# GHTCE 2012

## 2012 IEEE GLOBAL HIGH TECH CONGRESS

### ON ELECTRONICS

November 18-20, 2012
Shenzhen Convention & Exhibition Center, Shenzhen, China

# Program Booklet

# Program at a glance

| Time | Bougainvillea | Daisy | Jasmine | Peony | Rose-3 |
|---|---|---|---|---|---|
| **Sunday, November 18** | | | | | |
| 09:00 | RE-S: *Registration* | | | | |
| 09:30 | | | | OC-S0P: *Opening Ceremony* | |
| 10:00 | | RS-S1D: *Image & Video Processing* | | RS-S1P: *Internet of Things* | RS-S1R: *RF & Wireless* |
| 12:00 | LB-S: *Lunch Break* | | | | |
| 14:00 | | RS-S2D: *Image & Video Processing* | | RS-S2P: *Internet of Things* | RS-S2R: *Network Technology & Energy Management* |
| 16:00 | TB-S: *Tea Break* | | | | |
| 16:15 | | RS-S3D: *Smart Grid, Power Systems and Renewable Energy* | | RS-S3P: *Enabling Technology* | RS-S3R: *ICT and Electronics for Healthcare* |
| **Monday, November 19** | | | | | |
| 09:00 | RE-M: *Registration* | | | | |
| 09:30 | PS-M1B: *Plenary Session* | | | | |
| 12:00 | LB-M: *Lunch Break* | | | | |
| 14:00 | PS-M2B: *Plenary Session* | | | | |
| 16:00 | TB-M: *Tea Break* | | | | |
| 16:15 | PS-M3B: *Plenary Session* | | | | |
| 17:15 | AC-M4B: *Awards Ceremony* | | | | |
| 19:00 | RD-M: *Reception Dinner* | | | | |
| **Tuesday, November 20** | | | | | |
| 09:00 | RE-T: *Registration* | | | | |
| 09:30 | | SS-T1D: *Next Generation ICT for Consumer Applications - Enabling Technology* | SS-T1J: *Next Generation ICT for Consumer Applications - Communications & Networking* | SS-T1P: *Next Generation ICT for Consumer Applications - Smart & Connected Applications* | SS-T1R: *Next Generation ICT for Consumer Applications - Multimedia & Human-Device Interaction* |
| 12:00 | LB-T: *Lunch Break* | | | | |
| 14:00 | | RS-T2D: *Network Technology & Energy Management* | SC-T2J: *IEEE Consumer Electronics Society Shenzhen Chapter meeting (everyone is welcome)* | PW-T2P: *Authors' Workshop: How to write papers for IEEE CE Transactions and Magazine* | RS-T2R: *RF & Wireless* |
| 16:00 | GE-T: *GOLD Event* | | | | |

# Sunday, November 18

**09:00 - 09:30**

**RE-S: Registration**

**09:30 - 10:00**

**OC-S0P: Opening Ceremony**

Chair: Yu Yuan (IBM Research - China, P.R. China)

9:30

Opening remark by
Stephen Dukes (President, IEEE Consumer Electronics Society);

Opening remark by
Stefan Mozar (VP Conferences and President-Elect, IEEE Consumer Electronics Society)

**10:00 - 12:00**

**RS-S1D: Image & Video Processing**

Room: Daisy
Chair: Xin Wang (Graduate School at Shenzhen, Tsinghua University, P.R. China)

10:00 *Weighted Bilateral Filter - A New Image Filter for Noise Removing and Detail Information Preserving*
Chen Shen (Nanjing University of Posts and Telecommunications, P.R. China); Zongqing Lu (Tsinghua University, P.R. China)
A new kind of adaptive image filter - Weighted Bilateral Filter (WBF) has been shown in this paper. The WBF can perform as a detail information-preserving smoothing and Gaussian noise removing filter like the Bilateral Filter (BF), meanwhile it can remove the impulse noise as Order-Statistic Filter (OSF) or nonlinear filter do. Derived from the Bilateral Filter, the coefficient of WBF is combined by geometric closeness and color value similarity among the pixels, and a weighted coefficient which is determined by whether the pixel is polluted by impulse noise. By analyzing Clifford Algebra, we can present the color difference between two color pixels in Clifford Algebra form, which can be applied in the color image processing of WBF, instead of operating on the three bands of a color image separately. WBF combines the advantage of BF and OSF, and it is local, no iterative, simple and adaptive.

10:30 *Table Image Registration Based On Gradient Projection*
Zhanlong Hao (Graduate School at Shenzhen, Tsinghua University, P.R. China); Youbin Chen (Graduate School at Shenzhen, Tsinghua University, P.R. China)
In this paper, we present an efficient and robust algorithm for document image registration, especially for table images. The projection-based method reduces the calculation complexity while also loses some information of the original image. The contribution of this paper is that our proposed method enhances the useful information in the projection using the image gradient feature. Besides, the rate of similarity (ROS) is presented to estimate

the similarity between two images. Results of experiment show the practicality and efficiency of our proposed method.

11:00    *A Novel Hybrid Human Detection System*

Gang Zheng (Graduate School at Shenzhen, Tsinghua University, P.R. China); Youbin Chen (Graduate School at Shenzhen, Tsinghua University, P.R. China)

This paper describes a novel system for hybrid human detection. The detection is based on combined human models, such as head-shoulder model, face model, skin color model, hair model, and histogram of oriented gradients (HOG) model. Adaboost technique is adapted to build a strong classifier to integrate multiple human models as listed above. Our system consists of three parts. First, moving regions are detected and segmented from the input video sequence using improved mixture of Gaussian models (GMM) [1]. We improve the conventional GMM method by eliminating smearing effect, caused by slowly moving objects, and accelerating the process of GMM method. Second, shadows are removed by adopting shadow pattern in HSV color space. Third, our hybrid human models are used to detect humans in the pre-segmented moving regions. A real-time system has been implemented to segment and classify objects. Examples of object classification (humans, running dogs, vehicles) are provided in this paper. Experimental results show that our hybrid models can effectively detect humans in video sequences from fixed monocular color or grayscale camera, and robust to observation noise, lighting changing, etc.

11:30    *Background Suppressed Shapelet Features Used for Vehicle Detection*

Congli Song (Graduate School at Shenzhen, Tsinghua University, P.R. China); Youbin Chen (Graduate School at Shenzhen, Tsinghua University, P.R. China)

In this paper, we address the problem of detecting vehicles in road surveillance videos. An algorithm for learning background suppressed shapelet features, a set of middle-level features, is proposed. This new algorithm is based on motion detection [1-10] and learning shapelet features [18]. First, moving objects are detected; then, background suppressed shapelet features are extracted to train a classifier which classify those objects into two classes: vehicles and non-vehicles. The difference between background suppressed shapelet features and original shapelet features is that the former one utilizes some background suppression techniques to suppress the gradients in the background areas to eliminate the influence of those gradients while the latter one does not. Experimental results show that our algorithm outperforms the original shapelet algorithm.


**RS-S1P: Internet of Things**


Room: Peony

Chair: Zhe Chen (Northeastern University, P.R. China)

10:00    *Adaptive Modulation in Public Transport Network System with Network Coding*

Scott Carr Ken Lye (Universiti Malaysia Sabah, Malaysia); Shee Eng Tan (Universiti Malaysia Sabah, Malaysia); Zhan Wei Siew (Universiti Malaysia Sabah, Malaysia); Yit Kwong Chin (Universiti Malaysia Sabah, Malaysia); Kenneth Tze Kin Teo (University Malaysia Sabah & Modelling, Simulation & Computing Laboratory, Malaysia)

The complexity and function of transportation are evolving following the advancement in technology. This phenomenon is correlated to the needs of transportation users and also the requirement to develop new and safer transportation which will ease the commuting process. Using communication technology, transportation systems gain an added advantage on top of its conventional purpose. The technology of communications and computing embedded into transportation branches into a field named Intelligent Transportation Systems (ITS). To enable such frameworks, the communication support infrastructure has to be well defined and planned systematically. The integration of communication into transportation systems and vehicles helps broadcast information to help the driver make informed decisions. Users of transportation can also benefit from the updated information regarding routes and options to travel. Besides that, the introduction of wireless sensors will help autonomous systems facilitate public transportation. This paper describes a framework to address the

challenges in public transportation service in campus, more specifically, to improve the smoothness and reliability of service. The communication network can improve the overall efficiency and bring comfort to travellers.

10:30    *Agricultural Environment Information Collection System Based on Wireless Sensor Network*

Zheng Ma (Nankai University & College of Information Technical Science, P.R. China); Xing Pan (Nankai University, P.R. China)

In order to realize intelligent perception, intelligent warning and intelligent decisions-making of the agricultural production environment, this paper introduces an agricultural environment information collection system and designs specialized sensor nodes. This system adopts 渭 C/OS II for multitasking management. For enhancing the performance of the system, optimization in line with demand is applied to the OS. 渭 C/GUI is transplanted to build a friendly touchable graphical user interface. The proposed system integrates technologies of the Micro-Electro-Mechanism System, system on chip, wireless communication and low power consumption embedded technology, realizing the performing of functions of data collection, processing and transmission. Thus real time data collection and test of the temperature, humidity and other environmental information in agricultural greenhouses can be completed. The designed system based on Wireless Sensor Network provides a new approach to the realization of modern intelligent agriculture.

11:00    *The Design and Implementation of BAM Based on Event-driven Technology*

Gang Yang (Northwestern Polytechnical University, P.R. China); Tao Guan (Northwestern Polytechnical University, P.R. China)

Confronted with the problems existing in current enterprise applications: less efficiency in real-time data processing, poor effect in dynamic sense, and less performance of cooperative work, this paper presents a novel BAM model, combining the event-based with service-oriented, to analyze, describe and design the business activity monitoring middleware. Based on the event communication mechanism, It connects each mechanism via service bus and equipped with monitoring the on-line status of enterprise applications and delivering the real-time alert information to some specific users adaptively, so as to improve the flexibility, adaptability and expandability of enterprise computing system.

**RS-S1R: RF & Wireless**

Room: Rose-3

10:00    *Receive Diversity Impact on UE RF Characteristics in LTE System*

Xi Zhu (Beijing University of Posts and Telecommunications, P.R. China); Wei Li (Beijing University of Posts and Telecommunications, P.R. China); Xinning Zhu (Beijing University of Posts and Telecommunications, P.R. China); Chunyan Feng (Beijing University of Posts and Telecommunications, P.R. China); Haiyan Wang (China Academy of Telecommunications Research, P.R. China)

In order to achieve high data rate, Multiple-Input Multiple-Output (MIMO) technology is applied to 3GPP long term evolution (LTE) system with multiple antennas deployed in a LTE user equipment (UE), accordingly a dual-port test method is introduced in the LTE radio frequency (RF) conformance testing for UE, in which a receive diversity gain may be obtained in certain conditions. In this paper, the impact of receive diversity on two typical UE receiver RF characteristics i.e. reference sensitivity level and adjacent channel selectivity (ACS) is investigated, on that basis the modifications of the test parameters are proposed in order to guarantee the validity of the test results. Finally, the simulation results indicate that the inferences about the receive diversity and the analyses of test parameters modification are both reasonable.

10:30    *An Improved M-QAM Signal Recognition Algorithm Based on Clustering Analysis*

Canyan Zhu (Soochow University, P.R. China)

By comparing and analyzing different clustering algorithms for M-ary quadrature amplitude modulation (M-QAM) signals recognition, an improved method is proposed in this paper. The method is implemented based on symmetrical characteristics of constellation diagram and subtractive clustering. Firstly, timing error

estimation and interpolation filtering are employed to recover the signal constellation from received data; then abscissa or coordinate values of the constellation points in two quadrants which are symmetric about the origin are projected onto the horizontal axis or vertical one; finally, clustering analysis is executed with the projected points to identify the M-QAM signals. Simulation results show that the improved method not only identifies the M-QAM signals correctly and effectively, but also saves the computation time. So it is practical for applications.

11:00     *Fuzzy Evaluation Algorithm for System Effectiveness of Wireless Sensor Networks*

Cunxiang Chen (Beijing Institute of Technology, P.R. China); Zunwen He (Beijing Institute of Technology, P.R. China); Jingming Kuang (Beijing Institute of Technology, P.R. China); Jianguang Jia (Beijing Institute of Technology, P.R. China); Zhongyu Zhang (Beijing Institute of Technology, P.R. China)

Evaluation of System Effectiveness (SE) plays a significant role in network design, construction, optimization, etc. of Wireless Sensor Networks (WSNs). This paper develops a rational and comprehensive five-layer indicator model which incarnates SE or monomial efficiency of WSNs. Also, we propose a valid evaluation model HFCE with Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation (FCE), both of which combined together is suitable for hierarchical indicator model and multiattribute decision analysis of WSNs. The results obtained from simulation demonstrate practicability of indicator model and accuracy of evaluation model.

**12:00 - 14:00**

**LB-S: Lunch Break**

**14:00 - 16:00**

**RS-S2D: Image & Video Processing**

Room: Daisy

Chair: Xin Wang (Graduate School at Shenzhen, Tsinghua University, P.R. China)

14:00     *A Review on Vision-Based Pedestrian Detection*

Gang Zheng (Graduate School at Shenzhen, Tsinghua University, P.R. China); Youbin Chen (Graduate School at Shenzhen, Tsinghua University, P.R. China)

This paper describes the state-of-the-art in vision-based pedestrian detection, including pedestrian detection methods, training of classifiers and commonly used pedestrian databases. In this paper, pedestrian detection algorithms are divided into static pedestrian detection and dynamic pedestrian detection, according to the application of motion information. The former is further divided into model-based methods and feature-classifier-based methods. We mainly focus on the feature-classifier-based pedestrian detection. Unlike other surveys in pedestrian detection, we also introduce the newest techniques of training classifiers and some general databases of pedestrian detection. Finally, the pedestrian detection algorithms are discussed and concluded from the viewpoint of visual surveillance. Existing problems and future trends are presented too.

14:30     *Accurately calibrate an embedded 3-D depth perception system*

Jianyang Liu (City University of Hong Kong, Hong Kong); Youfu Li (City University of Hong Kong, Hong Kong)

Small-sized structured light system is immensely potential in extensive application. Using embedded technology for 3-D depth perception system can remarkably reduce system size to make it real-time, portable and convenient. However, the crucial issue for calibrating small-sized projector-camera system is not well solved yet. In this paper, we present an improved systematic calibration method focusing on accurate calibration of a small-sized 3-D depth perception system. In this system, the projector and camera are fixed at a short baseline. We identify that the degradation of precision mainly results from the limitation of pixel discrimination

of depth data. Due to the inherent problem, we describe an improved calibration method which incorporates Phase Shifting mechanism into Gray Code structured light patterns. Using this method, a sub-pixel point correspondence between image plane and projector plane can be established with the help of an easy planar board. For each sub-pixel point pair, a three dimension Depth Data Box (DDB) is created via triangulation method. The accurate depth points in DDB are obtained using maximum likelihood estimation method. Then we can calibrate the camera and projector simultaneously using these target 3-D points and corresponding sub-pixel points on the camera/projector image plane. Some experiments results are presented to demonstrate the performance of this method.

15:00    *Fast DCT-based Image Saliency Detection*

Xiaoshan Yang (Beijing Institute of Technology, P.R. China); Jianbing Shen (Beijing Institute of Technology, P.R. China); Chao Liang (Beijing Institute of Technology, P.R. China); Yun Zhu (Beijing Institute of Technology, P.R. China)

Saliency map detection is fundamental to many image and video processing, such as the applications of image and video re-targeting, retrieval and segmentation. However, highly accurate image saliency map detection algorithms are also very computationally expensive, which limits their applicability, even for offline batch processing. In this work, we examine the frequency domain algorithms for accelerating the saliency map detection with selecting fewer DCT coefficients. We combine the context-aware detection approach with the efficient nearest neighborhood search strategy into a fast implementation. The runtime of the proposed approach is reduced from one minute to several seconds, and the created saliency map achieves the similar visual-quality.

15:30    *Superpixels using Random Walker*

Yunfan Du (Beijing Institute of Technology, P.R. China); Jianbing Shen (Beijing Institute of Technology, P.R. China); Xuemin Yu (Beijing Institute of Technology, P.R. China); Dapeng Wang (Beijing Institute of Technology, P.R. China)

In this paper, we present a novel image superpixel approach using random walker algorithm. Our method begins with downsampling the input image with a sampling factor, and then we initialize the seed positions and run the random walker algorithm on the low-resolution image to reduce the computational complexity. Finally, we upsample the probabilities to obtain the superpixels boundaries of the full resolution image. The experimental results show that the superpixels by our method achieve the better performance than the result by the previous superpixel segmentation method.

**RS-S2P: Internet of Things**

Room: Peony

Chair: Jingxin K. Wang (Harbin Institute of Technology, P.R. China)

14:00    *A Multi-hop and Load Balanced Routing Protocol Oriented to the Neighbors of the Sink for Wireless Sensor Networks*

Chunping Wang (Zhejiang University of Technology, P.R. China)

In wireless sensor networks with multi-hop routing protocols, the direct neighbors of the sink play a dominant role on the network lifetime. The funneling effect and the imbalance load phenomenon existing in the neighbors of the sink may lead to unnecessary energy consumption and shorten the network lifetime. To overcome the imbalance phenomenon, a load-balanced routing protocol based on the data path was proposed. The data path starts with a sensor node and ends with a direct neighbor of the sink. During the process of data gathering, multiple data paths will be constructed to balance the loads of all the neighbors of the sink. Experiments showed our protocol can well deal with the imbalance phenomenon and effectively lengthen the network lifetime.

14:30    *Lightweight Authentication scheme for wireless sensor networks*

Chih-Hung Huang (I-Shou University, Taiwan); Hsuan-Hsun Wu (I-SHOUU University, Taiwan); Yu-Jung Huang (I-Shou University, Taiwan); Wei Lin (I-Shou University, Taiwan); Chung-Long Pan (I-Shou University,

Taiwan); Shao-I Chu (National Kaohsiung University of Applied Sciences, Taiwan); Po-Ying Chen (I-Shou University, Taiwan)

This paper presented a lightweight mutual authentication protocol for wireless sensor network (WSN) applications. The transmitted data are protected with a proposed encryption function which only requires simple exclusive-OR (XOR) arithmetic operations. The advantages of the present proposed scheme not only provide low computational cost but also allow legitimate users can freely change their own passwords.

15:00    *Distributed Beamforming with Uniform Circular Array Formation in Wireless Sensor Networks*

Chen How Wong (Universiti Malaysia Sabah, Malaysia); Zhan Wei Siew (Universiti Malaysia Sabah, Malaysia); Aroland Mconie Jilui Kiring (Universiti Malaysia Sabah, Malaysia); Hoe Tung Yew (University Malaysia Sabah, Malaysia); Kenneth Tze Kin Teo (University Malaysia Sabah & Modelling, Simulation & Computing Laboratory, Malaysia)

Collaborative beamforming (CB) has been introduced in the context of wireless sensor networks (WSNs) to enhance the communication range and energy efficiency of the networks. CB relies on a subset of nodes in the network which acts as a virtual antenna array to collectively transmit a common signal to an intended location. Due to random deployment of the sensor nodes in the networks, proper selection of participating nodes to perform distributed CB is vital to achieve better array pattern synthesis. Different topologies of the participating nodes will produce different impact on transmission gains. In this paper, a node selection method based on uniform circular array formation is presented. The analysis is carried out with the assumption that the sensor nodes are randomly distributed with uniform distribution. Statistical evaluation on the average beampattern is carried out to demonstrate the behavior and properties of the mainlobe, and sidelobe level (SLL) for the selected scheme.

15:30    *Random Matrix Games in Wireless Networks*

Manzoor Ahmed Khan (TU Berlin, Germany); Hamidou Tembine (Supelec, France)

In this paper we propose an interactive decision- making framework for wireless networks where the outcome is influenced not only by the decisions of the users but also by a random variable. We examine specially the finite players case which we call random matrix games (RMGs). We present different approaches and solutions concepts in such games as well as distributed strategic learning in which each player adjusts her strategy in response to the recent information and signals. The applicability of the proposed framework is illustrated in user-centric network selection under measurement noise.


**RS-S2R: Network Technology & Energy Management**


Room: Rose-3

14:00    *Design of AC-Coupled Circuit for High-speed Interconnects*

Chun-Wei Huang (I-SHOU University, Taiwan); Kai-Jen Liu (I-SHOU University, Taiwan); Yu-Jung Huang (I-Shou University, Taiwan); Ming-Kun Chen (Advanced Semiconductor Engineering Test RD, Taiwan); Yi-Lung Lin (Advanced Semiconductor Engineering, Taiwan)

This paper describes a chip-to-chip circuit design suitable for three-dimensional integrated circuit (3D IC) stacked applications. The proposed AC-Coupled chip-to-chip circuit was simulated using SPICE with TSMC 0.18CMOS 1P6M technology file. The simulation results indicated the proposed circuit is not only with the self-test characteristics but also suitable for 3DIC stacked applications with differential input signals up to 2.5 Gbps.

14:30    *An Efficient SIR-first Adaptive Power Control Method in Cognitive Radio Network*

Kaiwang Lu (Wuhan University of Technology, P.R. China); Liangjun Zhang (Wuhan University of Technology, P.R. China); Jie Yang (Wuhan University of Technology, P.R. China)

Efficient power management is very important in wireless communication network. Cognitive Radio (CR) has been proposed to improve the spectrum utilization by sensing and accessing idle spectrum. However, for CR mobile users with limited battery power, transmitting at high power will increase the interferences and reduce

the lifetime of both users and the network. In this paper, a double-threshold adaptive algorithm based on game theory is used to optimize the power allocation for users in CDMA cognitive radio network. Iterative formula is derived and proved to have Nash Equilibrium solution, by which the power vector of users can be calculated. The experiment results indicate that the proposed power control method has both characters of Sarah Koskie's and Power Balancing algorithm, which ensures all users' SIRs only with little extra power consumption. It maintains the fairness of all CR users, which is more suitable in Qos first networks.

15:00     *Development of a Wireless Device Control Based Mobile Robot Navigation System*

Phey Sia Kwek (Universiti Malaysia Sabah, Malaysia); Zhan Wei Siew (Universiti Malaysia Sabah, Malaysia); Chen How Wong (Universiti Malaysia Sabah, Malaysia); Bih Lii Chua (Universiti Malaysia Sabah, Malaysia); Kenneth Tze Kin Teo (University Malaysia Sabah & Modelling, Simulation & Computing Laboratory, Malaysia)

Tablets are highly functional and flexible platforms to pair with robotic autonomy and navigation control. The advantage of remotely controlling robots using mobile devices is location independence. New research is merging towards more applications for mobile devices and robotics. Specifically, more emphasis is given to the communication technology that connects mobile devices with robots. In this paper, the design and development of a mobile robot system with tablet is presented in detail. The wireless communications interfaced between the microcontroller, computer and tablet is described. The user is able to navigate the mobile robot to travel through points of interest via a GUI interface on the tablet.

**16:00 - 16:15**

**TB-S: Tea Break**

**16:15 - 18:15**

**RS-S3D: Smart Grid, Power Systems and Renewable Energy**

Room: Daisy

16:15     *A Battery Management Scheme for Versatile Power Transfer in Smart Microgrids*

Hyojoon Bae (DGIST, Korea)

A hybrid energy system consisting of wind turbines, photovoltaic (PV) arrays and battery storage interconnected via a common DC bus, is one of the key building block of smart microgrids. Such hybrid systems have a wide variety of applications ranging from homes and buildings to factories thanks to its capability of reducing the electricity cost. In this paper, we present a battery management scheme for hybrid energy systems that allow versatile power transfer as well as improved power quality management in connecting various distributed generators. We first develop a scheme for flexible battery management and then apply a modified hysteresis-based control strategy to our battery management scheme. To demonstrate the effectiveness of our scheme, we implement a MATLAB/Simulink framework to model and simulate our scheme under a 100-kW hybrid system scenario.

16:45     *Measurement Denoising Using Kernel Adaptive Filters in the Smart Grid*

Zhe Chen (Northeastern University, P.R. China); Robert Caiming Qiu (Tennessee Tech University, USA)

State estimation plays an important role in the smart grid. Conventionally, noisy measurements are directly used for state estimation. Today, in the context of the smart grid, security becomes more important. False data or malicious data could be injected to compromise the smart grid system. In this paper, a measurement denoising module is proposed for denoising measurements and filtering out random false or malicious data ahead of state estimation. The measurement denoising module can suppress not only noises, but also random false or malicious data. Moreover, the emerging kernel adaptive filters are proposed to be applied to measurement

denoising. Simulation results show that kernel adaptive filters perform better in denoising measurements and filtering out random false or malicious data.


**RS-S3P: Enabling Technology**


Room: Peony

16:15    *Design and Development of a Tablet Based Real Time Wireless Data Logger*

Zhan Wei Siew (Universiti Malaysia Sabah, Malaysia); Chen How Wong (Universiti Malaysia Sabah, Malaysia); Shee Eng Tan (Universiti Malaysia Sabah, Malaysia); Hou Pin Yoong (Universiti Malaysia Sabah & Centre of Materials & Minerals, Malaysia); Kenneth Tze Kin Teo (University Malaysia Sabah & Modelling, Simulation & Computing Laboratory, Malaysia)

To date, data loggers are getting more implementation in business and home applications compare with several years ago. Data loggers can be customized according to the application requirement based on the available resources in the market. Thus, this creates a cost effective solution for the end user. In this paper, a wireless data logger with remote control capability via PC and tablet is introduced. The proposed wireless data logger is developed using microcontroller with analog-to-digital converter (ADC). The design of the portable wireless data logger is compact and light to increase the mobility and usability. Sampled data with time stamp from real time clock (RTC) module will be stored into SD memory card which is attached to controller board. Wireless data logger can directly transmit the data to end user if the device is in the communication coverage or stored the data into memory card if it is out of range. Graphic user interface (GUI) developed using Visual Basic and Android application. These applications can communicate with wireless data logger through wireless XBee module and Bluetooth module. End user can change the data logger settings such as, data sampling frequency, date and time remotely.

16:45    *Data Security and Authentication in Hybrid Cloud Computing Model*

Jingxin K. Wang (Harbin Institute of Technology, P.R. China); Xinpei Jia (Harbin Institute of Technology, P.R. China)

With the progress and mature of cloud computing technology, the social demand for cloud computing is growing. Meanwhile the demand of data security is increasing sharply, especially in hybrid cloud computing model. This paper describes several methods to protect user data, which includes single encryption, multi-level virtualization, authentication interface. Authentication intercloud is the other main theme of this paper. This paper also discussed a model of authentication intercloud which based on CA and PKI model which be extended to the scenario without CA system or it crashed.


**RS-S3R: ICT and Electronics for Healthcare**


Room: Rose-3

Chair: Ezendu Ifeanyi Ariwa (London Metropolitan University, United Kingdom)

16:15    *Portable Low Cost Electrocardiogram Ambulatory Support System For Cardiologists*

Syed Akbar Raza Naqvi (National University of Science and Technology-Military College of Signals, Pakistan); Shariq Rafiq Khan (University Of Engineering and Technology, Taxila, Pakistan); Waqas Hassan (University Of Engineering and Technology, Taxila, Pakistan); Cheng Yi (Guangdong University of Technology, P.R. China)

A portable ECG based system has become an important area of research in tele-medicine applications. A low cost ECG machine with its implementation to address the need for on-line health care has been presented in this paper. This paper attempts to achieve the same functionality as a traditional ECG machine but based on three leads and a wireless transceiver system, hence reducing the size and cost as compared to a 12-lead ECG machine. The live data was obtained on the PC using a sound card oscilloscope. This paper will also discuss in detail how ECG signals from the body are obtained and are amplified and sent to the PC for analysis.

16:45     *Digital Mammogram Segmentation Based on Normalized Cuts*

Liang Liu (NanYang Medical College, P.R. China); Feng Zeng (NanYang Medical College, P.R. China)
Mammography is the most effective method for the early diagnosis and treatment of breast Cancer diseases. As mammograms are complex images, accurate segmentation of breast masses plays a crucial role in computer-aided mammography screening systems. Segmentation of the breast region from the background is made difficult by the tapering nature of the breast, such that the breast contour lies in between the soft-tissue and the non-breast region. In this paper, a novel mammogram segmentation method is proposed based on normalized cuts algorithm. We extracted three important features from the multi-channel grayscale information and the texture features of mammogram, by the statistical analyses of the surface observation. Having set up the weight matrix by those features, we use the spectral graph theoretic framework of normalized cuts to find partitions of the mammogram. The proposed method has been tested on standard digital mammograms obtained from standard database. The results obtained are quite good.

17:15     *Parallelizing Ultrasound Image Processing using OpenMP on Multicore Embedded Systems*

Lei Huang (Prairie View A & M University, USA); Sunita Chandrasekaran (University of Houston, USA); Eric Stotzer (University of Houston, USA); Barbara Chapman (University of Houston, USA); Hangjun Yi (University of Houston, USA)
The shift towards multicore architectures poses significant challenges to the programmers. Unlike programming on single core architectures, multicore architectures require the programmer to decide on how the work needs to be distributed across multiple processors. In this contribution, we analyze the needs of a high-level programming model to program multicore architectures. We use OpenMP as the high-level programming model to increase programmer productivity, reduce time to market and development/design costs for these systems. In this work, we have explored the medical ultrasound application using OpenMP on a TI-based Tomahawk platform that is a six-core, high performance multicore DSP system. This application is heavily based on image processing and the goal is to achieve desired level of image quality. We have explored the different cache configurations of the system. In this process, we were able to study the performance impacts of data locality when data objects are placed into different components of the Tomahawk memory system.

# Monday, November 19

**09:00 - 09:30**

**RE-M: Registration**

**09:30 - 12:00**

**PS-M1B: Plenary Session**

Room: Bougainvillea
Chairs: Chun Yuan (Tsinghua University, P.R. China), Yu Yuan (IBM Research - China, P.R. China)

9:30

Opening remark by
Stephen Dukes (President, IEEE Consumer Electronics Society)

Opening remark by
Wang Xuewei (Vice Chairman of China Hi-Tech Fair; Vice Chairman of Shenzhen CPPCC)

Opening remark by
Stefan Mozar (VP Conferences and President-Elect, IEEE Consumer Electronics Society)

10:00
"Storing Your Life, You're Part of the Zetabyte Future" by
Thomas Coughlin (VP Operations and Planning, IEEE Consumer Electronics Society; Director-Elect, IEEE Region 6)

10:30
"A New and Very Efficient Way to Implement Analog-to-Digital Converter" by
Nicholas Vun (Co-founder, IEEE Consumer Electronics Society Singapore Chapter; Associate Editor, IEEE Consumer Electronics Magazine; Associate Professor, Nanyang Technological University, Singapore)

11:00
"Strategy and Investigation of Intellectual Property in Consume Electronics" by
T. Gary Yip (Investigator - Intellectual Property in Electronic Systems; Consultant - Product Analysis and System Integration)

11:30
"Cloud Computing and Standards" by
Stephen L. Diamond (Chair, IEEE Cloud Computing Initiative; General Manager, Industry Standards Office, EMC)

**12:00 - 14:00**

**LB-M: Lunch Break**

**14:00 - 16:00**

**PS-M2B: Plenary Session**

Room: Bougainvillea
Chairs: Nicholas C H Vun (Nanyang Technological University, Singapore), Zhenkun Wen (Shenzhen University, P.R. China)

14:00
"Technology Challenges for Cellular Wireless Communications" by
Larry Zhang (Past President, IEEE Consumer Electronics Society; Member, IEEE Spectrum Chinese Edition Advisory board)

14:30
"UL2755, the New Safety Standard for Containerized Data Center (New Engine to Boost Cloud Services)" by
Chris CH Lin (Global Business Development Manager for Computers and Peripherals product categories, UL; Greater China BDM for all High-Tech product categories, UL)

15:00
"New Challenges in Vehicular Systems" by
Jinshi Zhang (General Manager, Redflag Software Co. Ltd. Embedded Division)

15:30
"DSP Technology or Consumer Electronics Devices, who is leading Consumer?" by
Sharon Peng (Treasurer, IEEE Consumer Electronics Society; Principal Video Engineer and Digital Hardware Manager, Harman)

**16:00 - 16:15**

**TB-M: Tea Break**

**16:15 - 17:15**

**PS-M3B: Plenary Session**

Room: Bougainvillea
Chair: Rong Yan (IBM, P.R. China)

16:15
Distinguished Lecture: "'A Day Made of Glass' - A Vision for an Enabled Future: Challenges and Opportunities" by

Zachi Baharav (Distinguished Lecturer, IEEE Consumer Electronics Society; Researcher, Corning West Technology Center, Corning Incorporated)

16:45
Finale keynote by
Stefan Mozar (VP Conferences and President-Elect, IEEE Consumer Electronics Society)

**17:15 - 18:15**

**AC-M4B: Awards Ceremony**

Room: Bougainvillea
Chairs: Stephen Dukes (Consultant, USA), Stefan Mozar (CQ University, Sydney International Campus & Dynexsys Pty Ltd, Australia), Yu Yuan (IBM Research - China, P.R. China)

**19:00 - 20:30**

**RD-M: Reception Dinner**

Chair: Yu Yuan (IBM Research - China, P.R. China)

# Tuesday, November 20

**09:00 - 09:30**

**RE-T: Registration**

**09:30 - 12:00**

**SS-T1D: Next Generation ICT for Consumer Applications - Enabling Technology**

Room: Daisy

9:30        "Are Printed Circuit Board Assemblies Being Over Tested?" by
Stefan Mozar (CQ University, Australia)

10:00        *Micro-scale Cu Metallization on Polyimide Substrate for High-speed Interconnects*
Ya-Hui Tseng (I-SHOU University, Taiwan); Yu-Jung Huang (I-Shou University, Taiwan); Ming-Kun Chen
(Advanced Semiconductor Engineering Test RD, Taiwan); Yi-Lung Lin (Advanced Semiconductor Engineering,
Taiwan)
The present study can be applicable to fine wire interconnections, particularly for high-speed solutions in 3D
packaging. The fine traces with 50 micron pitch (25 碌 m line /space) built on a flexible 50 micron thick
polyimide film using wet fabrication process are reported in this paper. The thick copper (Cu) layer was
obtained from the Cu plating process using evaporated ultra-thin layer of Cu as the adhesion layer between Cu
and a Polyimide (PI). The fabricated fine-pitch pattern is inspected for further failure analysis using scanning
electron microscope (SEM) and energy-dispersive spectrometry (EDS) technologies. The experiment is
conducted to study the effect of the process parameters on the Cu film surface properties. The results obtained
in this work can be applied to the fabrication of flexible high-speed interconnection devices.

10:30        *An HMM-based Cantonese Speech Synthesis System*
Xin Wang (Graduate School at Shenzhen, Tsinghua University, P.R. China); Zhiyong Wu (Graduate School at
Shenzhen, Tsinghua University, P.R. China)
This paper describes a Cantonese HMM-based speech synthesis system (HTS) using the general architecture of
Crystal - a multilingual text-to-speech (TTS) framework developed in Tsinghua University. The generated
synthesis engine of HTS has advantage of small footprint, the size of which is less than 7M bytes, and can be
easily ported to embedded electronic devices such as smart-phones, set-top boxes, etc. Furthermore, the quality
of the synthetic speech can be easily characterized by modifying the synthetic acoustic parameters of the
proposed system. The result shows noticeable improvement in naturalness and smoother transition than the
corpus-based unit-selection concatenative speech synthesis approach.

11:00        *A Time Domain SLM for PAPR reduction in SC-FDMA Systems*
Ahmad Mohammad (Ainshams University, Egypt)
Single carrier frequency division multiple access (SC-FDMA) has not only utilized the single carrier
modulation, frequency domain equalization, and has the most features of OFDMA, but also, it has an
outstanding feature. It is the lower PAPR due to its single carrier structure. However, localized frequency
division multiple access (LFDMA) still need more PAPR reduction since pulse shaping does not affect much on
PAPR performance for (LFDMA). In this paper, we propose a scheme that's utilizing the selective mapping
technique, which consider a distortionless PAPR reduction scheme in multicarrier systems. Afterwards, we
numerically discuss the PAPR characteristics using the complementary cumulative distribution function (CCDF)

of PAPR. The results demonstrate that SC-FDMA signals, which use (TD-SLM), indeed have a significant reduction in PAPR compared to those, which do not use. For long term, we also prove numerically that the only thing effect on the PAPR performance is the number of phase, and the phases' values do not effect on the PAPR performance by any mean.

**SS-T1J: Next Generation ICT for Consumer Applications - Communications & Networking**

Room: Jasmine

09:30　　*Adaptive Frequency Reuse in Two-hop Cellular System with Fixed Relay Nodes*

Yi Wang (Chong Qing University of Posts and Telecommunication & CHONG QING ELECTRIC POWER RESEARCH INSTITUTE, P.R. China); Xingzhe Hou (Chong Qing Electric Power Research Institute, P.R. China); Hongliang Sun (Chong Qing Electric Power Research Institute, P.R. China); Yong Xiang Liu (Chong Qing Electric Power Research Institute, P.R. China); Ke Zheng (Chong Qing Electric Power Research Institute, P.R. China); Jing Ji (Chong Qing Electric Power Research Institute, P.R. China)

In this paper we investigate dynamic frequency reuse scheme for cellular system enhanced with two-hop fixed relay station (RS). Frequency reuse can increase spectrum efficiency. However, it will also introduce more interference. In order to reuse more frequency resources with satisfactory quality of service (QOS), we propose an adaptive frequency reuse scheme according to the desired interference level. Both inter-cell and intra-cell reuse are considered. No interference measurement is needed, the signaling overhead is reduced. Numerical results show that in our proposed scheme the signal to interference ratio (SIR) performance on the cell edge is improved significantly, the spectrum efficiency is also increased.

10:00　　*A Novel Bridge over Intersecting Node Routing Protocol for Cognitive Radio Ad-Hoc Networks*

Ahmad Mohammad (Ainshams University, Egypt)

In this paper, we present a novel routing protocol called, Bridge over Intersecting Node, BoIN. This scheme's main goal is maximizing the end-to-end throughput for cognitive radio ad-hoc networks, CRAHNs.

10:30　　*Full-Wave Analysis of Non-Radiative Wireless Power Transmission System in Half Space*

Yong Xiang Liu (Chong Qing Electric Power Research Institute, P.R. China); Yinglu Zhou (Chong Qing Electric Power Corporation, P.R. China); Xingzhe Hou (Chong Qing Electric Power Research Institute, P.R. China); Yi Ren (Chongqing University of Post and Communications(CQUPT), P.R. China); Yi Wang (Chong Qing University of Posts and Telecommunication & CHONG QING ELECTRIC POWER RESEARCH INSTITUTE, P.R. China)

This article studies the property of wireless power transmission (WPT) system by electromagnetic full-wave simulation method when half-space condition is considered. Specially, the Time Domain Integral Equation (TDIE) is applied in this simulation. With this time domain method, the WPT without the ground is analyzed and compared with the traditional method, which has demonstrated the validity and high efficiency of this simulation method. After that, TDIE is applied to analysis the impact of infinite ground to the performance of WPT system which is a common situation when the WPT system is applied. The simulation results demonstrate that the ground will increase the resonant frequency and decrease the efficiency seriously. Besides, the ground will also bring along the split of resonant frequency in the traditional under coupled area.

**SS-T1P: Next Generation ICT for Consumer Applications - Smart & Connected Applications**

Room: Peony

Chair: Zhe Chen (Northeastern University, P.R. China)

09:30　　*Innovation of automated video surveillance system by smart external interface*

Zhou Wu (Tsinghua University, P.R. China); Chun Yuan (Tsinghua University, P.R. China); Qinghao Ceng (Shenzhen Teamway Electric CO., LTD, P.R. China); Delei Zhang (Shenzhen Teamway Electric CO., LTD, P.R. China)

Automated video surveillance (AVS) is now adopted in wide scope of scenario. However, they are mostly insufficient in the aspects of expansibility, where flexible interface with various requirements outside the AVS is required. In this paper, we provide an innovated AVS framework with external accessing interface which achieves smart interactions among server, user and device.

10:00     *Terminal player controlled by server XML based on STBSP board*

Qiang Zhang (Tsinghua University, P.R. China); Chun Yuan (Tsinghua University, P.R. China); Bai CaiXia (Tsinghua University, P.R. China); Lv WenZheng (STMicroelectronics(Shenzhen) R&D Co., Ltd, P.R. China); Kun Li (STMicroelectronics(Shenzhen) R&D Co., Ltd, P.R. China); YiHeng Liu (STMicroelectronics(Shenzhen) R&D Co., Ltd, P.R. China); Gang Wang (STMicroelectronics(Shenzhen) R&D Co., Ltd, P.R. China)

The paper presents a distributed multimedia application system, where server automatically controls numerous multimedia clients by means of distributing XML files containing multimedia function instructions. In the system, several techniques are adopted and implemented such as STBSP Class complement 锛變 irectFB library, xml parser, network and FTP server. STMicroelectronics' STBSP is adopted as client development platform. The system has well prospect in distributed advertisement application and other distributed multimedia applications.

10:30     *One-Touch Caching for Content Delivery in Wireless Consumer Networks*

Jihoon Sung (KAIST, Korea); Sangsu Jung (National Institute for Mathematical Sciences, Korea)

As consumer traffic rapidly increases, content caching becomes common in intermediate nodes for rapid content transportation reducing content-trip delay. Compared with wired content caching systems, wireless caching systems require a lighter-weight caching mechanism because of limited processing capability. In this paper, we address that one-touch caching just keeping the most-recently requested content and replacing a random content among existing contents for storage of the new content significantly enhances caching performance with little computational overhead. Through simulation results, it is demonstrated that our scheme shows hit-ratio comparable to LFU (least-frequently-used) and LRU (least-recently-used) caching strategies.

11:00     *An Autonomous Recovery Software Module for Protecting Embedded OS and Application Software*

Kuen-Long Lu (National Central University, Taiwan); Yung-Yuan Chen (National Taipei University, Taiwan); Yang-Lun Kuo (National Taipei University, Taiwan)

Embedded systems have been widespread for novel technologies which bring people more convenience and hence become more relevant to our life. When embedded systems are utilized on safety-critical applications, their availability and reliability issues must be addressed and systems must be protected by effective techniques. One primary cause of the embedded system crash is the data corruption error. In this study, the embedded system crashes caused by data corruption errors are resolved by an autonomous recovery software methodology (ARSM). ARSM is composed by system monitor, bad block salvage, autonomous recovery mechanism and OS initial backup. ARSM performs all-operation system monitoring. Once any application software and operation system crash is detected, the autonomous recovery mechanism will be activated to recover the embedded system back to normal operation. For verification of the ARSM, we adopt a car event data recorder to be the case demonstration, and generate data corruption errors to validate the efficiency of the ARSM.

**SS-T1R: Next Generation ICT for Consumer Applications - Multimedia & Human-Device Interaction**

Room: Rose-3

09:30     *Efficient Rendering and Cache Replacement Mechanisms for Hierarchical Tiling in Mobile GPUs*

Chih-Chieh Hsiao (Chung Yuan Christian University, Taiwan); Slo-Li Chu (Chung Yuan Christian University, Taiwan); Shang-Shun Dai (Chung Yuan Christian University, Taiwan)

The 3D rendering capabilities are now widely available in the consumer electronics devices because the consumer applications usually use it for superior user experience. However, those rendering capabilities have been very limited because the resources of these devices are limited; small amounts of memory, less bandwidth,

and limited energy consumption. Therefore, the tile-based rendering becomes prevalent in mobile GPUs for consumer electronic devices. In the tiled systems, a hierarchical tiling technique is used to further reduce bandwidth requirement. However, the hierarchical tiling has very high locality when multi-core GPUs are adopted which is not well exploited. Therefore, this paper proposes a block-based rendering sequence and a multi-core locality-aware cache replacement (MLCR) mechanism to utilize this locality. The results show the proposed mechanism reduces cache miss rates from 46.78% to 38.06% when block-based rendering sequence is used with conventional cache replacement. The miss rate can be further reduced to 35.98% when incorporate proposed sequence with MLCR. Furthermore, the implementation cost is analyzed and shows the proposed mechanism is affordable in a consumer electronics device and improves performance of consumer applications with 3D graphics.

10:00    *Implementation of Image Segmentation on Foetus Ultrasound Imaging System*

Mei Yeen Choong (Universiti Malaysia Sabah, Malaysia); May Chin Seng (Universiti Malaysia Sabah, Malaysia); Yit Kwong Chin (Universiti Malaysia Sabah, Malaysia); Soo Siang Yang (Universiti Malaysia Sabah, Malaysia); Kenneth Tze Kin Teo (University Malaysia Sabah & Modelling, Simulation & Computing Laboratory, Malaysia)

Obstetrics ultrasound scan has been a vital routine for a pregnant mother to get information on the foetus dating and growth. Foetus ultrasound image is normally not clear and contains unwanted noise. Furthermore, the displayed foetus scan on the monitor screen can be not in complete stationary because of the slight movement of the held ultrasound probe. Thus, a computerized method to do segmentation on the foetus image should be implemented. To obtain precise measurements, obstetrician needs to freeze the best possible scene throughout the scanning session. With the segmentation technique implemented, the point locations for measurement can be generated without the participation of the obstetrician. In this paper, the applied segmentation technique is variational level set algorithm. Based on the segmentation results, the level set contour evolved well on the ultrasound image although it is low in contrast and contains image noise.

10:30    *GPU_CPU based parallel architecture for reduction in power consumption*

Xiang Jun Zhao (Konkuk University, Korea); Yong Beom Cho (Konkuk University, Korea)

Real-time and power management are required for high quality video in mobile environment. This paper presents a GPU(graphics processing unit) based parallel architecture for Multi-view Video (MVC) decoder which reaches these requirements. The 3D video based on stereo or multi-view representation is becoming widely popular. Real-time decoding of such video is an important concern as the number and spatial/temporal resolution of views increase. Significant improvement in video compression capability has been demonstrated by using H.264/Advanced Video Coding (AVC) standard. Multi-view video (MVC) is the extension of H.264/AVC. In this paper, we proposed MVC decoder architecture based on parallel combination of Cortex-A8 processor and GPU (graphics processing unit). The basic operations are performed by the processor while the motion compensation (MC) feedback loop of the decoder is moved to GPU in order to achieve decoding efficiently. The experimental results show that compared to general implementation, the proposed parallel processing of a particular task in an embedded system can reconstruct the target images with higher quality with reduced processing time and energy saving with almost the same compression performance.

11:00    *An Online Speech Driven Talking Head System*

Kai Zhao (Graduate School at Shenzhen, Tsinghua University, P.R. China); Zhiyong Wu (Graduate School at Shenzhen, Tsinghua University, P.R. China); Jia Jia (Tsinghua National Laboratory for Information Science and Technology, P.R. China); Lianhong Cai (Tsinghua University, P.R. China)

This paper presents the design and implementation of an online speech driven talking head animation system. The system first recognizes phoneme sequence from the input speech with a Chinese Mandarin speech recognizer. The phoneme sequence is further transformed to a sequence of visemes. The sequence of MPEG-4 facial animation parameters (FAPs) is further derived from the viseme sequence, and is used to drive the facial animations on a 3-dimentional talking head. The architecture and the major features are also presented in the paper, together with the evaluations of the system.

**12:00 - 14:00**

**LB-T: Lunch Break**

**14:00 - 16:00**

**SC-T2J: IEEE Consumer Electronics Society Shenzhen Chapter meeting (everyone is welcome)**

Room: Jasmine
Chair: Yu Yuan (IBM Research - China, P.R. China)

IEEE Consumer Electronics Society Shenzhen Chapter's first meeting. Everyone is welcome to attend this meeting and join the chapter.

**PW-T2P: Authors' Workshop: How to write papers for IEEE CE Transactions and Magazine**

Room: Peony
Chairs: Thomas Coughlin (Coughlin Associates, USA), Stefan Mozar (CQ University, Sydney International Campus & Dynexsys Pty Ltd, Australia), Nicholas C H Vun (Nanyang Technological University, Singapore)

Meet with editors of the IEEE Transactions on Consumer Electronics and the IEEE Consumer Electronics Magazine:
Thomas Coughlin (VP Operations and Planning, IEEE Consumer Electronics Society; Director-Elect, IEEE Region 6);
Stefan Mozar (VP Conferences and President-Elect, IEEE Consumer Electronics Society);
Nicholas Vun (Co-founder, IEEE Consumer Electronics Society Singapore Chapter; Associate Editor, IEEE Consumer Electronics Magazine; Associate Professor, Nanyang Technological University, Singapore).

**16:00 - 20:00**

**GE-T: GOLD Event**

Chair: Xiaogang Peng (Shenzhen University, P.R. China)

Dear GHTCE 2012 attendees,

If you are graduates of the last ten years, or students about to graduate (IEEE members and non-members), you will be cordially invited to attend the GOLD event at GHTCE 2012.

Join us for a visit to PAOJIAO.cn, a top 3 mobile phone software platform in China and a Cantonese style dinner. We will drop you at a famous place of interest in Shenzhen - "Windows of the World" after dinner. (admission tickets are not included)

Enjoy being outside after spending most of the day in the meeting room,
Get together with fellow researchers and have a good time.

And the best is:
IT IS ALL FOR FREE!

IEEE Consumer Electronics Society wants to bring together the recently graduated members, especially those of the last ten years.
If you have graduated within the last ten years, or you are about to graduate, you are invited to join us.

Sign up by sending an email to Dr. Xiaogang Peng (pengxg@szu.edu.cn) until 10 AM Monday, Nov. 19th.

Please leave your name, and contact information. Confirmation letter with pick-up details will be sent through email by 1 pm Monday, Nov. 19th. We reserved seats for only 15 people. Sign up ASAP!

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