the next hop, node power and link quality are fully considered, it can solve the

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problem of uneven energy consumption load in AODV protocol. Simulation results show that, the proposed protocol increases the node expiration time by 32% and 7-9% higher packet delivery ratio compared to AODV or ASEA.AEDV can effectively prolong the network life-time and enhance the network performance.

P14

Authors: Longzhe Han, Jia Zhao, Hongying Yu, Xuecai Bao, Hui Sun, Huasheng Zhu, and Yeonseung Ryu

From: Nanchang Institute of Technology, Nanchang; Nanchang Institute of Technology, Nanchang; Jiangxi Province Key Laboratory of Water Information Cooperative Sensing and Intelligent Processing, Nanchang; Daqing Petroleum Equitment Group, Taicang; Myongji University, Yongin, Korea.

Title: A PID-FEC Mechanism Using Cross-layer Approach for Video Transmission over Multi-hop Wireless Networks

Abstract: This paper proposes a Proportional Integral Derivative control based Forward Error Correction (PID-FEC) mechanism to overcome packet losses and improve the quality of video streaming service over Multi-hop Wireless Networks (MWNs). The traditional FEC schemes require the feedback information from the receiver to calculate redundant rates. In MWNs, the transmission delay and various multi-link statuses, however, make the feedback information difficult to represent the real-time network conditions. Our proposed method adopts the cross-layer approach and leverages the functionalities of different network layers. The Automatic Repeat reQuest (ARQ) on the Media Access Control (MAC) layer is used as an indicator of packet losses. With the packet loss information, the redundancy rates are adaptively regulated based on the PID control algorithm. The experimental results show that the PID-FEC achieves better quality of video streaming and higher FEC efficiency than the conventional FEC schemes under various network conditions.

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Authors: Zhanyong Tang, Yujie Zhao, Lei Yang, Shengde Qi, Dingyi Fang, Xiaojiang Chen, Xiaoqing Gong and Zheng Wang

From: Northwest University, Xi'an; Lancaster University, UK

Title: DRET: A System for Detecting Evil-twin Attacks in Smart Homes

Abstract: Evil-twin is one of most commonly attacks in the WIFI environments, with which an attacker can steal sensitive information by cloning a fake AP in Smart Homes. The current approaches of detecting Evil-twin AP uses some identities/fingerprints of legitimated APs to identify rouge APs. Prior work in the area uses information like SSIDs, MAC addresses, and network traffics to detect bogus APs. However, such information can be easily intimated by the attacker, leading to low detection rates. This paper introduces a novel Evil-Twin AP detection method based on received signal strength indicator (RSSI). Our approach exploits the fact that the AP location is relatively stable in Smart Homes, which is to great extent to meet the requirement of the detection factor not easy to imitate as previous refer. We employ two detection

strategies: a single position detection and a multi-positioned detection methods. Our approach exploits the multipath effect of WIFI signals to translate the problem of attack detection into AP positioning detection. Compared to classical detection methods, our approach can perform detection without relying on professional devices. Experimental results show that the single position detection approach achieves 20 seconds' reduction of delay time with an accuracy of 98%, whereas the multi-positioned detection approach achieves 90% correct.

P31	**Authors:** Luo Guangming, Chang Baoming, Li Zhetao, Liu Anfeng, Pei Tingrui, and Tian Shujuan **From:** Xiangtan University, Central South University, ChangSha, **Title:** Dynamic Compressive Wideband Spectrum Sensing Based on Channel Energy Reconstruction in Cognitive Radio Networks **Abstract:** Cognitive radio (CR) networks provide a solution to improve spectrum utilization. Wideband spectrum sensing plays an important role in building CR networks (CRNs). In this paper, we propose a novel dynamic compressive wide-band spectrum sensing method based on channel energy reconstruction. We employ a wide-band random filters bank to achieve channel energy measurements, then directly recover the energy of each channel that is changing occupancy status in consecutive time slot rather than recovering the whole spectrum. Moreover, there is no need to use reconstruction algorithm unless there are two or more channels changing their occupancy status. Our simulation results show a significant improvement in probability of detection and probability of false alarm, in comparison to existing methods. And simulation results also show the fast speed and robustness to noise of the proposed method.
P4	**Authors:** Zhuangbin Chen, Anfeng Liu, Zhetao Li, Young-June Choi, Hiroo Sekiya and Jie Li **From:** Central South University, ChangSha. Xiangtan University, Xiangtan. Ajou University, Suwon. Chiba University, Chiba and University of Tsukuba, Tsukuba **Title:** Improving Broadcast QoS for Smart Industrial Wireless Sensor Networks **Abstract:** In smart industrial wireless sensor networks, sensor nodes transmit sensed data to sink node, however, in order to make industrial wireless sensor networks (IWSNs) more intelligent, sensor nodes usually adopt programmable technology. If sensor nodes need to be upgraded, sink will send program code packet to sensor nodes, which can be compiled by sensor nodes, so new capabilities can be installed to nodes, forming the so-called Software Defined Network (SDN). Due to the high volume of program code, the constraint energy of sensor nodes and the link quality of wireless network, rapidly broadcasting the program code packet to every node in network can be a challenge issue. In this paper, we propose a novel broadcast scheme which can simultaneously achieve low delay and high reliability. In our scheme, sensor nodes take full advantage of the nodes' residual energy, which is caused in data collection period, to enlarge the broadcast radius, i.e., the transmitting power, of sensor nodes in far-sink region. So the packet reception probability can be improved as well as the broadcast delay of program code packets, achieving a high quality of services (QoS). The theoretical analysis and experimental

	results show that, comparing with previous broadcast scheme, our approach can reduce the Network Upgrade Delay (NUD) by 14.8%-42.5% and at the same time increase the data reception reliability under the same lifetime.

P18	**Authors:** Chen Yu, Jiajie Zhang, Dezhong Yao, Ruiguo Zhang and Hai Jin **From:** Huazhong University of Science and Technology, Wuhan; Siemens Ltd., China Corporate Technology, Wuhan **Title:** Speed-Density Model of Interrupted Traffic Flow Based on Coil Data **Abstract:** As a fundamental traffic diagram, the speed-density relationship can provide a solid foundation for traffic flow analysis and efficient traffic management. Because of the change in modern travel modes, the dramatic increase in the number of vehicles and traffic density, and the impact of traffic signals and other factors, vehicles change velocity frequently, which means that a speed-density model based on uninterrupted traffic flow is not suitable for interrupted traffic flow. Based on the coil data of urban roads in Wuhan, China, a new method which can accurately describe the speed-density relation of interrupted traffic flow is proposed for speed fluctuation characteristics. The model of upper and lower bounds of critical values obtained by fitting the data of the coils on urban roads can accurately and intuitively describe the state of urban road traffic, and the physical meaning of each parameter plays an important role in the prediction and analysis of such traffic.

Session 2: Machine Learning

P34	**Authors:** Guoxun Wang, Yachen Lin **From:** Chinese Academy of Sciences, Beijing and China Guangfa Bank, Guangzhou **Title:** An Ensemble Feature Selection Method for Imbalanced Learning in Software Defect Prediction **Abstract:** Software development involves many kinds of hazards. Software defect prediction plays an important role in software risk management. Classification is an effective approach for software defect prediction. However, the relatively low error module rate makes it become an imbalanced learning problem. This paper proposes a new feature selection method to suppress the class imbalance problem, and identifies the most suitable techniques for software defect prediction. Various software defect datasets provided by MDP repository are used in the experiments. Simulation results indicated that the proposed feature selection approach makes a notable lift on the criteria overall accuracy, F-measure, and AUC, and would be suitable for applications in which the minorities are more concerned.

P33	**Authors:** Lin Li, Shengsheng Yu **From:** Wuhan University of Technology, Wuhan and Huazhong University of Science and Technology, Wuhan **Title:** No-reference Quality Assessment with Convolutional Neural Network **Abstract:** How to extract image features highly correlated with visual perception is still a challenging task in No-Reference Image Quality Assessment. We aim to test the feasibility of introducing deep learning into quality assessment algorithm. In this paper, we develop a novel convolution neural network IQFCNN that is able to learn more discriminative image quality features, and apply the learned features to predict image quality. We also use the local luminance coefficients normalization and dropout technology to improve the IQF-CNN learning ability. The proposed method can accurately measure the five common image distortions on standard benchmarks, and demonstrates improvement over the previous state of the art NR-IQA works.
P12	**Authors:** Kehe Wu, Jianyong Xue and Yan Zhou **From:** North China Electric Power University, Beijing **Title:** A Risk Analysis and Prediction Model of Electric Power GIS Based on Deep Learning **Abstract:** In the power distribution and supplying system, since the regional power grid, power supply and power users are complex and diverse, making production, operation and management in the power system are closely associated with the geographic information. Geographic Information Systems (GIS) have become an indispensable part of the power information system. With the help of GIS equipment for dynamic analysis, combined with the shallow depth study of nonlinear network structure for efficient learning. Complex function model is able to simulate the real operational situation of power grid equipment. Eventually, we are able to predict the risk of entire power grid and provide decision support for risk management. At the meantime, our work based on multiple sets of historical data that collected by the provincial power grid systems. After training and validation the model, we predicted real-time risk based on the trained model and compared the result with the analysis and forecasting results of posterior data, the experimental result shows that the model is fully capable of achieving better results.
P38	**Authors:** Zhonghe He, Zhongcheng Zhou, Liang Gan, Weihong Han **From:** National University of Defense Technology, Changsha **Title:** Chinese Entity Attributes Extraction Based on Bidirectional LSTM Networks **Abstract:** For the low performance of Slot Filling method applied in Chinese Entity-attribute extraction at present, this paper presents a distant supervision relation extraction method based on Bidirectional Long Short-Term Memory Neural Network. First we get the Infor-box of Baidu baike, using relation triples of Infor-box to get the training corpus from the Internet, and then we train the classifier based on bidirectional LSTM Networks. Compared with classical methods, the method of this paper is fully automatic in the aspect of data annotation and feature extraction.

	Experiment results show that the proposed method is effective and it's suitable for information extraction in high dimensional space. Compared with the SVM algorithm, the accuracy rate is significantly improved.

P25	**Authors:** Wei Du, Hu Lin, Jianwei Sun, Bo Yu, Haibo Yang **From:** Shenyang Institute of Computing Technology, Shenyang. University of Chinese Academy of Sciences, Beijing. **Title:** Combining Density Estimation and Distance Computation for K-Means Initialization **Abstract:** As a partition based clustering algorithm, K-Means is widely used in many areas for the features of its efficiency and easily understood. However, it is well known that the K-Means algorithm may get suboptimal solutions, depending on the choice of the initial cluster centers. In this paper, we propose a new K-Means initialization algorithm which combines Density Estimation and Distance Computation. The proposed algorithm first employ conventional Gaussian kernel density estimation method to find the highly density data areas in one dimension. Then the next step is to iteratively use density estimation from the lower variance dimensions to the higher variance ones until all the dimensions are computed. Experiments on actual datasets show that our method can get similar results compared with other conventional methods with fewer computation tasks.

P15	**Authors:** Guirong Zheng, Changan Wu and Huaping Guo **From:** Xinyang Normal University, Xinyang **Title:** KNN based Ensemble Selection for Imbalance Learning **Abstract:** Classification of imbalance datasets is one of the crucial issues in the field of machine learning. Because the distribution of imbalance dataset is extremely skew, the traditional classifications often come up with a disappointed performance. Unlike the traditional methods, this paper reconsiders class imbalance problem from the viewpoint of ensemble learning. But the most ensembles tend to build base classifiers with high and low generalization performance at the same time, while the latter is helpless to improve the generalization ability of ensemble. To solve this problem, an ensemble algorithm named NNES (k-Nearest Neighbor based Ensemble Selection) was proposed in this paper. NNES tries to search for the k-nearest neighbors of an unlabeled instance as the selection set, and then select an optimal or suboptimal sub-ensemble to predict the instance. Considering the local properties of the unlabeled instance, thus NNES tends to pay more attention on minority and improve its performance on imbalance datasets. Experimental results show that NNES can improve the classification performance of the imbalance datasets. Besides, this method can combine with the sampling techniques to further improve its performance.

P23	**Authors:** Huaping Guo1, Rui Xue1, Hongbing Liu1 and Changan Wu

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From: School of Computer and Information Technology, Xinyang Normal University, Xingyang 464000, China

Title: Logistic Regression for Imbalanced Learning based on Clustering

Abstract: Class-imbalance is very common in real world. For the imbalanced class distribution, traditional state-of-the-art classifiers do not work well on imbalanced data sets. In this paper, we apply the well known statistical model logistic regression to imbalanced learning problem and, in order to improve its performance, we use cluster algorithms as the data pre-processing approach to partition majority class data to clusters. Then the logistic regression is learned on the corresponding rebalanced data sets. Experimental results show that, compared with other state-of-the art methods, the proposed one shows significantly better performance on measures of recall, g-mean, f-measure, AUC and accuracy.

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Session 3: Big Data & Data Intelligence

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Authors: Weiyang Wang, Mianxiong Dong, Kaoru Ota, Jun Wu, Jianhua Li, Gaolei Li
From: Shanghai Jiao Tong University, Shanghai. Muroran Institute of Technology, Muroran, Japan
Title: An Instant Message Scheme for Cross-Domain SDN Controllers in Cloud Data Center

Abstract: In this paper, we propose an instant messaging scheme based on Extensive Messaging and Presence Protocol (XMPP) and XMPP push functionality for flat distributed software defined network (SDN) control plane of enterprise network. The proposed scheme relies on push model and decentralized character of XMPP to overcome the shortcomings of poll method which can waste a lot of network and compute resources in large-scale distributed network environment. The instant messaging scheme enables all the controllers in the flat distributed control plane to share the same consistent global-view network information in real time through XMPP and XMPP publish/subscribe extension and solves the issue of not timely information synchronization among multiple controllers in the flat distributed SDN control plane.

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Authors: Nan Jia, Liang Yu, RuoMei Wang, XiaoNan Luo, QingZhen Xu and KaiXing Yang
From: Sun Yat-Sen University, Guangzhou and South China Normal University, Guangzhou
Title: A Novel Exercise Thermo-physiological Comfort Prediction Model with Fuzzy Logic

Abstract: Participation in a regular exercise program can improve health status and contribute to an increase in life expectancy. During exercise, the thermal interactions between human body, clothing and environment (HCE) are considered by integrating clothing heat and moisture models with the thermoregulatory model of the body. Research of thermo-physiological comfort is important to alleviate or avoid exercise accidents before they happened. In this paper, an exercise

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thermo-physiological comfort prediction model is reported. Considering the human body physiological properties, the human physiological attributes thermoregulatory model is designed to enhance the heat and moisture transfer simulation performances in the HCE system. The experiment results shown that some important thermal and physiological performances can be simulated based on the improved thermoregulatory model and there has same prediction trend about the experiment result and simulation result about thermo-physiological comfort.

P37	**Authors:** Xin Song, Jingyuan Wang, Yuanxin Ouyang, Zhang Xiong **From:** Beihang University, Beijing **Title:** Recovering Individual'S Commute Routes Based on Mobile Phone Data **Abstract:** Mining individuals' commute routes has been a hot spot in recent researches. Besides the impact on human mobility, it's quite important in lots of fields, such as traffic flow analysis, urban planning and path recommendation. Common ways to obtain these information are mostly based on questionnaire, which have many disadvantages such as high manpower cost, low accuracy, and low sampling precision. In this paper, we propose a method to recover individuals' commute routes based on passively generated mobile phone data. Mobile phone data have a wild coverage in most of the countries which are quite suitable to be used in studying human mobilities. The challenges lie in the low sampling rate and low precision of mobile phone data. To address these challenges, we adopt a two-step method to generate the commute route. The first step is data pre-processing, which extracts commute trajectories from raw dataset and format the road network into a better modality. The second step combines two information together and generates the commute route with best possibility. To evaluate the effectiveness of our method, we design two evaluating methods, which are path score evaluation and evaluating based on visualisation. Experimental results have shown the better performance of our method than the compared method.

P20	**Authors:** Hui Chen, Wenge Rong , Xiaoyang Ma, Yue Qu , Zhang Xiong **From:** Beihang University, Beijing; Jacobs Institute, Cornell Tech, Cornell University, USA **Title:** Social Network Based Mobile Gaming Popularity Analysis: The Case of WeChat Game in China **Abstract:** The game industry has been growing prosperously with the development of information technology. Recently, with the further advances in social network services and mobile services, playing social network based gaming in the mobile environment has gradually changed our daily life in terms of social connection and leisure time spending. It is then becoming an interesting question to ask what are the determinant factors affecting peoples intention in playing such games. Therefore in this research we use games in WeChat (Known as Wexin in China), the most popular mobile social network service in China, as an empirical study case and apply technology acceptance model (TAM) to study the reasons beneath the popularity of games in Weixin platform. Furthermore, factors from social and mobile perspective are particularly

studied and incorporated into the conventional TAM model. Experimental study on accumulated online survey data has revealed several interesting findings and it is believed that this research will be able to offer the researchers in the community further insight in analysing the social network based mobile games current popularity and future potential.

P24	**Authors:** Yiying Zhang, Yeshen He, Ying Liu, Kun Liang **From:** Tianjin University of Science & Technology, Tianjin. China Gridcom CO,.LTD ,Shenzhen **Title:** The Power Big Data Based Energy Analysis for Intelligent Community in Smart Grid **Abstract:** Smart grid deploys large numbers of intelligent terminals, to monitor or control the operating status and improve the energy efficiency and functional applications. In the intelligent community and smart industrial park, we deployed a variety of internet of things sensors to carry out applications for business users, ordinary users, commercial users and conducted energy analysis. In this paper, we established a multivariable, multi-dimensional intelligent electricity energy analysis model, and built a novel business intelligence system. Meanwhile, based on Hadoop, HBase, Hive etc., we realize the ETL, OLAP, data mining and BIReport functions. Also we present a novel parallel algorithm to achieve the data mining algorithms and data analysis algorithms, and solve the issue of processing speed of large-scale data analysis. We have deployed the business intelligence system in Gansu Province, Beijing, Shanghai and other areas of China. In terms of energy efficiency, it can save more than 8% costs. We focused on the user characteristics and electricity consumption, analyzed the energy efficiency and energy-related parameters. The analysis results guided the efficient electricity, and increased the functions of the intelligent community and the intelligent life preliminarily.

P22	**Authors:** Xiao-Yu Huang, Xian-Hong Xiang **From:** South China University of Technology, the First Affiliated Hospital of Sun Yat-Sen University **Title:** The Wisdom of the Few: A Provable Approach **Abstract:** In recent years, the Wisdom Of the Few (WOF) model has attracted substantial research interests. The WOF refers to the findings that in some collaborative prediction tasks, e.g., Collaborative Filtering (CF), with only the ratings from a small set of expert users, it nearly suffices to predict a much larger number of other users' unobserved ratings. In this paper, we propose a WOF algorithm for the CF problem, and prove that under some mild statistical assumptions, the algorithm can predict the users' missing ratings correctly with high probability guarantee. We also conduct CF experiments with the proposed algorithm on real datasets, the results show that our algorithm is competitive with the conventional CF algorithm.

Session 4: Smart Models and Systems

P41	**Authors:** Jinsheng Gao, Changle Zhou **From:** Xiamen University, Xiamen and Fujian Key Lab of the Brain-like Intelligent Systems, Xiamen **Title:** A Cognitive System about Intelligent Agent with Rational Belief **Abstract:** The relation between rational belief in mind and Nash equilibrium in games has been widely researched in different ways. In addition, about agent's belief, it has been defined as a graded function in artificial intelligence or epistemic logic. These works have obtained lots of achievements. Those researches mainly take subjective probability as the parameter of rational belief. And it is analyzed by empiricism and pragmatism. However, this paper mainly studies the cognitive properties about intelligent agent with rational belief. Based on the semantic analysis of the rational belief, we establish a cognitive inference system. After the proof of its soundness and completeness, we obtain some properties such like that rational belief is a necessary condition for knowledge, rational belief has realistic and clarity, and so on. All our works is to promote the research in necessary conditions for rational agent in artificial intelligence.

P28	**Authors:** Liang Yu, Nan Jia and Ruomei Wang, Jiao Jiao, Qingzhen Xu **From:** Sun Yat-sen University, The Hong Kong Polytechnic University, South China Normal University **Title:** An Improved Human Physiological Simulation Model for Health Care Applications **Abstract:** Abstract: Health care becomes more and more important in modern society. In order to prevent some health symptoms happened in daily life, it is important to develop an e_cient model to simulate the human physiological performance for predicting and reducing accidents like dehydration, exertional heatstroke, syncope, even sudden death and so on. In this paper, a novel human physiological computer simulation model is introduced. A nonlinear heart rate regulation model and the two-node thermal regulation model are integrated together to simulate the human physiological performance like temperature, sweat rate and heart rate. Experiment results show that our proposed physiological simulation model can well simulate the human physiological mechanisms and some important numerical computation results predict the same trends as the experimental measurements. These simulation results are used to analyze human physiological symptoms and assist the health risk assessment in the health care, furthermore.

P5	**Authors:** Xin Zhang, Xiaoming Liu, Chang Liu and Zhenyu Na **From:** School of Information Science and Technology, Dalian Maritime University **Title:** An Iterative Shrinkage Threshold Method for Improving Radar Angular Super-resolution **Abstract:** A new method for improving radar angular super-resolution is introduced in this

paper. Our aim is to regard the super-resolution problem as a constrained optimization problem. In this method we first establish a convex quadratic programming model with orthogonalizing the antenna pattern matrix that it could overcome the shortcoming of ringing artifact. To restore radar angular information, a fast Iterative Shrinkage Threshold (IST) algorithm is used by iterations. We endeavor to find the optimal solution of convex quadratic programming model by modifying the residual at each iteration because the optimal solution is equivalent to the restored radar angular information. Simulations further confirm our theoretical discussion, and manifested that our method could address the ill-posed problem existed in the classical super-resolution methods. A favorable performance is gained that the resolution could reach $0.3°$. Meanwhile, signal to restoration error ratio (SRER) comparisons provide an amazing result that our method is superior to other methods in terms of efficiency while the signal to noise ratio (SNR) is less than 0dB.

P21

Authors: Zhiming Ding, Xu Gao, Zhi Cai, and Juncheng Chen
From: Beijing University of Technology, Institute of Software the Chinese Academy of Sciences
Title: A Novel Statistical Database Management Mechanism in Smart Transportations

Abstract: The continued proliferation of sensors and mobile devices produces increasing volumes of data that capture the states of transportation infrastructures and reveal how people use them. By utilizing such kind of data, Intelligent Transportation Systems (ITS) can provide queries about individual objects, but also response for more complicated queries through statistical analysis. Obviously, statistical analysis is a typical method in smart transportation and is crucial in transforming individual sampling data into knowledge, which facilitates smart transportation systems to make decisions to optimize the use of transportation infrastructures. Unfortunately, however, most existing statistical analysis methods on sensor sampling data are either implemented outside the database kernel, or focus on specific analytical tasks, making them inappropriate for ITS big data analysis where both the types of sensor sampling data and the analytical tasks are diverse. To solve these problems, we propose a "Statistical Database Management Mechanism for Real-Time Big Data Analysis in Intelligent Transportation Systems" (denote as ITS-StatisticDB), in which various statistical operators are implemented inside a DBMS kernel. Thus, various complicated statistical analytical tasks can be expressed in standard SQL-like query statements and can be efficiently executed in the DBMS kernel. In addition, ITS-StatisticDB is designed in a distributed and parallel manner such that the statistical analysis tasks can be shared among the server nodes and the performance of analytical tasks can be greatly improved. We conduct an extensive evaluation on different sets of real sensor sampling data set, results show that our algorithms and ITS-StatisticDB are efficient and scalable.

P36

Authors: Chenchen Ji, Peng Yu, Wenjing Li, Puyuan Zhao
From: Beijing University of Posts and Telecommunications, Beijing
Title: Comprehensive Vulnerability Assessment and Optimization Method of Power

Communication Network

Abstract: Power communication network is a special communication network which bearers information interaction business of smart gird. The vulnerability assessment and optimization method of power communication network can enhance network robustness and has important theoretical and practical significance. A new vulnerability assessment and optimization method is established for the present assessment lacking consideration of business or actual availability and the optimization method having no dynamic update process. Firstly, in the vulnerability assessment, the influence factors of vulnerability are analyzed from two aspects of static and dynamic. Comprehensive vulnerability indexes, which are proved by different attacks are defined to assess the vulnerability of nodes and edges combining these factors. And then, for the problem of vulnerability distributing unevenly, a routing optimization method based on vulnerability balance is proposed by the reconfiguration of business routes. Finally, taking a real communication network as the simulating background, the assessment of nodes and edges in the network and the optimization of business route has been completed and it is proved that the assessment result is reasonable and the vulnerability of network after optimization is more balanced.

P3

Authors: Yangqian Su, Yunfei Yi, Jun Qin
From: Hechi University, Yizhou and South-Central University for Nationalities, Wuhan
Title: The Attack Efficiency of PageRank and HITS Algorithms on Complex Networks

Abstract: With the growing of the network scales, network attack strategies with high attack efficiency and computational efficiency are becoming more and more important. How to determine the attack order of objects is the the most important task in the attack strategy Various attack strategies with various sorting methods have been proposed while most of which neglected the computational efficiency. Inspired by the high computational efficiency of PageRank and HITS algorithms used in web pages sorting, we introduce those two algorithms to the field of network attack and try to explore the feasibility of those two algorithms used in attack strategies. The initial experimental results indicate that considering the computational efficiency and attack efficiency simultaneously, PageRank strategy has a better attack performance than other compared strategies. Initial discussions about the results are also given.